Ordinance No. 122531

Council Bill No. 116034

The City of Seattle - Legislative Department

Council Bill/Ordinance sponsored by: Peter Steinbrueck
Councilmember

An ordinance relating to the Seattle Mechanical Code, amending Chapter 22.400.010 of the Seattle Municipal Code, and adopting by reference Chapters 2 through 9, and Chapters 11 through 15 of the 2006 International Mechanical Code with errata published by the International Code Council, and amending certain of those chapters; adopting a new Chapter 1 related to administration, permitting and enforcement; and repealing Sections 3-55 of Ordinance 121523 and Section 1 of Ordinance 122048.

Committee Action: Pass 3-0
PS, TR, RG

10-1-07 Passed 8-0 (Excused: McIver)

CF No. 308940

Date Introduced: Sept. 24, 2007	
Date 1st Referred:	To: (committee) Urban Development + Planning
Date Re - Referred:	To: (committee)
Date Re - Referred:	To: (committee)
Date of Final Passage: 10-1-07	Full Council Vote: 8-0
Date Presented to Mayor: 10-2-07	Date Approved: 10.11.07
Date Returned to City Clerk: 10.11.07	Date Published: 11.0 T.O. ___ F.T. X
Date Vetoed by Mayor:	Date Veto Published:
Date Passed Over Veto:	Veto Sustained:

This file is complete and ready for presentation to Full Council. Committee: _____ (initial/date)

Law Department

Law Dept. Review	OMP Review	City Clerk Review	Electronic Copy Loaded	Indexed

Vicki Baucom/vb
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ORDINANCE 122531

AN ORDINANCE relating to the Seattle Mechanical Code, amending Chapter 22.400.010 of the Seattle Municipal Code, and adopting by reference Chapters 2 through 9, and Chapters 11 through 15 of the 2006 International Mechanical Code with errata published by the International Code Council, and amending certain of those chapters; adopting a new Chapter 1 related to administration, permitting and enforcement; and repealing Sections 3-55 of Ordinance 121523 and Section 1 of Ordinance 122048.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 22.400.010 of the Seattle Municipal Code is amended as follows:

22.400.010 Adoption of International Mechanical Code.

The Seattle Mechanical Code ((~~shall consist~~)) consists of: 1) the following portions of the ((~~2003~~)) 2006 edition of the International Mechanical Code ((~~as~~)) published by the International Code Council, as amended by City Council by ordinance, and all errata published by the International Code Council after February 1, 2006, ((~~together with the amendments and additions thereto adopted~~)): Chapters 2 through 9, Chapters 11 ((~~, and Chapters 13~~)) through 15, and 2) Chapter 1 relating to administration, permitting and enforcement adopted by City Council ordinance. One copy of the ((~~2003~~)) 2006 International Mechanical Code is filed with the City Clerk in C.F. ((~~306758~~)) 308940.

Section 2. Chapter 1 of the Seattle Mechanical Code is adopted to read as follows:

CHAPTER 1

ADMINISTRATION

SECTION 101

TITLE

101.1 Title. These regulations shall be known as the "Seattle Mechanical Code," may be cited as such, and are referred to herein as "this code." All references to the *International Mechanical Code* contained in this code mean the *Seattle Mechanical Code*.

SECTION 102

PURPOSE

102.1 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, and maintenance or use of heating, ventilating, cooling, refrigeration systems, incinerators and other miscellaneous heat–producing appliances within the City.

The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

SECTION

103 SCOPE

103.1 Applicability. The provisions of this code apply to the erection, installation, alteration, repair, relocation, replacement, addition to, use or maintenance of any heating, ventilating, cooling, refrigeration systems, incinerators or other miscellaneous heat-producing appliances within the City. The design and testing of equipment regulated by this code are subject to the approval of the code official.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane with a separate means of egress and their accessory structures shall comply with the *International Residential Code*.

2. The standards for liquefied petroleum gas installations are the 2004 edition of NFPA 58 (Liquefied Petroleum Gas Code) and the 2006 edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code), as amended.

103.2 Alterations. Additions, alterations, repairs and replacement of equipment or systems shall comply with the provisions for new equipment and systems except as otherwise provided in Section 104 of this code.

103.3 Most restrictive. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. Where there is a conflict between a general requirement and a specific requirement, the specific requirement is applicable.

[W][1]103.4 Conflict with Ventilation Code. In the case of conflict between the ventilation requirements of this code and the ventilation requirements of Washington Administrative Code Chapter 51-13 the Washington State Ventilation and Indoor Air Quality Code (VIAQ) the provisions of the VIAQ govern.

103.5 Referenced codes and standards. The codes and standards referenced in this code are part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply.

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[1] [W] preceding a section number indicates that the section incorporates a provision of the Washington State Mechanical Code.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions apply.

103.6 Appendices. Provisions in the *International Mechanical Code* appendices do not apply unless specifically adopted.

103.7 Metric units. Wherever in this ordinance there is a conflict between metric units of measurement and English units, the English units govern.

SECTION 104

APPLICATION TO EXISTING MECHANICAL SYSTEMS

104.1 Additions, alterations or repairs. Additions, alterations, renovations or repairs may be made to any mechanical system without requiring the existing mechanical system to comply with all the requirements of this code, if the addition, alteration, renovation or repair conforms to the standards required for a new mechanical system. Additions, alterations, renovations or repairs shall not cause an existing system to become unsafe, unhealthy or overloaded.

Minor additions, alterations, renovations, and repairs to existing mechanical systems may be installed in accordance with the law in effect at the time the original installation was made, if approved by the code official.

104.2 Existing installations. Mechanical systems lawful at the time of the adoption of this code may continue their use, be maintained or repaired, be converted to another type of fuel, or have components replaced if the use, maintenance, repair, conversion of fuel, or component replacement is done in accordance with the basic original design and location, and no hazard to life, health or property has been or is created by such mechanical system.

104.3 Changes in building occupancy. Mechanical systems that are a part of a building or structure undergoing a change in use or occupancy as defined in the Building Code shall comply with all requirements of this code that are applicable to the new use or occupancy.

104.4 Maintenance. All mechanical systems, materials, equipment, appurtenances and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards that were required by a code in effect when the mechanical system was installed shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent is responsible for maintenance of mechanical systems and equipment. To determine compliance with this subsection, the code official may cause a mechanical system or equipment to be reinspected.

The fire chief and the code official each have authority to obtain compliance with the requirements of this subsection.

Exception: The code official may modify the requirements of this section where all or a portion of the building is unoccupied.

104.5 Moved buildings. Building or structures moved into or within the City shall comply with standards adopted by the code official. No building shall be moved into or within the City unless, prior to moving, the code official has inspected the building for compliance with this code and the permit holder has agreed to correct all deficiencies found and has been issued a building permit for the work. A bond or cash deposit in an amount sufficient to abate or demolish the building shall be posted prior to issuance of a permit. See Section 117 for information required on plans. Any moved building that is not in complete compliance with standards for moved buildings within eighteen months from the date of permit issuance and is found to be a public nuisance may be abated.

104.6 Historic buildings and structures. The code official may modify the specific requirements of this code as it applies to landmarks and require in lieu thereof alternate requirements that, in the opinion of the code official, will result in a reasonable degree of safety to the public and the occupants of those buildings.

For purposes of this section a landmark is a building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation or has been designated for preservation by the City Landmarks Preservation Board, or that has been designated for preservation by the State of Washington, or has been listed or determined eligible to be listed in the National Register of Historic Places, or is a structure in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of the structure.

SECTION 105

ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION

105.1 Alternate materials and methods. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been approved and its use authorized by the code official. The code official may approve an alternate, provided the code official finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. The code official may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The code official may, but is not required to,

record the approval of alternates and any relevant information in the files of the code official or on the approved permit plans.

SECTION 106

MODIFICATIONS

106.1 Modifications. The code official may modify the provisions of this code for individual cases if the code official finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of fire protection and structural integrity when considered together with other safety features of the building or other relevant circumstances. The code official may, but is not required to, record the approval of modifications and any relevant information in the files of the code official or on the approved permit plans.

SECTION 107

TESTS

107.1 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code or evidence that any material or method of construction does not conform to the requirements of this code, the code official may require tests as proof of compliance, to be made at no expense to the City.

Test methods shall be as specified in this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the code official shall determine the test procedures. All tests shall be made by an approved agency. Reports of such tests shall be retained by the code official.

SECTION 108

JURISDICTION AND POWERS AND DUTIES OF CODE OFFICIAL

108.1 Jurisdiction. The Department of Planning and Development is authorized to administer and enforce this code. The Department of Planning and Development is under the administrative and operational control of the Director, who is the code official.

108.2 Deputies. The code official may appoint such officers, inspectors, assistants and other employees as are authorized from time to time. The code official may authorize such employees as may be necessary to carry out the functions of the code official.

108.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the code official may enter a building or premises at any reasonable time to perform the duties imposed by this code.

108.4 Stop work orders. The code official may issue a stop work order whenever any work is being done contrary to the provisions of this code, or in the event of dangerous or unsafe conditions related to equipment or construction. The stop work order shall identify the violation and may prohibit work or other activity on the site.

108.4.1 Service of stop work order. The code official may serve the stop work order by posting it in a conspicuous place at the site, if posting is physically possible. If posting is not physically possible, then the stop work order may be served in the manner set forth in RCW 4.28.080 for service of a summons or by sending it by first class mail to the last known address of: the property owner, the person doing or causing the work to be done, and the holder of a permit if work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or of personal service, or if mailed, three days after the date of mailing. When the last

day of the period so computed is a Saturday, Sunday or city holiday, the period runs until 5:00 p.m. on the next business day.

108.4.2 Effective date of stop work order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section 108.4.1 is served.

108.4.3 Review by the code official for stop work orders.

108.4.3.1 Any person aggrieved by a stop work order may obtain a review of the order by delivering to the code official a request in writing within 2 business days of the date of service of the stop work order.

The review shall occur within 2 business days after receipt by the code official of the request for review unless the requestor agrees to a longer time.

Any person aggrieved by or interested in the stop work order may submit additional information to the code official for consideration as part of the review at any time prior to the review.

The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

a. Sustain the stop work order;

b. Withdraw the stop work order;

c. Modify the stop work order; or

d. Continue the review to a date certain for receipt of additional information.

108.4.3.2 The code official shall issue an order of the code official containing the decision within 2 business days after the review and shall cause the order to be sent by first class mail to the

person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order. The City and all parties shall be bound by the order.

108.5 Authority to disconnect utilities in emergencies. The code official has the authority to disconnect fuel-gas utility service or energy supplies to a building, structure, premises or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official may enter any building or premises to disconnect utility service. The code official shall, whenever possible, notify the serving utility, the owner and the occupant of the building, structure or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner and occupant of the building, structure or premises in writing of such disconnection immediately thereafter.

108.6 Authority to condemn equipment. Whenever the code official determines that any equipment or portion thereof regulated by this code is hazardous to life, health or property, the code official shall order in writing that such equipment either be disconnected, removed or restored to a safe or sanitary condition, as appropriate. The written notice shall fix a date certain for compliance with such order. It is a violation for any person to use or maintain defective equipment after receiving such notice.

When any equipment or installation is to be disconnected, the code official shall give written notice of such disconnection and causes therefor within 24 hours to the serving utility, the owner and the occupant of the building, structure or premises. When any equipment is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the code official shall institute any appropriate action to prevent, restrain, correct or abate the violation.

108.7 Connection after order to disconnect. No person shall make connections from any energy, fuel or power supply nor supply energy or fuel to any equipment regulated by this code that has been disconnected or ordered to be disconnected by the code official, or the use of which has been ordered to be discontinued by the code official until the code official authorizes the reconnection and use of such equipment.

108.8 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the City, or its officers, employees or agents, for any injury or damage resulting from the failure of equipment to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or 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 by its officers, employees or agents.

This code shall not be construed to lessen or relieve the responsibility of any person owning, operating or controlling any equipment, building or structure for any damages to persons or property caused by defects, nor shall the Department of Planning and Development or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

108.9 Cooperation of other officials and officers. The code official may request, and shall receive so far as is required in the discharge of the code official's duties, the assistance and cooperation of other officials of the City of Seattle.

SECTION 109

UNSAFE EQUIPMENT AND HAZARD CORRECTION ORDER

109.1 Unsafe equipment. Any equipment regulated by this code that constitutes a fire or health hazard or is otherwise dangerous to human life is, for the purpose of this section, unsafe. Any use of equipment regulated by this code constituting a hazard to safety, health or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard, disaster, damage or abandonment is, for the purpose of this section, an unsafe use. Any such unsafe equipment is hereby declared to be a public nuisance and may be abated.

109.2 Hazard correction order. Whenever the code official finds that unsafe equipment exists, the code official may issue a hazard correction order specifying the conditions causing the equipment to be unsafe and directing the owner or other person responsible for the unsafe equipment to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the code official analyzing said conditions and establishing that the equipment is, in fact, safe. The code official may require that the report or analysis be prepared by a licensed engineer. It is a violation of this code for any person to fail to comply with a hazard correction order as specified in this subsection.

SECTION 110

APPEALS

110.1 Appeals to the Construction Codes Advisory Board. Except for where this code provides for review by the code official, appeals of the code official's interpretations of this code may be made to the Construction Codes Advisory Board by sending a request in writing to the code official. The review shall be conducted by three or more members of the Construction Codes Advisory Board, chosen by the Chair. The issue of the appeal shall be taken into account by the Chair when selecting members to hear an appeal. The decision of the review panel is advisory only. The final decision on any appealable matter is made by the building official.

SECTION 111

RESPONSIBILITY FOR COMPLIANCE

111.1 General. Compliance with the requirements of this code is the obligation of the owner of the building, structure or premises, the duly authorized agent of the owner, or other person responsible for the condition or work, and not of the City or any of its officers or employees.

SECTION 112

VIOLATIONS AND PENALTIES

112.1 Violations. It is a violation of this code for any person to:

1. install, erect, construct, enlarge, alter, repair, replace, remodel, move, improve, remove, convert or demolish, equip, occupy, use or maintain any mechanical system or equipment or cause or permit the same to be done in the City, contrary to or in violation of any of the provisions of this code.

2. use any material or install any device, appliance or equipment that is subject to this code and has not been approved by the code official.

3. knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to violate or fail to comply with this code.

4. violate or fail to comply with any final order issued by the code official pursuant to the provisions of this code.

5. remove, mutilate, destroy or conceal any notice or order issued or posted by the code official pursuant to the provisions of this code, or any notice or order issued or posted by the code official in response to a natural disaster or other emergency.

112.2 Notice of violation. If, after investigation, the code official determines that standards or requirements of this code have been violated or that orders or requirements have not been

complied with, the code official may serve a notice of violation upon the owner, agent, 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, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be served by posting it in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail. The notice of violation shall be considered an order of the code official if no request for review before the code official is made pursuant to Section 112.3.

Nothing in this section limits or precludes any action or proceeding to enforce this chapter, and nothing obligates or requires the code official to issue a notice of violation prior to the imposition of civil or criminal penalties.

112.3 Review by the code official for notice of violation

112.3.1 Any person affected by a notice of violation issued pursuant to Section 112.2 may obtain a review of the notice by making a request 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 runs until 5:00 p.m. of the next business day.

The review shall occur not less than ten nor more than twenty days after the request is received by the code official unless otherwise agreed by the person requesting the review.

Any person aggrieved by or interested in the notice of violation may submit additional information to the code official.

112.3.2 The review shall be made by a representative of the code official who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and a site visit. After the review, the code official shall:

1. Sustain the notice; or

2. Withdraw the notice; or

3. Continue the review to a date certain; or

4. Amend the notice.

112.3.3 The code official shall issue an order containing the decision within 15 days of the date that the review is completed and shall cause the order to be mailed by regular first class mail to the persons requesting the review and the persons named on the notice of violation, addressed to their last known address.

112.4 Civil enforcement. Because civil actions to enforce Title 22 SMC are brought in Seattle Municipal Court pursuant to Section 112.5.2, orders of the code official issued under this chapter are not subject to judicial review pursuant to chapter 36.70C RCW.

112.5 Civil penalties.

112.5.1. Any person violating or failing to comply with the provisions of this code is 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 code 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.

112.5.2. Civil actions to enforce this chapter shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of the notice of violation or of an order following a review by the Code official is not itself evidence that a violation exists.

112.6 Alternative criminal penalty. Anyone who violates or fails to comply with any order issued by the code official pursuant to this code or who removes, mutilates, destroys or conceals a notice issued or posted by the code official shall, upon conviction thereof, be punished by a fine of not more than $5000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.

112.7 Additional relief. The code official may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

SECTION 113

RECORDING OF ORDERS AND NOTICES

113.1 Recording. The code official may record a copy of any order or notice with the Department of Records and Elections of King County. The code official may record with the Department of Records and Elections of King County a notice that a permit has expired without a final inspection after reasonable efforts have been made to provide a final inspection.

SECTION 114

RULES OF THE CODE OFFICIAL

114.1 Authority. The code official has authority to issue interpretations of this code and to adopt and enforce rules and regulations supplemental to this code as may be deemed necessary to

clarify the application of the provisions of this code. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of this code.

114.2 Procedure for adoption of rules. The code official shall promulgate, adopt and issue rules according to the procedures specified in the Administrative Code, Chapter 3.02 of the Seattle Municipal Code.

SECTION 115

CONSTRUCTION CODES ADVISORY BOARD

115.1 CCAB committee. A committee of the Construction Codes Advisory Board may examine proposed administrative rules, appeals and amendments relating to this code and related provisions of other codes and make recommendations to the code official and to the City Council for changes in this code. The committee will be called on as needed by the Construction Codes Advisory Board.

SECTION 116

PERMITS

116.1 Permits required. Except as otherwise specifically provided in this code, a permit shall be obtained from the code official prior to each installation, alteration, repair, replacement or remodel of any equipment or mechanical system regulated by this code. A separate mechanical permit is required for each separate building or structure.

116.2 Work exempt from permit.

116.2.1 Mechanical. A mechanical permit is not required for the work listed below.

1. Any portable heating appliance, portable ventilating equipment, or portable cooling unit, if the total capacity of these portable appliances does not exceed 40 percent of the cumulative heating,

cooling or ventilating requirements of a building or dwelling unit and does not exceed 3 kW or 10,000 Btu input.

2. Any closed system of steam, hot or chilled water piping within heating or cooling equipment regulated by this code.

3. Minor work or the replacement of any component part of a mechanical system that does not alter its original approval and complies with other applicable requirements of this code.

116.2.2 Refrigeration. A mechanical permit is not required for the following refrigerant equipment:

1. Any self-contained refrigerating equipment for which an operating permit is not required.

2. Any self-contained refrigeration system that does not exceed three horsepower rating.

116.3 Compliance required. Exemption from the permit requirements of this code does not authorize any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of the City.

116.4 Flood hazard areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard identified in the report entitled "Flood Insurance Study for King County, Washington and Incorporated Areas" and the accompanying Flood Insurance Rate Maps, both filed in C.F. 296948, is subject to additional standards and requirements set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance.

116.5 Emergency repairs. In the case of an emergency, the installation, alteration or repair of any refrigeration system or equipment may be made without a permit, provided that application for a permit is made within the later of twenty-four hours or one working day from the time when the emergency work was started.

SECTION 117

APPLICATION FOR PERMIT AND INFORMATION ON PLANS AND SPECIFICATIONS

117.1 Application. To obtain a permit, the applicant shall first file an application in writing on a form furnished by the Department of Planning and Development for that purpose. Every such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.

2. Describe the land on which the proposed work is to be done by legal description, property address or similar description that will readily identify and definitely locate the proposed building or work.

3. Provide the contractor's business name, address, phone number and current contractor registration number (required if contractor has been selected). To obtain a permit for work on a refrigeration system, the applicant shall also provide the number of the refrigeration contractor license issued by the City.

4. Be accompanied by plans, diagrams, computations and specifications, equipment schedules and other data as required in Sections 117.2 and 117.3.

5. State the valuation of the mechanical work to be done. The valuation of the mechanical work is the estimated current value of all labor and material, whether actually paid for or not, for which the permit is sought.

6. Be signed by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.

7. Give such other data and information as may be required by the code official.

8. Indicate the name of the owner and contractor and the name, address and phone number of a contact person.

117.2 Plans and specifications. Plans, engineering calculations, diagrams and other data shall be submitted in one or more sets with each application for a permit. The code official may require plans, computations and specifications to be prepared and designed by an engineer or architect licensed by the state to practice as such. Projects having a total mechanical valuation of $50,000 or larger shall have a mechanical engineering stamp and signature on each sheet.

Exception: A mechanical engineer's stamp or submission of plans, calculations or other data is not required if the code official finds that the nature of the work applied for is such that review of plans is not necessary to obtain compliance with this code.

117.3 Information on plans and specifications.

117.3.1 Clarity of plans. Plans shall be drawn to a clearly indicated and commonly accepted scale upon substantial paper such as blueprint quality or standard drafting paper. Tissue paper, posterboard or cardboard will not be accepted. The plans shall be of microfilm quality and limited to a minimum size of 18 inches by 18 inches and a maximum size of 41 inches by 54 inches. Plans and specifications shall be of sufficient clarity to show that the proposed installation will conform to the provisions of this code and to the provisions of all applicable laws, ordinances, rules, regulations and orders.

117.3.2 Fire-resistive notes. The code official may require that plans for buildings more than two stories in height of other than Group R-3 and Group U occupancies indicate how required structural and fire-resistive integrity will be maintained where a penetration will be made for electrical, mechanical, plumbing and communication conduits, pipes and similar systems.

117.3.3 Information required on plans. The plans or specifications shall show the following:

1. Layout for each floor with dimensions of all working spaces and a legend of all symbols used.
2. Location, size and material of all piping.

3. Location, size and materials of all air ducts, air inlets and air outlets.

4. Location of all fans, warm-air furnaces, boilers, absorption units, refrigerant compressors and condensers and the weight of all pieces of such equipment weighing 200 pounds or more.

5. Rated capacity or horsepower and efficiency rating of all boilers, warm-air furnaces, heat exchangers, blower fans, refrigerant compressors and absorption units. See also the *Washington State Energy Code with Seattle Amendments*.

6. Location, size and material of all combustion products vents and chimneys.

7. Location and area of all ventilation and combustion air openings and ducts.

8. Location of all air dampers and fire shutters.

9. The first sheet of each set of plans and specifications shall show the address of the proposed work and the name and address of the owner or lessee of the premises.

10. Architectural drawings, typical envelope cross sections and other drawings or data may be required to support system sizing calculations or other thermal requirements of this code or the *Washington State Energy Code with Seattle Amendments*.

SECTION 118

PERMIT REVIEW AND ISSUANCE

118.1 Issuance.

118.1.1 General. The application, plans, specifications, and other data filed by an applicant for permit shall be reviewed by the code official. Such plans may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

118.1.2 Decision and issuance of permit. If the code official finds that the work as described in an application for a permit and the plans, specifications and other data filed therewith substantially conforms to the requirements of this code and other pertinent laws and ordinances

and that the fees specified in the Fee Subtitle have been paid, the code official shall issue a permit to the applicant, who then becomes the permit holder or authorized agent.

Exception: The code official may issue a permit for the construction of part of a building or structure before complete plans for the whole building or structure have been submitted or approved, if the proposed project complies with the State Environmental Policy Act (Chapter 25.05 of the Seattle Municipal Code) as amended and the Land Use Code as amended; and if adequate information and plans have been filed and checked to assure compliance with all pertinent requirements of this and other pertinent codes. The holder of such a permit shall proceed at the holder's own risk without assurance that a permit for the entire building or structure will be granted.

118.1.3 Compliance with approved plans and permit. When the code official issues a permit, the code official shall endorse the permit in writing and endorse in writing or stamp the plans "APPROVED." Such approved plans and permit shall not be changed, modified or altered without authorization from the code official, and all work shall be done in accordance with the approved plans and permit except as the code official may require during field inspection to correct errors or omissions.

118.2 Amendments to the permit. When substitutions or changes to the approved work are made during construction approval of the code official shall be obtained prior to execution. The building inspector may approve minor modifications and changes for work not reducing the structural strength or fire and life safety of the structure. The building inspector shall determine if it is necessary to revise the approved plans. All other changes, modifications, or clarifications shall be shown on two sets of plans which shall be submitted to and approved by the code official, accompanied by appropriate fees as specified in the Fee Subtitle prior to occupancy.

These substitutions and changes shall conform to the requirements of this code and other pertinent laws and ordinances.

Minor substitutions or changes shall not incur additional fees if these substitutions and/or changes do not (1) add to the general scope of work; (2) change the basic design concept; (3) involve major relocation of equipment, ducts, or pipes; (4) substantially alter approved equipment size; or (5) require extensive re-review of the plans and specifications.

118.3 Cancellation of permit applications. Applications may be cancelled if no permit is issued by the earlier of the following: (1) twelve months following the date of application; or (2) sixty days after the date of written notice that the permit is ready to be issued. After cancellation, plans and other data submitted for review may be returned to the applicant or destroyed by the code official.

The code official shall notify the applicant in writing at least thirty days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

118.4 Extensions prior to permit issuance. At the discretion of the code official, applications for projects that require more than twelve months to review and approve may be extended for a period that provides reasonable time to complete the review and approval process, but in no case longer than twenty-four months from the date of the original application. No application may be extended more than once. After cancellation, the applicant shall submit a new application and pay a new fee to restart the application process.

Notwithstanding other provisions of this code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals,

strikes or other causes related to the application that are beyond the applicant's control, or while the applicant is making progress toward issuance of a master use permit.

See the Fee Subtitle for possible fee refunds.

118.5 Retention of plans. One set of approved plans, which may be on microfilm, shall be retained by the code official. One set of approved plans shall be returned to the applicant and shall be kept at the site of the building or work for use by the inspection personnel at all times when the work authorized is in progress.

118.6 Validity of permit. The issuance or granting of a permit or approval of plans shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or other pertinent laws and ordinances.

The issuance of a permit based upon plans shall not prevent the code official from requiring the correction of errors in said plans, or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City.

The issuance of a mechanical permit shall not prevent the code official from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City, nor shall the period of time for which any such permit is issued be construed to extend or otherwise affect any period of time for compliance specified in any notice or order issued by the code official or other administrative authority requiring the correction of any such conditions.

118.7 Permit expiration and renewal.

118.7.1 Expiration. Authority to do the work authorized by a permit or a renewed permit expires eighteen months from the date of issuance.

Exceptions:

1. Initial permits for major construction projects that require more than eighteen months to complete, according to a construction schedule submitted by the applicant, may be issued for a period that provides reasonable time to complete the work but in no case longer than three years.

2. Permits that expire in less than eighteen months may be issued where the code official determines a shorter period is appropriate to complete the work.

118.7.2 Renewal of permits. Permits may be renewed and renewed permits may be further renewed by the code official, if the following conditions are met:

1. Application for renewal is made within the thirty-day period immediately preceding the date of expiration of the permit;

2. If the project has had an associated discretionary Land Use review, the land use approval has not expired per Seattle Municipal Code 23.76. 032; and

3. If an application for renewal is made either more than eighteen months after the date of mandatory compliance with a new or revised edition of this code or after the effective date of an amendment to applicable provisions of the Land Use Code, the permit shall not be renewed unless:

3.1 The code official determines that the permit complies, or is modified to comply with the code or codes in effect on the date of application renewal; or

3.2 The work authorized by the permit is substantially underway and progressing at a rate approved by the building official. "Substantially underway" means that work such as excavation, inspections, and installation of framing, electrical, mechanical and finish work is being completed on a continuing basis.

Permits may also be renewed where commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes or other causes related to the work authorized by the permit, beyond the permit holder's control.

118.7.3 Reestablishment. A new permit is required to complete work if a permit has expired and was not renewed.

Exception: A permit that expired less than one year prior to the date of a request for reestablishment may be reestablished upon approval of the code official if it complies with Items 2 and 3 of Section 118.7.2.

118.8 Revocation.

118.8.1 Standards for revocation. A permit may be revoked if:

1. The code or the permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation;

2. The permit was obtained with false or misleading information.

118.8.2. Notice of revocation. Whenever the code official determines there are grounds for revoking a permit, the code official may issue a notice of revocation.

The notice of revocation shall identify the reason for the proposed revocation, including the violations, the conditions violated, and any alleged false or misleading information provided.

The notice of revocation shall be served on the owner of the property on which the work is occurring, the holder of a permit if different than the owner, and the person doing or causing the work to be done.

The notice of revocation shall be served in the manner set forth in RCW 4.28.080 for service of a summons or sent by first class mail. For purposes of this section, service is complete at the

time of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or City holiday, the period runs until five p.m. on the next business day.

The code official shall identify in the notice of revocation a date certain on which the revocation will take effect unless review before the code official is requested and pursued pursuant to Section 118.9.

118.9 Review by the code official for notice of revocation.

118.9.1 Any person aggrieved by a notice of revocation may obtain a review by making a request in writing to the code official within 3 business days of the date of service of the notice of revocation.

The review shall occur within 5 business days after receipt by the code official of the request for review.

Any person aggrieved by or interested in the notice of revocation may submit additional information to the code official for consideration as part of the review at any time prior to the review.

118.9.2 The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

1. Sustain the notice of revocation and set or modify the date the revocation will take effect;
2. Withdraw the notice of revocation;
3. Modify the notice of revocation and set or modify the date the revocation will take effect; or
4. Continue the review to a date certain for receipt of additional information.

118.9.2 The code official shall issue an order of the code official containing the decision within 10 days after the review and shall cause the same to be sent by first class mail to the person or persons requesting the review, any other person on whom the notice of revocation was served, and any other person who requested a copy before issuance of the order of the code official. The order of the code official is the final order of the City and the City and all parties shall be bound by the order.

Nothing in this section shall be deemed to limit or preclude any action or proceeding pursuant to Sections 108, 109 or 112 of this code.

SECTION 119

FEES

119.1 Fees. A fee for each mechanical permit and for other activities related to the enforcement of this code shall be paid as set forth in the Fee Subtitle.

SECTION 120

INSPECTIONS

120.1 General. All construction or work for which a permit is required is subject to inspection by the code official, and certain types of construction shall have special inspections by registered special inspectors specified in Section 1704 of the Building Code.

120.2 Inspection requests. It is the duty of the owner of the property or the owner's authorized agent, or the person designated by the owner/agent to do the work authorized by a permit, to notify the code official that work requiring inspection as specified in this section and Section 121 is ready for inspection.

120.3 Access for inspection. It is the duty of the permit holder and of the person requesting any inspections required by this code to provide access to and means for proper inspection of such

work, including safety equipment required by the Washington Industrial Safety and Health Agency. The work shall remain accessible and exposed for inspection purposes until approved by the code official. Neither the code official nor the City shall be liable for expense entailed in the required removal or replacement of any material to allow inspection.

120.4 Inspection record. Work requiring a mechanical permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position that allows the code official to conveniently make the required entries thereon regarding inspection of the work. This record shall be maintained in such a position by the permit holder until final approval has been granted by the code official.

120.5 Approvals required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the code official. Such written approval shall be given only after an inspection has been made of each successive step in the construction as indicated by each of the inspections required in this code.

Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

120.6 Final inspection. When the installation of a mechanical system is complete, an additional and final inspection shall be made.

Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give

authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

120.7 Operation of mechanical equipment. The requirements of this section do not prohibit the operation of any mechanical systems installed to replace existing equipment or fixtures serving an occupied portion of the building in the event a request for inspection of such equipment or fixture has been filed with the code official not more than 48 hours after such replacement work is completed, and before any portion of such mechanical system is concealed by any permanent portion of the building.

120.8 Testing of equipment and systems. Refrigeration equipment regulated by this code shall be tested and approved as required by Chapter 11 of this code. Fuel-oil piping shall be tested and approved as required by Chapter 13 of this code.

120.9 Other inspections. In addition to the "called" inspections specified above, the code official may make or require any other inspections of any mechanical work to ascertain compliance with the provisions of this code and other laws and ordinances that are enforced by the code official.

120.10 Special investigation. If work for which a permit or approval is required is commenced or performed prior to making formal application and receiving the code official's permission to proceed, the code official may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with the Fee Subtitle.

120.11 Reinspections. The code official may require a reinspection if work for which inspection is called is not complete, corrections required are not made, the inspection record is not properly posted on the work site, the approved plans are not readily available to the inspector, access is

not provided on the date for which inspection is requested, if deviations from plans that require the approval of the code official have been made without proper approval, or as otherwise required by the code official.

For the purpose of determining compliance with Section 104.4, Maintenance, the code official or the fire chief may cause any structure or system to be reinspected.

The code official may assess a reinspection fee as set forth in the Fee Subtitle for any action for which reinspection may be required. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

SECTION 121

CONNECTION APPROVAL

121.1 Energy connections. No person shall make connections from a source of energy fuel to a mechanical system or equipment regulated by this code for which a permit is required until approved by the code official.

121.2 Temporary connections. The code official may authorize temporary connection of the mechanical equipment to the source of energy fuel for the purpose of testing the equipment, or for use under a temporary certificate of occupancy.

SECTION 122

REFRIGERATION LICENSES

122.1 Refrigeration licenses. No person shall perform any of the services or activities related to refrigeration systems regulated by Chapter 11 without a license required by Chapter 6.82 of the Seattle Municipal Code, or under the direct supervision of a person holding a required license.

SECTION 123

OPERATING PERMITS FOR REFRIGERATION SYSTEMS

123.1 An operating permit issued by the code official is required to operate any refrigeration system meeting any one of the following criteria:

1. Any system over 50 horsepower, or

2. Any system over 50 tons of refrigerant effect, or

3. Any system that contains over 150 pounds of refrigerant, or

4. Any system that includes a refrigerant containing a pressure vessel over six inches in diameter with a capacity of more than 5 cubic feet and a design working pressure under 250 psig, or

5. Any system that includes a refrigerant containing a pressure vessel over six inches in diameter having a capacity of one and one-half cubic feet and a design working pressure over 250 psig.

123.2 The operating permit will not be issued until the system has been inspected and approved by the code official as safe to operate and in compliance with the provisions of this code. The permit is valid for a period of one year, renewable annually. The permit shall be displayed in a conspicuous place adjacent to the refrigeration system.

Section 3. The following sections of Chapter 2 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 201

GENERAL

* * *

201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the *International Building Code*, ((~~ICC~~)) <u>*Seattle* *Electrical Code*</u>, *International Fire Code*, *International Fuel Gas Code* or the ((~~*International*~~)) <u>*Uniform* *Plumbing Code*</u>, such terms have meanings ascribed to them as in those codes.

* * *

201.5 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, including local amendments. References to the "Building Code", "Fuel Gas Code", "Fire Code", "Residential Code" and "Plumbing Code" mean the Seattle editions of those codes.

SECTION 202

GENERAL DEFINITIONS

* * *

((~~**AUTOMATIC BOILER.** Any class of boiler that is equipped with the controls and limit devices specified in Chapter 10.~~))

* * *

BOILER. A closed heating appliance intended to supply hot water or steam for space heating, processing or power purposes. ((~~Low-pressure boilers operate at pressures less than or equal to 15 pounds per square inch (psi) (103 kPa) for steam and 160 psi (1103 kPa) for water. High-pressure boilers operate at pressures exceeding those pressures.~~))

BOILER CODE. The *Seattle Boiler and Pressure Vessel Code.*

* * *

CODE. These regulations, subsequent amendments thereto, or any emergency rule or regulation that ((~~the administrative authority having jurisdiction~~)) has been lawfully adopted.

CODE OFFICIAL. ((~~The officer or other designated authority charged with the administration and enforcement of this code,~~)) Director of the Department of Planning and Development or a duly authorized representative.

* * *

CONDITIONED SPACE. ((~~An area, room or space being heated or cooled by any equipment or appliance.~~)) A cooled space, heated space (fully heated), heated space (semi-heated), or indirectly conditioned space.

* * *

CONTAINER (REFRIGERANT). A cylinder for the transportation of refrigerant.

* * *

CRITICAL PRESSURE, CRITICAL TEMPERATURE, AND CRITICAL VOLUME. Terms given to the state points of a substance at which liquid and vapor have identical properties. Above the critical pressure or critical temperature there is no line of demarcation between liquid and gaseous phases.

DAMPER. A manually or automatically controlled device to regulate draft or the rate of flow of air or combustion gases.

Backdraft damper. A damper installed to restrict introduction of unconditioned air from an unconditioned space to a conditioned space.

Barometric damper. Any listed device that freely allows the flow of air in one direction, but does not allow conditioned air to escape. All installed combustion air dampers shall meet the installation requirements of the manufacturer.

Chimney Damper. A movable valve or plate within the chimney connector for controlling the draft or flow of combustion gases.

Fire damper. See "fire damper".

Smoke damper. See "smoke damper".

Volume damper. A device that, when installed, will restrict, retard or direct the flow of air in a duct, or the products of combustion in a heat-producing appliance, its vent connector, vent or chimney therefrom.

* * *

DIRECT REFRIGERATION SYSTEM. A system in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. See Figure 2-1.

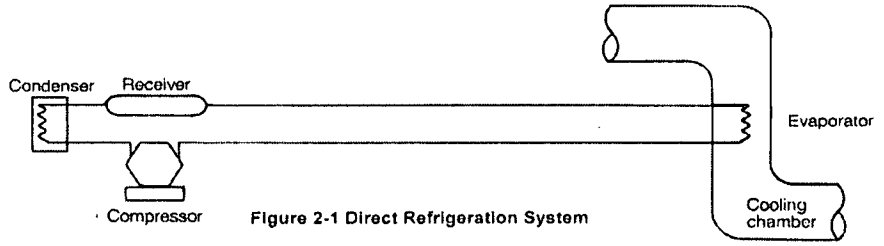

Figure 2-1 Direct Refrigeration System

Double direct refrigeration system. A system in which an evaporative refrigerant is used in a secondary circuit to condense or cool a refrigerant in a primary circuit. For the purpose of this code, each system enclosing a separate body of an evaporative refrigerant is considered a separate direct system. See Figure 2-2.

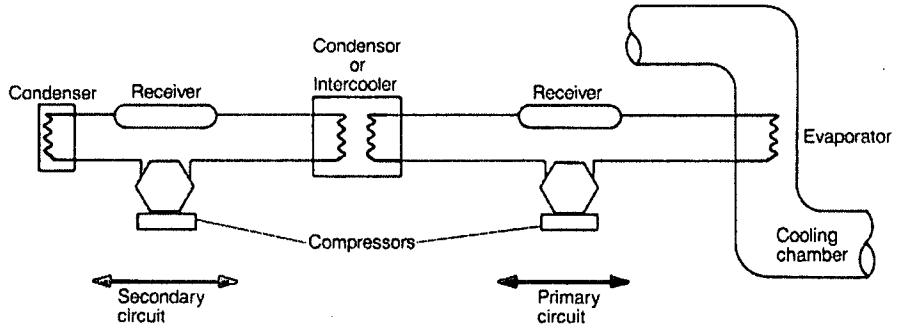

Figure 2-2 Double Direct Refrigeration System

* * *

ENERGY CODE. The *Washington State Energy Code with Seattle Amendments.*

* * *

ENVIRONMENTAL AIR. Air that is, at temperatures not exceeding 250^{0}F (121^{0}C), conveyed to or from occupied areas through ducts which are not part of the heating or air-conditioning system, such as ventilation for human usage, relief air, domestic kitchen range exhaust, bathroom exhaust, ((~~and~~)) domestic clothes dryer exhaust, parking garage exhaust, and elevator exhaust.

* * *

[B] FIRE DAMPER. A listed device installed in ducts and air transfer openings designed to close automatically upon detection of heat and resist the passage of flame. Fire dampers are classified for use in either static systems that will automatically shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic fire damper is tested and rated for closure under elevated temperature airflow.

* * *

[F] GAS ROOM. A separately ventilated, fully enclosed room in which only compressed gases and associated equipment and supplies are stored or used.

* * *

HOOD. An air-intake device used to capture by entrapment, impingement, adhesion or similar means, grease and similar contaminants before they enter a duct system.

Type I. A kitchen hood for collecting and removing grease vapors and smoke generated from medium-duty, heavy-duty, extra-heavy-duty, and some light-duty cooking appliances.

Type II. A general kitchen hood for collecting and removing steam, vapor, heat and odors generated from some light-duty cooking appliances.

* * *

INDIRECT REFRIGERATION SYSTEM. A system in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated. See Figure 2-3. Indirect systems are distinguished by the method of application shown below:

Closed system. A system in which a secondary fluid is either cooled or heated by the refrigerating system and then circulated within a closed circuit in indirect contact with the air or other substance to be cooled or heated.

Double-indirect open-spray system. A system in which the secondary substance for an indirect open-spray system is heated or cooled by an intermediate coolant circulated from a second enclosure.

Open-spray system. A system in which a secondary coolant is cooled or heated by the refrigerating system and then circulated in direct contact with the air or other substance to be cooled or heated.

Vented closed system. A system in which a secondary coolant is cooled or heated by the refrigerating system and then passed through a closed circuit in the air or other substance to be cooled or heated, except that the evaporator or condenser is placed in an open or appropriately vented tank.

* * *

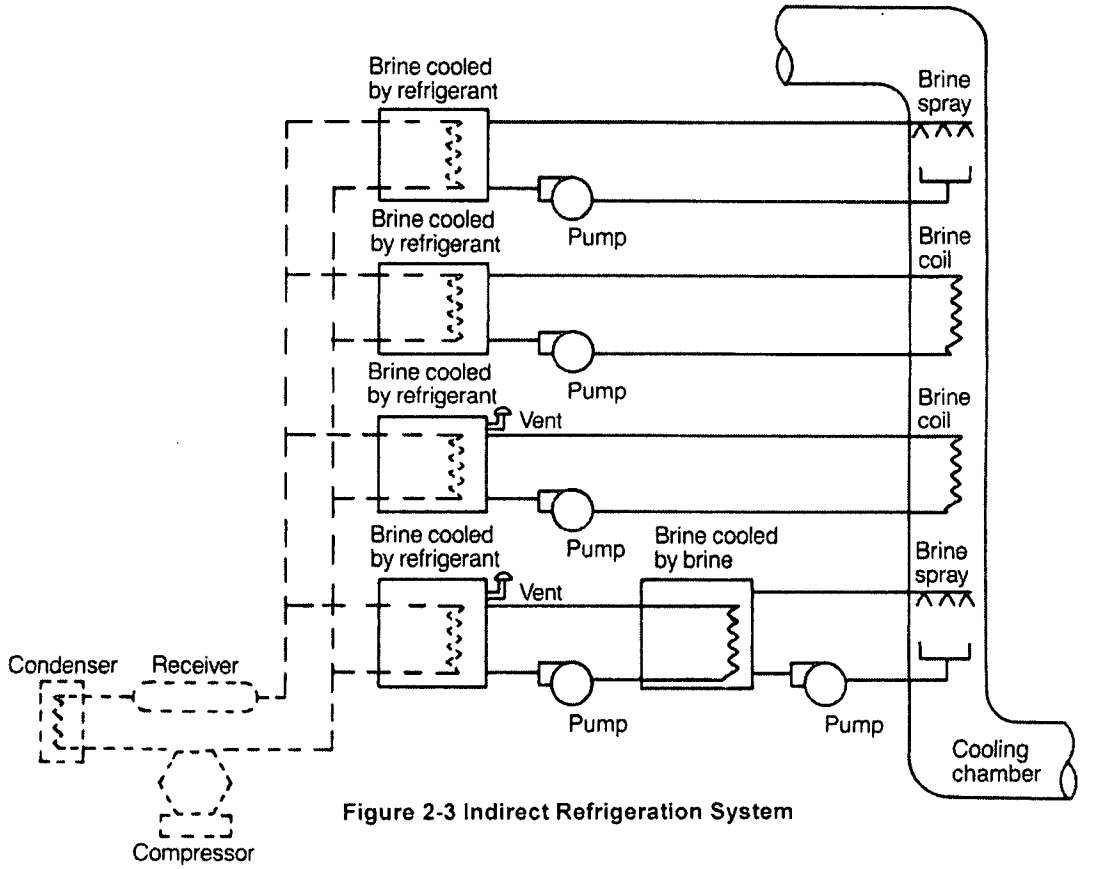

Figure 2-3 Indirect Refrigeration System

LIGHT-DUTY COOKING APPLIANCE. Light-duty cooking appliances include gas and electric ovens of a maximum 6 kW or 20,000 Btu/h capacity (including standard, bake, roasting, coffee roasting, revolving, retherm, convection, combination convection/steamer, conveyor, deck or deck-style pizza, and pastry), electric and gas steam-jacketed kettles, electric and gas compartment steamers (both pressure and atmospheric) and electric and gas cheesemelters.

* * *

MEDIUM-DUTY COOKING APPLIANCE. Medium-duty cooking appliances include electric discrete element ranges (with or without oven), electric and gas hot-top ranges, electric and gas griddles, electric and gas double-sided griddles, electric and gas fryers (including open deep fat fryers, donut fryers, kettle fryers, and pressure fryers), ((~~electric and gas pasta cookers,~~

~~electric and gas conveyor pizza ovens~~)), electric and gas tilting skillets (braising pans) and electric and gas rotisseries.

* * *

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

* * *

((~~**POWER BOILER.** See "Boiler."~~))

* * *

((~~**PRESSURE VESSELS.** Closed containers, tanks or vessels that are designed to contain liquids or gases, or both, under pressure.~~))

* * *

PRODUCT-CONVEYING AIR. Air used for conveying solid particulates, such as refuse, dust, fumes and smoke; liquid particulate matter, such as spray residue, mists and fogs; vapors, such as vapors from flammable or corrosive liquids; noxious and toxic gases; and air at temperatures exceeding 250°F (121°C). Examples of product-conveying air include, but are not limited to, those that serve a combustion engine, industrial vacuum system, chemical booth, paint booth, paint enclosure and photo lab exhaust.

* * *

RELIEF AIR. Exhausted return air from a system that provides ventilation for human usage.

* * *

SATURATION PRESSURE. The pressure at which there is a stable coexistence of the vapor and liquid or the vapor and solid phases of a refrigerant.

* * *

SLEEVE. A factory-built chimney fitting designed to protect combustible materials when it is necessary to penetrate a combustible wall to connect a chimney.

* * *

((~~**STEAM-HEATING BOILER.** A boiler operated at pressures not exceeding 15 psi (103 kPa) for steam.~~))

* * *

THIMBLE. A listed fitting designed to be installed in the opening in a masonry chimney through which the chimney connector passes.

* * *

UNUSUALLY TIGHT CONSTRUCTION. Construction meeting the following requirements:

1. Walls exposed to the outdoor atmosphere having a continuous water vapor retarder with a rating of 1 perm [57 ng/(s• m^2 • Pa)] or less with openings gasketed or sealed; and

2. Openable windows and doors meeting the air leakage requirements of the *International Energy Conservation Code*, Section 402.4.2; and

3. Caulking or sealants are applied to areas, such as joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical and gas lines and at other openings; ((~~.~~))or

[W] 4. Buildings built in compliance with the 1986 or later editions of the Washington State Energy Code, WAC 51-11; Northwest Energy Code; or Super Good Cents weatherization standards or equivalent.

Interpretation: 1986 and later editions of the Washington State Energy Code with Seattle Amendments, and Seattle City Light's Built Smart program are considered equivalent standards for unusually tight construction.

* * *

WATER HEATER. Any heating appliance or equipment, not exceeding a pressure of 160 psi (1103 kPa), a volume of 120 gallons and a heat input of 200,000 Btu/hr, that heats potable water and supplies such water to the potable hot water distribution system.

Section 4. The following sections of Chapter 3 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 301

GENERAL

301.1 Scope. This chapter shall govern the approval and installation of all equipment and appliances that comprise parts of the building mechanical systems regulated by this code in accordance with Section 103.1. ((~~101.2~~))

301.2 Energy utilization. Heating, ventilating and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with the ((~~*International Energy Conservation Code*~~)) *Washington State Energy Code with Seattle Amendments*.

* * *

301.4 Listed and labeled. Appliances regulated by this code shall be listed and labeled for the application in which they are installed and used, unless otherwise approved in accordance with Sections 105, 106 or 107.

Exception: Listing and labeling of equipment and applications used for refrigeration shall be in accordance with Section 1101.2.

* * *

301.7 Electrical. Electrical wiring, controls and connections to equipment and appliances regulated by this code shall be in accordance with the ((~~*ICC*~~)) *Seattle Electrical Code*.

301.8 Plumbing connections. Potable water supply and building drainage system connections to equipment and appliances regulated by this code shall be in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

* * *

SECTION 303

EQUIPMENT AND APPLIANCE LOCATION

* * *

303.3 Prohibited locations. Fuel-fired appliances shall not be located in, or obtain combustion air from, any of the following rooms or spaces:

1. Sleeping rooms.
2. Bathrooms.
3. Toilet rooms.
4. Storage closets.
5. Surgical rooms.

Exception: This section shall not apply to the following appliances:

1. Direct-vent appliances that obtain all combustion air directly from the outdoors.

2. Solid fuel-fired appliances, provided that the room is not a confined space and the building is not of unusually tight construction.

3. Appliances installed in a dedicated enclosure in which all combustion air is taken directly from the outdoors, in accordance with Section 703. Access to such enclosure shall be through a solid door, weather-stripped in accordance with the exterior door air leakage requirements of the ((~~*International Energy Conservation Code*~~)) *Washington State Energy Code with Seattle Amendments* and equipped with an approved self-closing device.

* * *

303.7 Pit locations. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil. The sides of the pit or excavation shall be held back a minimum of 12 inches (305 mm) from the appliance, and a minimum of 30 inches (762 mm) on the control side. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry. Such concrete or masonry shall extend a minimum of 4 inches (102 mm) above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse. The appliance shall be protected from flooding in an approved manner.

[B] 303.8 ((~~Elevator shafts.~~ ~~Mechanical systems shall not be located in an elevator shaft.~~))

Installation of pipes or ducts conveying gases, vapors or liquids in hoistways, machine rooms, or machinery spaces. Pipes and ducts conveying gases, vapors or liquids shall not be installed in hoistways, machine rooms, and machinery spaces.

Exceptions:

1. Only ducts for heating, cooling, ventilating, and venting these spaces are permitted to be installed in the hoistway, machine room, and machinery space.

2. Ducts and electrical conduit may pass through an elevator machine room or machinery space if they are separated from the room or space by construction equal to the rated construction of the room or space and located so that all required clearances are maintained.

If a vented machine room is not vented directly to the outside of the building, the vent shall be enclosed within a fire barrier with at least a one-hour fire-resistance rating, or as required for a shaft where it passes through occupied floors.

3. Standard sprinkler protection conforming to the requirements of NFPA 13 shall be permitted to be installed in these spaces, subject to rules promulgated by the code official.

4. Subject to the approval of the code official, pipes protected with double containment and pipes with threaded or welded joints are permitted. Pipes shall not be located less than 7 feet above the floor in machine rooms.

[B] 303.9 Exit Enclosures. Mechanical systems shall not be located in exit enclosures. Penetrations passing entirely through both protective membranes are prohibited.

Exceptions:

1. Equipment allowed or required by the *International Building Code* to serve the exit enclosure such as:

1.1 ductwork and equipment necessary for independent stairway pressurization,

1.2 sprinkler piping,

1.3 standpipes,

1.4 electrical conduit terminating in a listed box not exceeding 16 square inches (10 323 mm^2) in area, and

1.5 piping used exclusively for the drainage of rainfall runoff from roof areas provided the roof is not used for a helistop or heliport.

2. Unfired heaters allowed by the *International Building Code* for freeze protection of fire protection equipment may penetrate one protective membrane. The conduit serving the heater may penetrate both protective membranes.

Penetrations shall be protected as required by the *International Building Code*. Penetrations and openings communicating between exit enclosures in the same building are not permitted regardless of their protection.

* * *

SECTION 304

INSTALLATION

* * *

304.3 Elevation of ignition source. Equipment and appliances having an ignition source and located in hazardous locations and public garages, private garages, repair garages, automotive motor-fuel-dispensing facilities and parking garages shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor surface on which the equipment or appliance rests. Such equipment and appliances shall not be installed in Group H occupancies or control areas where open use, handling or dispensing of combustible, flammable or explosive materials occurs. For the purpose of this section, rooms or spaces that are not part of the living space of a dwelling unit and that communicate directly with a private garage through openings shall be considered to be part of the private garage.

304.3.1 Parking garages. Connection of a parking garage with any room in which there is a fuel-fired appliance shall be by means of a vestibule providing a two-doorway separation, except

that a single door is permitted where the sources of ignition in the appliance are elevated in accordance with Section 304.3.

Exception: This section shall not apply to appliance installations complying with Section 304.5 or to equipment having an internal combustion engine.

* * *

304.10 Clearances and encroachments in the public right of way. All encroachments of equipment and appliances on, over or under sidewalks, streets, alleys and other public property are subject to approval by the Director of Transportation and the code official. Encroachments shall comply with this code and other codes as determined by the Director of Transportation and the code official.

Note: The Department of Transportation publishes the "Seattle Right-of-Way Improvement Manual" that contains detailed information on clearances, encroachments and required SDOT street use permits. The Department of Transportation discourages encroachments into the public right-of-way by mechanical equipment.

[B] 304.11 ((~~304.10~~)) Guards. Guards shall be provided where appliances, equipment, fans or other components that require service and roof hatch openings are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such appliances, equipment, fans, components and roof hatch openings and the top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code.*

304.12 ((~~**304.11**~~)) **Area served.** Appliances serving different areas of a building other than where they are installed shall be permanently marked in an approved manner that uniquely identifies the appliance and the area it serves.

* * *

SECTION 306

ACCESS AND SERVICE SPACE

* * *

306.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the appliance location in accordance with the ((~~ICC~~)) *Seattle Electrical Code*.

* * *

306.4.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the appliance location in accordance with the ((~~ICC~~)) *Seattle Electrical Code*.

* * *

306.5.2 Electrical requirements. A receptacle outlet shall be provided at or near the equipment location in accordance with the ((~~ICC~~)) *Seattle Electrical Code*.

* * *

SECTION 309

TEMPERATURE CONTROL

[B] 309.1 Space-heating systems. Interior spaces intended for human occupancy shall be provided with active or passive space-heating systems capable of maintaining ((~~a minimum~~)) an average indoor temperature of 68°F (20°C) at a point 3 feet (914 mm) above floor ((~~on the~~

~~design heating day~~)) when the outside temperature is 24°F. The installation of portable space heaters shall not be used to achieve compliance with this section.

Exception: Interior spaces where the primary purpose is not associated with human comfort.

* * *

SECTION 312

HEATING AND COOLING LOAD CALCULATIONS

312.1 Load calculations. Heating and cooling system design loads for the purpose of sizing systems, appliances and equipment shall be determined in accordance with the procedures described in the ((~~ASHRAE Handbook of Fundamentals~~)) *Washington State Energy Code with Seattle Amendments.* ((~~Heating and cooling loads shall be adjusted to account for load reductions that are achieved when energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE Handbook - HVAC Systems and Equipment. Alternatively, design loads shall be determined by an approved equivalent computation procedure, using the design parameters specified in Chapter 3 of the International Energy Conservation Code.~~))

Section 5. The following sections of Chapter 4 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 401

GENERAL

401.1 Scope. This chapter shall govern the ventilation of spaces within a building intended to be occupied. This chapter does not govern the requirements for smoke control systems.

See Chapter 5 for mechanical exhaust systems serving clothes dryers and cooking appliances; hazardous exhaust systems; dust, stock and refuse conveyor systems; subslab soil exhaust

systems; smoke control systems; energy recovery ventilation systems; and other systems specified in Section 502.

401.2 Ventilation required. Every occupied space shall be ventilated.

401.2.1 Group R occupancies four stories or less. Ventilation in Group R occupancies four stories or less shall be provided in accordance with the *Washington State Ventilation and Indoor Air Quality Code.*

401.2.2 Group R occupancies over four stories. Ventilation in Group R occupancies over four stories shall be provided in accordance with Section 403.3.6.

401.2.3 All other occupancies. All other occupancies shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403.

401.3 When required. Ventilation shall be provided during the periods that the room or space is occupied.

401.4 Opening location. Outdoor air exhaust and intake openings shall be located a minimum of 10 feet (3048 mm) from lot lines or buildings on the same lot. Where openings front on a street or public way, the distance shall be measured to the ((~~centerline~~)) opposite side of the street or public way.

Exceptions:

1. Group R-3.

2. Exhaust outlets for environmental air exhaust openings shall be located not less than 3 feet (914 mm) from property lines and not less than 3 feet (914 mm) from openings into the building.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

401.4.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a source of contaminant is located within 10 feet (3048 mm) horizontally of an intake opening, such opening shall be located a minimum of 2 feet (610 mm) below the contaminant source.

The exhaust from a bathroom, clothes dryer or kitchen in a residential dwelling shall not be considered to be a hazardous or noxious contaminant.

Intake openings shall not be located:

1. In a crawlspace;

2. Less than one foot (305 mm) above a roof, adjacent grade, or other surface directly below the intake; or

3. Under a deck having a surface height less than three feet above grade or other surface directly below the intake.

401.4.2 Exhaust openings. Outdoor exhaust openings shall be located ((~~so as not to create a nuisance~~)) in accordance with Chapter 5. Exhaust air shall not be directed onto walkways in such a manner that the users of the walkway are subjected to the exhaust air stream.

Note: Seattle Land Use Code (Municipal Code Title 23) requires that the venting of odors, vapors, smoke, cinders, dust, gas and fumes shall be at least 10 feet (3048 mm) above finished sidewalk grade, and directed away as much as possible from residential uses within 50 feet (15 240 mm) of the vent. This requirement has been interpreted to apply to garage exhaust systems.

[B] 401.4.3 Flood hazard. For structures located in flood hazard areas, outdoor exhaust openings shall be at or above the design flood elevation.

SECTION 402

NATURAL VENTILATION

402.1 Natural ventilation. Natural ventilation of an occupied space shall be designed to occur through windows, doors, louvers or other openings to the outdoors. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants.

Exception: Automatically controlled natural ventilation systems do not require ready access and control by building occupants.

* * *

SECTION 403

MECHANICAL VENTILATION

* * *

403.2 Outdoor air required. The minimum ventilation rate of outdoor air shall be determined in accordance with Section 403.3.

Exception: Where the registered design professional demonstrates that an engineered ventilation system ((~~design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor air ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.~~)) is designed in accordance with ASHRAE Standard 62.1-2004.

403.2.1 Recirculation of air. The air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

1. Ventilation air shall not be recirculated from one dwelling to another or to dissimilar occupancies.

2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces.

3. Where mechanical exhaust is required by Note b in Table 403.3, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.

((~~4. Where mechanical exhaust is required by Note h in Table 403.3, mechanical exhaust is required and recirculation is prohibited where 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces.~~))

4. Building HVAC air used as transfer air for heat removal may be recirculated.

403.2.2 Transfer air. Except where recirculation from such spaces is prohibited by Table 403.3, air transferred from occupied spaces is not prohibited from serving as makeup air for required exhaust systems in such spaces as kitchens, baths, toilet rooms, and elevators ((~~and smoking lounges~~)). The amount of transfer air and exhaust air shall be sufficient to provide the flow rates as specified in Sections 403.3 and 403.3.1. The required outdoor air rates specified in Table 403.3 shall be introduced directly into such spaces or into the occupied spaces from which air is transferred or a combination of both.

403.2.3 Outdoor air delivery. The outdoor air shall be ducted in a fully enclosed path directly to every air handling unit in each zone not provided with sufficient operable opening area for natural ventilation to occur.

Exception: Ducts may terminate within 12 inches of the intake to an HVAC unit if they are physically fastened so that the outside air duct is directed into the unit intake.

403.3 Ventilation rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate determined in accordance with Table 403.3 based on the occupancy of the space and the occupant load or other parameter as stated therein. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the estimated maximum occupant load rate indicated in Table 403.3. Ventilation rates for occupancies not represented in Table 403.3 shall be determined by an approved engineering analysis. The ventilation system shall be designed to supply the required rate of ventilation air continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

Exception: ((~~The occupant load is not required to be determined, based on the estimated maximum occupant load rate indicated in Table 403.3 where approved statistical data document the accuracy of an alternate anticipated occupant density.~~)) Where occupancy density is known and documented in the plans, the outside air rate may be based on the design occupant density. Under no circumstance shall the occupancies used result in outside air less than one-half that resulting from application of Table 403.3 estimated maximum occupancy rates.

403.3.1 System operation. The minimum flow rate of outdoor air that the ventilation system must be capable of supplying during its operation shall be permitted to be based on the rate per person indicated in Table 403.3 and the actual number of occupants present.

403.3.2 Common ventilation system. Where spaces having different ventilation rate requirements are served by a common ventilation system, the ratio of outdoor air to total supply

air for the system shall be determined based on the space having the largest outdoor air requirement or shall be determined in accordance with the following formula:

$$Y = \frac{X}{(1+X-Z)} \qquad \textbf{(Equation 4-1)}$$

Where

$Y = V_{ot} / V_{st}$ = Corrected fraction of outdoor air in system supply.

$X = V_{on} / V_{st}$ = Uncorrected fraction of outdoor air in system supply.

$Z = V_{oc} / V_{sc}$ = Fraction of outdoor air in critical space. The critical space is that space with the greatest required fraction of outdoor air in the supply to this space.

V_{ot} = Corrected total outdoor airflow rate.

V_{st} = Total supply flow rate, i.e., the sum of all supply for all branches of the system.

V_{on} = Sum of outdoor airflow rates for all branches on system.

V_{oc} = Outdoor airflow rate required in critical spaces.

V_{sc} = Supply flow rate in critical space.

403.3.3 Variable air volume system control. Variable air volume air distribution systems, other than those designed to supply only 100-percent outdoor air, shall be provided with controls to regulate the flow of outdoor air. Such control system shall be designed to maintain the flow of outdoor air at a rate of not less than that required by Section 403 over the entire range of supply air operating rates. Calculations and a description of controls operation shall be submitted with the permit drawings.

403.3.4 Balancing. Ventilation systems shall be balanced by an approved method. Such balancing shall verify that the ventilation system is capable of supplying the airflow rates required by Section 403.

403.3.5 Ventilation of occupied spaces accessory to the maintenance and repair of vehicles. Offices and waiting rooms connected to buildings used for the maintenance and repair of vehicles shall be maintained at a positive pressure and shall be provided with ventilation in accordance with Section 403.

403.3.6 Ventilation systems for Group R occupancies over 4 stories. Each dwelling unit or guest room in a building over 4 stories shall be equipped with source specific and whole house ventilation systems and shall comply with Sections 403.3.6.1 through 403.3.6.7.

403.3.6.1 Compliance and commissioning. Compliance with Section 403.3.6 shall be demonstrated through engineering calculations. Documentation of calculations shall be submitted on the permit plan sets.

Testing and commissioning shall be performed and documented in accordance with Section 1416 of the *Washington State Energy Code with Seattle Amendments*.

403.3.6.2 Minimum ventilation performance. Ventilation systems shall be designed and installed to satisfy the ventilation requirements of Table 403.3.

403.3.6.3 Controls. Ventilation system controls shall be readily accessible by the dwelling unit occupants.

1. Source specific ventilation systems shall be controlled by manual switches, dehumidistats, timers, or other approved means.

2. Whole house ventilation system controls shall be capable of operating the ventilation system without energizing other energy-consuming appliances. Intermittently operated whole house

ventilation systems shall be capable of continuous operation. The system shall have a manual control and an automatic control, such as a clock timer. At the time of final inspection, the automatic control shall be set to operate the whole house fan for no less than 8 hours a day. A label shall be affixed to the control that reads "Whole House Ventilation (see operating instructions)."

403.3.6.4 Source specific ventilation requirements. Source specific exhaust ventilation as required in Table 403.3 shall be provided in each kitchen, bathroom, water closet, laundry area, indoor swimming pool, spa, and other rooms where excess water vapor or cooking odor is produced. Source specific ventilation ducts shall terminate outdoors. Outlets shall comply with Section 401.4. Exhaust ducts in systems that are designed to operate intermittently shall be equipped with back-draft dampers.

403.3.6.5 Whole house ventilation requirements. Whole house ventilation systems shall be capable of providing the volume of outdoor ventilation air required in Table 403.3.

Outdoor air shall be distributed to each habitable space. Outdoor air distribution is permitted to be provided through the use of individual inlets, separate duct systems or a forced-air system. Where outdoor air supplies are separated from exhaust vents by doors, air distribution to separated habitable spaces is permitted to use distribution ducts, installed grilles, transoms, doors undercut to a minimum of 1/2-inch above the surface of the finish floor covering, or similar means where permitted by the *International Building Code*.

403.3.6.5.1 Outdoor air. A mechanical system shall supply the volume of outdoor air required in Table 403.3. The mechanical system is permitted to consist of exhaust fans, supply fans, or both.

Exhaust-fan-only ventilation systems shall provide outdoor air through one of the following methods.

1. Operable windows, doors and other openings shall have a minimum openable area to the outdoors of 4 percent of the floor area being ventilated. Exit doors that open into a corridor, court or public way shall not be used to provide outdoor air. For adjoining spaces without openings to the outdoors, the opening to the adjoining room shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet; or

2. Air inlets installed in walls or windows shall have controllable, secure openings and shall be designed to not compromise the thermal properties of the building envelope. Inlets shall provide not less than 4 square inches of net free area of opening for each 10 cfm of outdoor air required in Table 403.3. Inlets shall also comply with Section 401. Any inlet or combination of inlets that provides 10 cfm at 10 Pascals as determined by the Home Ventilation Institute Air Flow Test Standard (HVI 901 [November 1996]) are deemed equivalent to 4 square inches of net free area.

403.3.6.5.2 Ventilation integrated with forced-air systems. Where outdoor air is provided by a forced-air system, the outdoor air connection to the return air stream shall be located upstream of the forced-air system blower and, in order to prevent thermal shock to the heat exchanger, shall not be connected directly to the furnace cabinet.

403.3.6.6 Corridors. Air movement in corridors shall comply with Section 601 of this code and the *International Building Code*.

403.3.6.7 Fan noise. Whole house fans located 4 feet or less from the interior grille shall have a sone rating of 1.5 or less measured at 0.10 inches water gauge. Manufacturer's noise ratings shall be determined according to HVI 915 (October 1995). Remotely mounted fans shall be

acoustically isolated from the structural elements of the building and from attached ductwork using insulated flexible duct or other approved material.

Exception: Whole house ventilation systems that are integrated with forced-air heating systems or heat-recovery ventilation systems are exempt from the sone rating requirements of this section.

TABLE 403.3

REQUIRED OUTDOOR VENTILATION AIR

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[e]
Correctional facilities		
Cells		
without plumbing fixtures	20	20
with plumbing fixtures[g((, h))]	20	20
Dining halls	100	15
Guard stations	40	15
Dry Cleaners, laundries		
Coin-operated dry cleaner	20	15
Coin-operated laundries	20	15
Commercial dry cleaner	30	30
Commercial laundry	10	25
Storage, pick up	30	35
Education		
Auditoriums	150	15
Classrooms	50	15
Corridors	--	0.10 cfm/ft^2
Laboratories	30	20
Libraries	20	15
Locker rooms[((h))]	--	0.50 cfm/ft^2
Music rooms	50	15
((~~Smoking lounges~~[b, g]))[j]	((~~70~~))	((~~60~~))
Training shops	30	20
Food and beverage service		
Bars, cocktail lounges	100	30
Cafeteria, fast food	100	20
Dining rooms	70	20
Kitchens (cooking)[f, g]	20	15
Hospitals, nursing and convalescent homes		
Autopsy rooms[b]	--	0.50 cfm/ft^2
Medical procedure rooms	20	15
Operating rooms	20	30
Patient rooms	10	25
Physical therapy	20	15
Recovery and ICU	20	15
Hotels, motels, resorts and dormitories		
Assembly rooms	120	15

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[e]
Bathrooms [g ((,h))]	--	35
Bedrooms	--	30 cfm per room
Conference rooms	50	20
Dormitory sleeping areas	20	15
Gambling casinos	120	30
Living rooms	--	30 cfm per room
Lobbies	30	15
Offices		
Conference rooms	50	20
Office spaces	7	20
Reception areas	60	15
Telecommunication centers and data entry	60	20
Private dwellings, single and multiple		
Garages, common for multiple units [b]	--	((~~1.5~~)) 1.0 cfm/ft^2
Garages, separate for each dwelling	--	100 cfm per car
Kitchens [g]	--	100 cfm intermittent or 25 cfm continuous
Living areas ((e))	Based upon number of bedrooms, first bedroom: 2; each additional bedroom: 1	0.35 air changes per hour[a] or 15 cfm per person, whichever is greater
Toilet rooms ((~~and~~)), bathrooms [g ((,h))] and laundry areas [k]	--	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous
Public spaces		
Corridors and utilities	--	0.05 cfm/ft^2
Elevator car [g]	--	1.00 cfm/ft^2
Locker rooms		0.5 cfm/ft^2
Shower rooms (per shower head) [g h]		50 cfm intermittent or 20 cfm continuous
((~~Smoking lounges~~[b,h])) [j]	((~~70~~))	((~~60~~))
Toilet rooms [g]		75 cfm per water closet or urinal
Retail stores, sales floors and showroom floors		
Basement and street	--	0.30 cfm/ft^2
Dressing rooms	--	0.20 cfm/ft^2
Malls and arcades	--	0.20 cfm/ft^2
Shipping and receiving	--	0.15 cfm/ft^2
((~~Smoking lounges~~[b])) [j]	((~~70~~))	((~~60~~))
Storage rooms	--	0.15 cfm/ft^2
Upper floors	--	0.20 cfm/ft^2
Warehouses	--	0.05 cfm/ft^2
Specialty shops		
Automotive motor-fuel-dispensing stations	--	1.5 cfm/ft^2
Barber	25	15

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[e]
Beauty	25	25
Clothiers, furniture	--	0.30 cfm/ft^2
Embalming room [b]		2.0 cfm/ft^2
Florists	8	15
Hardware, drugs, fabrics	8	15
Nail salon [b, i]	--	50 cfm intermittent or 20 cfm continuous per station
Pet shops	--	1.00 cfm/ft^2
Reducing salons	20	15
Supermarkets	8	15
Sports and amusement		
Ballrooms and discos	100	25
Bowling alleys (seating areas)	70	25
Game rooms	70	25
Ice arenas	--	0.50 cfm/ft^2
Playing floors (gymnasiums)	30	20
Spectator areas	150	15
Swimming pools (pool and deck area)	--	0.50 cfm/ft^2
Storage		
((~~Repair garages, enclosed~~))		
Enclosed loading docks [d]	--	1.5 cfm/ft^2
Enclosed parking garages [d]	--	1.0 cfm/ft^2
Repair garages	--	1.5 cfm/ft^2
Warehouses	--	0.05 cfm/ft^2
Non-retail storage spaces (>100 ft^2) [g]	--	0.05 cfm/ft^2
Theaters		
Auditoriums	150	15
Lobbies	150	20
Stages, studios	70	15
Ticket booths	60	20
Transportation		
Platforms	100	15
Vehicles	150	15
Waiting rooms	100	15
Workrooms		
Bank vaults	5	15
Darkrooms	--	0.50 cfm/ft^2
Duplicating, printing	--	0.50 cfm/ft^2
Meat processing [c]	10	15
Pharmacy	20	15
Photo studio	10	15

For SI: 1 cubic foot per minute= 0.0004719 m^3/s, 1 ton= 908 kg,
1 cubic foot per minute per square foot= 0.00508 m^3/(s•m^2), °C= [(°F) – 32]/1.8, 1 square foot = 0.0929 m^2.

Based upon net floor area.

Mechanical exhaust required and the recirculation of air from such spaces as permitted by Section 403.2.1 is prohibited (see Section 403.2.1, Items 1 and 3).

Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

Ventilation systems ((~~in enclosed parking garages~~)) shall comply with Section 404.

Where the ventilation rate is expressed in cfm/ft^2, such rate is based upon cubic feet per minute per square foot of the floor area being ventilated.

The sum of the outdoor and transfer air from adjacent spaces shall be sufficient to provide an exhaust rate of

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[e]

not less than 1.5 cfm/ft^2.

Transfer air permitted in accordance with Section 403.2.2.

[W] Reserved. ((~~Mechanical exhaust is required and recirculation is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces (see Section 403.2.1, Items 2 and 4).~~))

The required exhaust system shall capture the contaminants and odors at their source.

RCW 70.160.030 states: "No person may smoke in a public place or in any place of employment."

A laundry area contained within a kitchen or bathroom is not required to have source specific exhaust. When door(s) separate the area from the room, the door(s) shall be louvered.

SECTION 404

ENCLOSED LOADING DOCKS AND PARKING GARAGES

404.1 Enclosed loading dock and parking garage((s)) exhaust ventilation systems.

Mechanical ventilation systems for enclosed loading docks and parking garages shall be permitted to operate intermittently where the system is equipped with a control device that ((~~is arranged to~~)) operates the system automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices. Each of the following types of controllers shall be capable of shutting off fans or modulating fan speed.

1. Gas sensor controllers used to activate the exhaust ventilation system shall stage or modulate fan speed upon detection of specified gas levels. All equipment used in sensor controlled systems shall be designed for the specific use and installed in accordance with the manufacturer's recommendations. The following are minimum gas sensor system requirements:

1.1. Garages and loading docks used predominantly by gasoline-powered vehicles shall be equipped with a controller and a full array of carbon monoxide (CO) sensors set to maintain levels of carbon monoxide below 35 parts per million (ppm). Spacing and location of the sensors shall be in accordance with manufacturer specifications.

1.2. Where more than 20 percent of the vehicles using the garage or loading dock are powered by non-gasoline fuels, the area exposed to non-gasoline fueled vehicle exhaust shall be equipped with a controller and fuel-appropriate sensors. The set-point for the non-gasoline sensors shall be no less than the standard used by OSHA for eight hour exposure. The controller shall activate the ventilation system when sensor set-point is reached. Spacing and location of the sensors shall be in accordance with manufacturer specifications.

2. Automatic time clocks used to activate the system during occupied periods shall be capable of scheduling multiple start and stop times for each day of the week, varying the daily schedule, and retaining programming for a 10-hour period during loss of power.

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

404.1.1 System activation devices for enclosed loading docks. Ventilation systems for enclosed loading docks shall be activated by one of the following:

1. Gas sensors, or

2. Time clock and manual over-ride switch located in the dock area that is accessible to persons in the loading dock area.

404.1.2 System activation devices for enclosed parking garages. Ventilation systems for enclosed parking garages shall be activated by gas sensors.

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

404.1.3 Ventilation makeup air. Ventilation makeup air shall be mechanically supplied to levels of enclosed loading docks and parking garages more than 3 stories above or below the nearest garage or loading dock entrance or exit.

404.1.4 Exhaust termination point. The termination point or exhaust outlet for enclosed loading dock and garage exhaust ducts discharging to the atmosphere shall be located using the following minimum distances: 10 feet from property lines, 10 feet from operable openings into buildings, and 10 feet from mechanical air intakes. Exhaust outlets extending to the roof shall extend 3 feet (914 mm) above the roof surface.

404.2 Minimum ventilation. Where a time clock is used as the only control device for the automatic operation of the exhaust ventilation system, fans shall be staged to maintain continuous operation of the system. The minimum ventilation rate shall not be reduced below the requirements of 404.2.1 and 404.2.2.

404.2.1 Enclosed parking garages. Automatic operation of the exhaust ventilation system for enclosed parking garages shall not reduce the minimum ventilation rate below 0.05 cfm per square foot (0.00025 $m^3/s \cdot m^2$) of the garage floor area and the system shall be capable of producing a ventilation rate of ((~~1.5~~)) 1.0 cfm per square foot ((~~0.0076 $m^3/s \cdot m$~~)) (0.00508 $m^3/s \cdot m^2$) of floor area.

404.2.2 Enclosed loading docks. Automatic operation of the exhaust ventilation system for enclosed loading docks shall not reduce the minimum ventilation rate below 1.0 cfm per square foot (0.00508 $m^3/s \cdot m^2$) of the loading dock floor area and the system shall be capable of producing a ventilation rate of 1.5 cfm per square foot (0.0076 $m^3/s \cdot m$) of floor area.

404.3 Occupied spaces accessory to public garages. Connecting offices, waiting rooms, ticket booths and similar uses that are accessory to a public garage shall be maintained at a positive pressure and shall be provided with ventilation in accordance with Section 403.3.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

Interpretation: In certain land use zones, the Seattle Land Use Code (Municipal Code Title 23) requires that the venting of odors, vapors, smoke, cinders, dust, gas and fumes shall be at least 10 feet (3048 mm) above finished sidewalk grade, and directed away as much as possible from residential uses within 50 feet (15 240 mm) of the vent. This requirement has been interpreted to apply to garage exhaust system terminations.

SECTION 405

SYSTEMS CONTROL

405.1 General. Mechanical ventilation systems shall be provided with manual or automatic controls that will operate such systems whenever the spaces are occupied. Air-conditioning systems that supply required ventilation air shall be provided with controls designed to automatically maintain the required outdoor air supply rate during occupancy. Additional mechanical system control requirements are contained in the *Washington State Energy Code with Seattle Amendments*.

SECTION 406

VENTILATION OF UNINHABITED SPACES

406.1 General. ((~~Uninhabited spaces, such as c~~)) Crawl spaces and attics((,)) shall be provided with natural ventilation openings as required by the *International Building Code* or shall be provided with a mechanical exhaust and supply air system. The mechanical exhaust rate shall be not less than 0.02 cfm per square foot (0.00001 $m^3/s \cdot m^2$) of horizontal area and shall be

automatically controlled to operate when the relative humidity in the space served exceeds 60 percent.

Section 6. The following sections of Chapter 5 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 501

GENERAL

501.2 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a nuisance and not less than the distances specified in Section 501.2.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or crawl space.

Exceptions:

1. Whole-house ventilation-type attic fans shall be permitted to discharge into the attic space of dwelling units having private attics.

2. Commercial cooking recirculating systems.

501.2.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade

Interpretation: Item 1 includes carpentry shop exhaust, industrial chemical lab, paint shop and sandblasting exhaust systems.

2. For other product-conveying outlets: 10 feet (3048 mm) from ((~~the~~)) property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.

Interpretation: Item 2 includes central vacuum systems, dry cleaner, photo lab, school chemical lab and combustion engine exhaust.

3. For environmental air duct exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes.

[W] Exceptions:

1. The separation between an air intake and exhaust outlet on a single listed package HVAC unit.

2. Exhaust from environmental air systems other than garages may be discharged into an open parking garage.

3. Except for Group I occupancies, where ventilation system design circumstances require building HVAC air to be relieved, such as during economizer operation, such air may be relieved into an open or enclosed parking garage within the same building.

[W] 4. For specific systems: for clothes dryer exhaust, see Section 504.4; for kitchen hoods, see Section 506.3; ((~~and~~)) for dust, stock and refuse conveying systems, see Section 511.2; for subslab soil exhaust systems, see Section 512.4; for enclosed parking garage exhaust systems, see Section 404; for transformer vaults, see Seattle Building Code Section 422.

* * *

501.4 Ducts. Where exhaust duct construction is not specified in this chapter, such construction shall comply with Chapter 6.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

Note: Seattle Land Use Code (Municipal Code Title 23) requires that the venting of odors, vapors, smoke, cinders, dust, gas and fumes shall be at least 10 feet (3048 mm) above finished sidewalk grade, and directed away as much as possible from residential uses within 50 feet (15 240 mm) of the vent in some locations.

SECTION 502

REQUIRED SYSTEMS

* * *

502.1 General. An exhaust system shall be provided, maintained and operated as specifically required by this section and for all occupied areas where machines, vats, tanks, furnaces, forges, salamanders and other appliances, equipment and processes in such areas produce or throw off dust or particles sufficiently light to float in the air, or which emit heat, odors, fumes, spray, gas or smoke, in such quantities so as to be irritating or injurious to health or safety.

502.1.1 Exhaust inlet location. The inlet to an exhaust system shall be located in the area of heaviest concentration of contaminants.

[F] 502.1.2 Fuel-dispensing areas. The bottom of an air inlet or exhaust opening in fuel-dispensing areas shall be located not more than 18 inches (457 mm) above the floor.

502.1.3 Equipment, appliance and service rooms. Equipment, appliance and system service rooms that house sources of odors, fumes, noxious gases, smoke, steam, dust, spray or other

contaminants shall be designed and constructed so as to prevent spreading of such contaminants to other occupied parts of the building.

[F] 502.1.4 Hazardous exhaust. The mechanical exhaust of high concentrations of dust or hazardous vapors shall conform to the requirements of Section 510.

* * *

[F] 502.7 Application of flammable finishes. Mechanical exhaust as required by this section shall be provided for operations involving the application of flammable finishes.

Spray finishing operations conducted in Group A, E, I or R occupancies shall be located in a spray room separated vertically and horizontally from other areas in accordance with the *International Building Code*. In other occupancies, spray-finishing operations shall be conducted in a spray room, spray booth or limited spraying area approved for such use.

* * *

502.14 Motor vehicle operation. In areas where motor vehicles operate, mechanical ventilation shall be provided in accordance with Section 403. Additionally, areas in which stationary motor vehicles are operated shall be provided with a source capture system that connects directly to the motor vehicle exhaust systems. When the source capture system extends more than 10 feet from the tailpipe connection to the outdoors, the system shall exhaust at a rate of 600 cfm for heavy-duty diesel vehicles and at a rate of 300 cfm for all other vehicles.

Exceptions:

1. This section shall not apply where the motor vehicles being operated or repaired are electrically powered.

2. This section shall not apply to one- and two-family dwellings.

3. This section shall not apply to motor vehicle service areas where engines are operated inside the building only for the duration necessary to move the motor vehicles in and out of the building.

* * *

502.18 Specific rooms. Specific rooms, including bathrooms, locker rooms, ((~~smoking lounges~~)) and toilet rooms, shall be exhausted in accordance with the ventilation requirements of Chapter 4.

Interpretation: RCW 70.160.030 states: "No person may smoke in a public place or in any place of employment." A public place is defined in RCW 70.160.020 in part as: "...A public place does not include a private residence unless the private residence is used to provide licensed child care, foster care, adult care, or other similar social service care on the premises. . . . This chapter is not intended to restrict smoking in private facilities which are occasionally open to the public except upon the occasions when the facility is open to the public."

* * *

SECTION 504

CLOTHES DRYER EXHAUST

* * *

504.4 Exhaust installation. Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or chimney. ((~~Clothes dryer exhaust ducts shall not extend into or through ducts or plenums.~~))

* * *

504.6 Domestic clothes dryer ducts. Exhaust ducts for domestic clothes dryers shall be constructed of metal and shall have a smooth interior finish. The exhaust duct shall be a minimum nominal size of 4 inches (102 mm) in diameter. The entire exhaust system shall be supported and secured in place. The male end of the duct at overlapped duct joints shall extend in the direction of airflow. Clothes dryer transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) and shall be listed and labeled for the application. Transition ducts shall not be concealed within construction.

504.6.1 Maximum length. The maximum length of a clothes dryer exhaust duct shall not exceed 25 feet (7620 mm) from the dryer location to the outlet terminal. The maximum length of the duct shall be reduced 2 ½ feet (762 mm) for each 45 degree (0.79 rad) bend and 5 feet (1524 mm) for each 90 degree (1.6 rad) bend. The maximum length of the exhaust duct does not include the transition duct.

Exceptions:

1. Where the make and model of the clothes dryer to be installed is known and the manufacturer's installation instructions for such dryer are provided to the code official, the maximum length of the exhaust duct, including any transition duct, shall be permitted to be in accordance with the dryer manufacturer's installation instructions.

2. The maximum length of the duct may be increased in an engineered exhaust system when a listed and labeled dryer exhaust booster fan is installed in accordance with the manufacturer's installation instructions.

504.6.2 Rough-in required. Where a compartment or space for a domestic clothes dryer is provided, an exhaust duct system shall be installed in accordance with Sections 504.6 and 504.6.1.

[W] 504.6.3 Protection required. Plates or clips shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Plates or clips shall be placed on the finish face of all framing members where there is less than 1¼ inch (32 mm) between the duct and the finish face of the framing material. The plate or clip shall be steel not less than 1/16 inch (1.59 mm) in thickness and of sufficient width to protect the duct.

* * *

SECTION 505

DOMESTIC KITCHEN EXHAUST EQUIPMENT

505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are located within dwelling units, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls and shall be air tight and equipped with a backdraft damper. Domestic kitchen exhaust systems shall be exhausted separately from domestic clothes dryer and bathroom vent systems.

Exceptions:

1. Where installed in accordance with the manufacturer's installation instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.

Interpretation: When a recirculating hood is used in a domestic kitchen, the kitchen shall have environmental air exhaust that complies with Table 403.3 and Section 501.

2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe provided that the installation complies with all of the following:

2.1. The duct shall be installed under a concrete slab poured on grade.

2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.

2.3. The PVC duct shall extend not greater than 1 inch (25 mm) above the indoor concrete floor surface.

2.4. The PVC duct shall extend not greater than 1 inch (25 mm) above grade outside of the building.

2.5. The PVC ducts shall be solvent cemented.

SECTION 506

COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST EQUIPMENT

* * *

[W] 506.3.3.1 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed ((~~in the presence of the code official~~)). Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test. A light test or an approved equivalent test method shall be performed to determine that all welded and brazed joints are liquid tight. A light test shall be performed by passing a lamp having a power rating of

not less than 100 watts through the entire section of duct work to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls.

A test shall be performed for the entire duct system, including the hood-to-duct connection. The ductwork shall be permitted to be tested in sections, provided that every joint is tested.

* * *

506.3.10 Grease duct enclosure. A grease duct serving a Type I hood that penetrates a ceiling, wall or floor shall be enclosed from the point of penetration to the outlet terminal. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code*. Ducts shall be enclosed in accordance with the *International Building Code* requirements for shaft construction. The duct enclosure shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings. Clearance from the duct to the interior surface of enclosures of combustible construction shall be not less than 18 inches (457 mm). Clearance from the duct to the interior surface of enclosures of noncombustible construction or gypsum wall board attached to noncombustible structures shall be not less than ((~~6~~)) 3 inches (((~~152 mm~~)) 76 mm). The duct enclosure shall serve a single grease exhaust duct system and shall not contain any other ducts, piping, wiring or systems.

Exceptions:

1. The shaft enclosure provisions of this section shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated and where the surface of the duct is continuously covered on all sides from the point at which the duct penetrates a ceiling, wall or floor to the outlet terminal with a classified and

labeled material, system, method of construction or product specifically evaluated for such purpose, in accordance with ASTM E 2336. Exposed duct wrap systems shall be protected where subject to physical damage.

2. The shaft enclosure provisions of this section shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated and where a prefabricated grease duct enclosure assembly is protected on all sides from the point at which the duct penetrates a ceiling, wall or floor to the outlet terminal with a classified and labeled prefabricated system specifically valuated for such purposes in accordance with UL 2221.

3. A duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.

* * *

506.3.12 Exhaust outlets serving Type I hoods. Exhaust outlets for grease ducts serving Type I hoods shall conform to the requirements of Sections 506.3.12.1 through 506.3.12.3.

506.3.12.1 Termination above the roof. Exhaust outlets that terminate above the roof shall have the discharge opening located not less than 40 inches (1016 mm) above the roof surface.

506.3.12.2 Termination through an exterior wall. Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors, and odors in the discharge from such terminations do not create a public nuisance or a fire hazard. Such terminations shall not be located where protected openings are required by the *International Building Code*. Other exterior openings shall not be located within ((~~3~~)) 10 feet (((~~914 mm~~)) 3048 mm) of such terminations.

Note: See Director's Rule 6-2005, or any rule superseding Director's Rule 6-2005 for additional requirements.

506.3.12.3 Termination location. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from parts of the same or contiguous buildings, adjacent buildings, adjacent property lines and air intake openings into any building and shall be located not less than 10 feet (3048 mm) above the adjoining grade level.

Exception: Exhaust outlets shall terminate not less than 5 feet (1524 mm) from parts of the same or contiguous building, an adjacent building, adjacent property line and air intake openings into a building where air from the exhaust outlet discharges away from such locations.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

506.4 Ducts serving Type II hoods. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. Commercial kitchen exhaust systems serving Type II hoods shall comply with Sections 506.4.1 and 506.4.2.

506.4.1 Type II exhaust outlets. Exhaust outlets for ducts serving Type II hoods shall comply with Sections 401.4 and 401.4.2. Such outlets shall be protected against local weather conditions and shall meet the provisions for exterior wall opening protectives in accordance with the *International Building Code.*

506.4.2 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials. Duct construction, installation, bracing and supports shall comply with Chapter 6. A duct serving a Type II hood that penetrates a fire-resistance-rated ceiling, floor or wall shall be enclosed in a duct enclosure from the point of penetration to the outlet terminal. Ducts subject to

positive pressure and ducts conveying moisture-laden or waste-heat-laden air shall be constructed, joined and sealed in an approved manner.

* * *

SECTION 507

COMMERCIAL KITCHEN HOODS

* * *

507.2 Where required. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2.1 and 507.2.2. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed.

507.2.1 Type I hoods. Type I hoods shall be installed ((~~where~~)) for collecting and removing grease and smoke generated from cooking appliances ((~~produce grease or smoke~~)), such as occurs with griddles, fryers, broilers, ovens, ranges and wok ranges.

507.2.1.1 Operation. Type I hood systems shall be designed and installed to automatically activate the exhaust fan whenever cooking operations occur. The activation of the exhaust fan shall occur through an interlock with the cooking appliances, by means of heat sensors or by means of other approved methods.

507.2.2. Type II hoods. Type II hoods shall be installed ((~~where~~)) for collecting and removing steam, vapor, heat or odors from cooking or dishwashing appliances ((~~produce heat, steam, or products of combustion and do not produce grease or smoke~~)), such as steamers, kettles, pasta cookers, pastry ovens, pizza ovens, coffee roaster ovens, roasting ovens of maximum 6 kW (20,000 Btu/h) capacity, and dishwashing machines above 140°F (60° C) maximum water temperature.

Exceptions:

1. Under-counter-type commercial dishwashing machines.

2. A Type II hood is not required for dishwashers and potwashers that are provided with heat and water vapor exhaust systems that are supplied by the appliance manufacturer and are installed in accordance with the manufacturer's instructions.

3. A single light-duty electric convection, bread, retherm or microwave oven. The additional heat and moisture loads generated by such appliances shall be accounted for in the design of the HVAC system.

4. A Type II hood is not required for the following electrically heated appliances: toasters, steam tables, popcorn poppers, hot dog cookers, coffee makers, rice cookers, egg cookers, holding/warming ovens. The additional heat and moisture loads generated by such appliances shall be accounted for in the design of the HVAC system.

507.2.3 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliances and processes in accordance with Sections 507.2, 507.2.1 and 507.2.2.

507.2.4 Extra-heavy-duty. Type I hoods for use over extra-heavy-duty cooking appliances shall not cover other appliances that require fire extinguishing equipment and such hoods shall discharge to an exhaust system that is independent of other exhaust systems.

Note: The definition of extra-heavy-duty cooking appliance includes appliances using solid fuel.

-**Interpretation:** The table below summarizes the types of hoods that are required for different types of appliances.

TYPE OF APPLIANCE[1]	TYPE OF HOOD REQUIRED[2]		
	TYPE I[3]	TYPE II	NONE
Baking oven	Solid fuel	> 6 kW	≤ 6 kW

Charbroiler	All sizes		
Coffee maker		> 6 kW	≤ 6 kW
Coffee roaster[4]		All sizes	
Convection ovens (electric)		> 6 kW	< 6 kW
Deep-fat fryer	All sizes		
Dishwasher		> 140°F	≤ 140°F
Grill	All sizes		
Hot dog display heater		> 6 kW	≤ 6 kW
Microwave oven			All sizes
Pastry oven		> 6 kW	≤ 6 kW
Pizza oven	Solid fuel	> 6 kW	≤ 6 kW
Popcorn maker		> 6 kW	≤ 6 kW
Roasting oven[5]	> 6 kW	≤ 6 kW	
Roll warmer		> 6 kW	≤ 6 kW
Solid-fuel burning appliances	All sizes & all food products		
Soup warmer, soup preparation cooking unit		> 6 kW	≤ 6 kW
Steam reconstitution device		> 6 kW	≤ 6 kW
Steam table		> 6 kW	≤ 6 kW
Steamer		> 6 kW	≤ 6 kW
Toaster		> 6 kW	≤ 6 kW
Warming oven		> 6 kW	≤ 6 kW
The code official shall determine hood requirements for appliances not listed in the table.			
Section 507.2 defines Type I and Type II kitchen hoods.			
The definition of extra-heavy-duty cooking appliance includes all appliances utilizing solid fuel.			
Puget Sound pollution control requires an after-burner for particulates.			
Roasting ovens are used to cook raw or partially cooked food.			

* * *

507.13. Capacity of hoods. Commercial food service hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections 507.13.1 through 507.13.4. The net quantity of exhaust air shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood. Where any combination of heavy-duty, medium-duty and light-duty cooking appliances are utilized under a single hood, the exhaust rate required by this section for the heaviest duty appliance covered by the hood shall be used for the entire hood.

507.13.1 Extra-heavy-duty (solid fuel) cooking appliances. The minimum net airflow for Type I hoods used for extra-heavy-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	Not allowed
Double island canopy (per side)	550
Eyebrow	Not allowed
Single island canopy	700
Wall-mounted canopy	550

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.2 Heavy-duty cooking appliances. The minimum net airflow for Type I hoods used for heavy-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	400
Double island canopy (per side)	400
Eyebrow	Not allowed
Single island canopy	600
Wall-mounted canopy	400

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.3 Medium-duty cooking appliances. The minimum net airflow for Type I hoods used for medium-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	300
Double island canopy (per side)	300
Eyebrow	250
Single island canopy	500
Wall-mounted canopy	300

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.4 Light-duty cooking appliances. The minimum net airflow for Type I hoods used for light duty cooking appliances and food service preparation and cooking operations approved for use under a Type II hood shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	250
Double island canopy (per side)	250
Eyebrow	250
Single island canopy	400
Wall-mounted canopy	200

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.5 Dishwashing appliances. The minimum net airflow for Type II hoods used for dishwashing appliances shall be 100 CFM per linear foot of hood length.

Exception: Dishwashing appliances and equipment installed in accordance with Section 507.2.2, Exception 2.

* * *

SECTION 508

COMMERCIAL KITCHEN MAKEUP AIR

508.1 Makeup air. Makeup air shall be supplied during the operation of commercial kitchen exhaust systems that are provided for commercial cooking appliances. ((~~The amount of makeup air supplied shall be approximately equal to the amount of exhaust air.~~)) A separate makeup air system for the kitchen shall supply not less than 90 percent of the air to be exhausted. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both. For mechanical makeup air systems, the exhaust and all systems providing makeup air ((~~systems~~)) shall be electrically interlocked to insure that makeup air is provided whenever the exhaust system is in operation. Exterior windows and doors shall not be used to provide commercial kitchen makeup air. When individual kitchen hoods are designed to exhaust greater than 5000 cfm, refer to *Washington State Energy Code with Seattle Amendments* Section 1439.1 for additional makeup air system requirements. Makeup air intake opening locations shall comply with Sections 401.4 and 401.4.1.

Exceptions:

1. The total makeup air for the exhaust system is less than 400 cfm; or

2. Occupant ventilation air that would otherwise exfiltrate or be exhausted by other mechanical exhaust systems may be used to provide all makeup air, or a portion of makeup air when a direct path through permanent openings exists for occupant ventilation air to transfer to the kitchen hood area. That portion of air not supplied by occupant ventilation air shall be provided by a separate makeup air system. The combined air quantity provided by a separate makeup air system and occupant ventilation air shall provide 100 percent of the air to be exhausted.

508.1.1 Makeup air temperature. The temperature differential between makeup air and the air in the conditioned space shall not exceed 10°F (6°C) if the amount of makeup air supply exceeds 2,500 cfm (1180 L/s) per space.

Exceptions:

1. Makeup air that is part of the air-conditioning system.

2. Makeup air that does not decrease the comfort conditions of the occupied space.

* * *

SECTION 510

HAZARDOUS EXHAUST SYSTEMS

* * *

510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.

2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.

3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.

((~~**Exception:** Laboratories, as defined in Section 510.1, except where the concentrations listed in Item 1 are exceeded or a vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2, 3 or 4 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.~~))

Laboratories are permitted to comply with rules promulgated by the code official and the fire code official in lieu of this section.

Note: See Director's Rule 30-2005, or any rule superseding Director's Rule 30-2005 for alternate provisions for research and education laboratories.

* * *

510.7 Suppression required.

510.7.1 Ducts. Ducts shall be protected with an approved automatic fire suppression system installed in accordance with the *International Building Code*.

Exceptions:

1. An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists and vapors that are nonflammable and noncombustible under all conditions and at any concentrations.

2. An approved automatic fire suppression system shall not be required in ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).

3. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required in laboratory hoods or exhaust systems.

4. An approved automatic fire suppression system is not required in metallic ducts if all fume hoods served by the duct are equipped with an approved fire suppression system.

510.7.2 Fume Hoods. Approved automatic fire suppression shall be installed in fume hoods within which operations are conducted involving hazardous materials that have the potential to create a flammable vapor, gas, fume, mist, or dust in concentrations exceeding 25 percent of the lower flammability limit of the substance or mixture for the expected room temperature in the absence of the fume hood and under normal operating conditions.

* * *

SECTION 511

DUST, STOCK AND REFUSE CONVEYING SYSTEMS

* * *

511.1.1 Collectors and separators. Collectors and separators involving such systems as centrifugal separators, bag filter systems and similar devices, and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe that extends above the highest part of any roof with a distance of 30 feet (9144 mm).

Exceptions:

1. Collectors such as "Point of Use" collectors, close extraction weld fume collectors, spray finishing booths, stationary grinding tables, sanding booths, and integrated or machine-mounted

collectors shall be permitted to be installed indoors provided the installation is in accordance with the *International Fire Code* and the ((~~ICC~~)) Seattle *Electrical Code*.

2. Collectors in independent exhaust systems handling combustible dusts shall be permitted to be installed indoors provided that such collectors are installed in compliance with the *International Fire Code* and the ((~~ICC~~)) Seattle *Electrical Code*.

* * *

SECTION 512

SUBSLAB SOIL EXHAUST SYSTEMS

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512.2 Materials. Subslab soil exhaust system duct material shall be air duct material listed and labeled to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the ((~~*International*~~)) Uniform *Plumbing Code* as building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper pipe; copper tube of a weight not less than that of copper drainage tube, Type DWV; and plastic piping.

* * *

SECTION 513

SMOKE CONTROL SYSTEMS

* * *

[F] 513.3 Special inspection and test requirements. In addition to the ordinary inspection and test requirements which buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 of the *International Building Code* shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke

control design in its final installed condition. The design submission accompanying the construction documents shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same terms as found in Section 1704 of the *International Building Code*.

Note: See SFD Administrative Rules 9.01.04 and 9.02.04 for further specific requirements.

* * *

[F] 513.11 Power systems. The smoke control system shall be supplied with two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an approved ((~~standby~~)) emergency source complying with the ((~~ICC~~)) *Seattle Electrical Code*. The ((~~standby~~)) emergency power source and its transfer switches shall be in a separate room from the normal power transformers and switch gear and shall be enclosed in a room constructed of not less than 1-hour fire-resistance-rated fire barriers, ventilated directly to and from the exterior. Power distribution from the two sources shall be by independent routes. Transfer to full ((~~standby~~)) emergency power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with the ((~~ICC~~)) *Seattle Electrical Code*.

[F] 513.11.1 Power sources and power surges. Elements of the smoke management system relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span 15-minute primary power interruption. Elements of the smoke management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other approved means.

[F] 513.11.2 Wiring. In addition to meeting requirements of the *Seattle Electrical Code*, all wiring regardless of voltage, shall have fire-resistance-rated protection of at least two hours or as required in rules promulgated by the code official.

Exception: Subject to the approval of the code official, fire-resistance-rating is not required for wiring located in a parking garage.

[F] 513.12 Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Chapter 9 of the *International Building Code* and NFPA 72. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control equipment.

Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, the presence of power downstream of all disconnects and, through a preprogrammed weekly test sequence, report abnormal conditions audibly, visually and by printed report.

[F] 513.12.1 Wiring. ((~~In addition to meeting the requirements of the ICC *Electrical Code*, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.~~)) See Section 513.11.

[F] 513.12.2 Activation. Smoke control systems shall be activated in accordance with the *International Building Code*.

[F] 513.12.3 Automatic control. Where completely automatic control is required or used, the automatic control sequences shall be initiated from an appropriately zoned automatic sprinkler system complying with Section 903.3.1.1 of the *International Fire Code* or from manual controls that are readily accessible to the fire department, and any smoke detectors ((~~required by engineering analysis~~)).

* * *

SECTION 514

ENERGY RECOVERY VENTILATION SYSTEMS

514.1 General. Energy recovery ventilation systems shall be installed in accordance with this section. Where required for purposes of energy conservation, energy recovery ventilation systems shall also comply with the ((~~*International Energy Conservation Code*~~)) *Washington State Energy Code with Seattle Amendments*.

* * *

Section 7. The following sections of Chapter 6 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 601

GENERAL

[B] 601.2 Air movement in egress elements. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.

Exceptions:

1. Use of a corridor as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, ((~~smoking lounges~~)) and janitor closets, shall be permitted, provided that each such corridor is directly supplied with ((~~outdoor~~)) air at a rate greater than the rate of makeup air taken from the corridor.

2. Where located within a dwelling unit, the use of corridors for conveying return air shall not be prohibited.

3. Where located within tenant spaces of 1,000 square feet (93 m^2) or less in area, utilization of corridors for conveying return air is permitted.

[W] 4. Where such air is part of an engineered smoke control system.

[W] 5. Make up or relief air in corridors of Group I-2 occupancies.

[W] 6. Corridors serving residential occupancies shall be permitted to be supplied without specific mechanical exhaust subject to the following:

6.1 The supply air is 100% outdoor air; and

6.2 The units served by the corridor have conforming ventilation independent of the air supplied to the corridor, and

6.3 For other than high-rise buildings, the supply fan will automatically shut off upon activation of corridor smoke detectors that shall be spaced at no more than 30 feet (9144 mm) on center along the corridor, or

6.4 For high-rise buildings, corridor smoke detector activation will close required smoke/fire dampers at the supply inlet to the corridor at the floor receiving the alarm.

[B] 601.2.1 Corridor ceiling. Use of the space between the corridor ceiling and the floor or roof structure above as a return air plenum is permitted for one or more of the following conditions:

1. The corridor is not required to be of fire-resistance-rated construction;

2. The corridor is separated from the plenum by fire-resistance-rated construction;

3. The air-handling system serving the corridor is shut down upon activation of the air-handling unit smoke detectors required by this code;

4. The air-handling system serving the corridor is shut down upon detection of sprinkler waterflow where the building is equipped throughout with an automatic sprinkler system; or

5. The space between the corridor ceiling and the floor or roof structure above the corridor is used as a component of an approved engineered smoke control system.

* * *

601.4 Contamination prevention. Exhaust ducts under positive pressure, chimneys, and vents shall not extend into or pass through ducts or plenums.

[W] **Exception:** Exhaust ducts conveying environmental air shall be permitted to pass through a duct or plenum where one of the following conditions is satisfied.

1. The duct is maintained under sufficient negative pressure to prevent leakage of exhaust air into the surrounding duct or plenum;

2. If maintained under a positive pressure with respect to the surrounding duct or plenum, the exhaust duct is sealed to prevent leakage;

3. The surrounding air stream is an exhaust air stream that is not recirculated to the building and cross contamination of the two air streams will not create a hazardous condition;

4. The duct is an insulated and sealed clothes dryer exhaust duct.

SECTION 602

PLENUMS

* * *

602.2 Construction. Plenum enclosures shall be constructed of materials permitted for the type of construction classification of the building.

The use of gypsum boards to form plenums shall be limited to systems where the air temperatures do not exceed 125°F (52°C) and the building and mechanical system design conditions are such that the gypsum board surface temperature will be maintained above the airstream dew-point temperature as determined by the design engineer. Air plenums formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

* * *

602.2.1.1 Wiring. Combustible electrical or electronic wiring methods and materials, optical fiber cable, and optical fiber raceway exposed within a plenum shall have a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread not greater than 5 feet (1524 mm) when tested in accordance with NFPA 262. Only type OFNP (plenum rated nonconductive optical fiber cable) shall be installed in plenum-rated optical fiber raceways. Wiring, cable, and raceways addressed in this section shall be listed and labeled as plenum rated and shall be installed in accordance with ((~~ICC~~)) *Seattle Electrical Code.*

* * *

SECTION 603

DUCT CONTRUCTION AND INSTALLATION

* * *

603.5 Nonmetallic ducts. Nonmetallic ducts shall be constructed with Class 0 or Class 1 duct material in accordance with UL 181. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards.* The maximum air temperature within nonmetallic ducts shall not exceed 250°F (121°C).

603.5.1 Gypsum ducts. The use of gypsum boards to form air shafts (ducts) shall be limited to return air systems where the air temperatures do not exceed 125°F (52°C) and the gypsum board surface temperature is maintained above the airstream dew-point temperature as determined by the design engineer. Air ducts formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

Exceptions:

1. Gypsum boards coated on the inside with epoxy paint may be used for supply or exhaust air ducts.

2. Foil-backed gypsum boards may be used for supply or exhaust air ducts.

3. Gypsum boards may be used for ducts that are used only for stairway or elevator pressurization air.

* * *

603.9 Joints, seams and connections. All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC *Duct Construction Standards—Metal and Flexible,* SMACNA *Fibrous Glass Duct Construction Standards,* and NAIMA *Fibrous Glass Duct Construction Standards*. All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes. Tapes and mastics used to seal ductwork listed and labeled in accordance with UL 181A shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Tapes and mastics used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-M" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked "181B-C". Unlisted duct tape is not permitted as a sealant on any metal ducts.

603.10 Supports. Ducts shall be supported with approved hangers at intervals not exceeding 10 feet (3048 mm) or by other approved duct support systems designed in accordance with the

International Building Code. Flexible and other factory-made ducts shall be supported in accordance with the manufacturer's installation instructions.

603.10.1 Seismic bracing of ducts. Longitudinal and transverse bracing is required for ducts 6 square feet (0.56 m^2) and larger, including round ducts with a diameter of 34 inches (864 mm) or more, and on all duct systems used for life safety and smoke control installed in either the horizontal or vertical position.

603.10.1.1 Transverse bracing. Transverse bracing shall occur at maximum intervals of 30 feet (9144 mm), at each duct turn and at the end of a duct run. Walls, including non-bearing fixed partitions, that have ducts running through them may replace a transverse brace.

603.10.1.2 Longitudinal bracing. Longitudinal bracing shall occur at maximum intervals of 60 feet (18 288 mm). Transverse bracing for one duct section may also act as longitudinal bracing for a duct section connected perpendicular to it, if bracing is installed within four feet (1219 mm) of the intersection and sized and installed on the larger duct.

603.10.2 Grouping of ducts. Groups of ducts may be combined in a larger size frame using overall dimensions and maximum weight of ducts. At least 2 sides of each duct shall be connected to the angles of the brace.

603.10.3 Seismic loads. Bracing for ducts shall be designed to resist seismic loading, using accepted engineering practices and Chapter 16 of the *International Building Code.*

Exception: No bracing is required if the duct is suspended by hangers 12 inches (305 mm) or less in length as measured from the top of the duct to the bottom of the support where the hanger is attached. Hangers shall be positively attached to the duct within 2 inches (51 mm) of the top of the duct with a minimum of two #10 sheet metal screws.

Interpretation: Duct bracing that complies with the SMACNA guideline "Seismic Restraint Manual Guidelines for Mechanical Systems" is deemed to comply with Section 603.10.1.

* * *

603.15 Mechanical protection. Ducts installed in locations where they are exposed to mechanical damage by vehicles or from other causes shall be protected by approved barriers. Ducts in parking garages shall not interfere with the headroom requirements specified by the *International Building Code*.

* * *

SECTION 604

INSULATION

604.1 General. Duct insulation shall conform to the requirements of ((~~Sections 604.2 through 604.13 and the *International Energy Conservation Code*~~)) the *Washington State Energy Code with Seattle Amendments*.

* * *

SECTION 606

SMOKE DETECTION SYSTEMS CONTROL

* * *

606.2 Where required. Smoke detectors shall be installed where indicated in Sections 601.2, 606.2.1 through 606.2.3.

Exception: Smoke detectors shall not be required where air distribution systems are incapable of spreading smoke beyond the enclosing walls, floors and ceilings of the room or space in which the smoke is generated.

606.2.1 Return air systems. Smoke detectors shall be installed in return air systems with a design capacity greater than 2,000 cfm (0.9 m^3/s), in the return air duct or plenum upstream of any filters, exhaust air connections, outdoor air connections, or decontamination equipment and appliances.

Exception: Smoke detectors are not required in the return air system where all portions of the building served by the air distribution system are protected by area smoke detectors connected to a fire alarm system in accordance with the *International Fire Code*. The area smoke detection system shall comply with Section 606.4.

606.2.2 Common supply and return air systems. Where multiple air-handling systems share common supply or return air ducts or plenums with a combined design capacity greater than 2,000 cfm (0.9 m^3/s), the return air system shall be provided with smoke detectors in accordance with Section 606.2.1.

Exception: Individual smoke detectors shall not be required for each fan-powered terminal unit, provided that such units do not have an individual design capacity greater than 2,000 cfm (0.9 m^3/s) and will be shut down by activation of one of the following:

1. Smoke detectors required by Sections 601.2, 606.2.1 and 606.2.3.

2. An approved area smoke detector system located in the return air plenum serving such units.

3. An area smoke detector system as prescribed in the exception Section 606.2.1.

In all cases, the smoke detectors shall comply with Sections 606.4 and 606.4.1.

606.2.3 Return air risers. Where return air risers serve two or more stories and serve any portion of a return air system having a design capacity greater than 15,000 cfm (7.1 m^3/s), smoke

detectors shall be installed at each story. Such smoke detectors shall be located upstream of the connection between the return air riser and any air ducts or plenums.

Interpretation: The fan-powered terminal units may be shut down by the building automation system upon activation of smoke detection described in Section 606.2.2 items 1, 2, or 3. The building automation system is not required to be listed as a smoke control system, nor comply with UL Standard 864 Standard for Control Units and Accessories for Fire Alarm Systems.

* * *

606.4 Controls operation. Upon activation, the smoke detectors shall shut down all operational capabilities of the air distribution system in accordance with the listing and labeling of appliances used in the system. Air distribution systems that are part of a smoke control system shall switch to the smoke control mode upon activation of a detector.

606.4.1 Supervision. The duct smoke detectors shall be connected to the building's fire alarm control panel as a supervisory signal when a fire alarm system is provided. Duct detectors shall not activate a fire alarm signal. The actuation of a duct smoke detector shall activate a visible and audible supervisory signal at a constantly attended location.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where the duct smoke detector activates the building's alarm-indicating appliances.

2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an approved location. Duct smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.

SECTION 607

DUCT AND TRANSFER OPENINGS

* * *

607.5.5 Shaft enclosures. Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with listed fire and smoke dampers installed in accordance with their listing.

Exceptions:

1. Fire dampers are not required at penetrations of shafts where:

1.1. Steel exhaust subducts extend at least 22 inches (559 mm) vertically in exhaust shafts provided that there is a continuous airflow upward to the outdoors;

1.2. Penetrations are tested in accordance with ASTM E 119 as part of the fire-resistance-rated assembly;

1.3. Ducts are used as part of an approved smoke control system in accordance with Section 909 of the *International Building Code*, and where the fire damper will interfere with the operation of the smoke control system; or

1.4. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.

2. In Group B and R occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*, smoke dampers are not required at penetrations of shafts where kitchen, clothes ((,)) dryer, bathroom and toilet room exhaust openings with steel exhaust subducts, having a wall thickness of at least 0.019 inch (0.48 mm) extend at least 22 inches (559 mm) vertically and the exhaust fan at the upper terminus is powered continuously in accordance with the provisions of Section 909.11 of the *International Building Code*, and maintains airflow upward to the outdoors.

3. Smoke dampers are not required at penetration of exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.

4. Smoke dampers are not required at penetrations of shafts where ducts are used as part of an approved mechanical smoke control system designed in accordance with Section 909 of the *International Building Code* and where the smoke damper will interfere with the operation of the smoke control system.

Note: See Director's Rules for additional information about combining smoke and fire dampers in a single shaft.

607.6 Horizontal assemblies. Penetrations by air ducts of a floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall be protected by a shaft enclosure that complies with Section 707 and Sections 716.6.1 through 716.6.3 of the *International Building Code* or shall comply with Sections 607.6.1 through 607.6.3.

607.6.1 Through penetrations. In occupancies other than Groups I-2 and I-3, a duct constructed of approved materials in accordance with Section 603 that penetrates a fire-resistance-rated floor/ceiling assembly that connects not more than two stories is permitted without shaft enclosure protection provided that a listed fire damper is installed at the floor line or the duct is protected in accordance with Section 712.4 of the *International Building Code.* For air transfer openings, see Exception 7 to Section 707.2 ((~~702.2~~)) of the *International Building Code.*

Exception: A duct is permitted to penetrate three floors or less without a fire damper at each floor provided it meets all of the following requirements.

1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel not less than 0.019 inch (0.48 mm) (26 gage) in thickness.

2. The duct shall open into only one dwelling unit or sleeping unit and the duct system shall be continuous from the unit to the exterior of the building.

3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m^2) for any 100 square feet (9.3 m^2) of the floor area.

4. The annular space around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E 119 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

5. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a listed ceiling radiation damper installed in accordance with Section 607.6.2.

* * *

Section 8. The following section of Chapter 8 of the International Mechanical Code, 2006 Edition, is amended as follows:

* * *

SECTION 804

DIRECT-VENT, INTEGRAL VENT AND MECHANICAL DRAFT SYSTEMS

* * *

804.3.3 Termination. The termination of chimneys or vents equipped with power exhausters shall be located a minimum of 10 feet (3048 mm) from the lot line or from adjacent buildings. The exhaust shall be directed away from the building.

804.3.4 Horizontal terminations. Horizontal terminations shall comply with the following requirements:

1. Where located adjacent to walkways, the termination of mechanical draft systems shall be not less than ((~~7~~)) 10 feet ((~~2134 mm~~)) (3048 mm) above the level of the walkway.

2. Vents shall terminate at least 3 feet (914 mm) above any forced air inlet located within 10 feet (3048 mm).

3. The vent system shall terminate at least 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from or 1 foot (305 mm) above any door, window or gravity air inlet into the building.

4. The vent termination point shall not be located closer than 3 feet (914 mm) to an interior corner formed by two walls perpendicular to each other.

5. The vent termination shall not be mounted directly above or within 3 feet (914 mm) horizontally from an oil tank vent or gas meter.

6. The bottom of the vent termination shall be located at least 12 inches (305 mm) above finished grade.

804.3.5 Vertical terminations. Vertical terminations shall comply with the following requirements:

1. Where located adjacent to walkways, the termination of mechanical draft systems shall be not less than ((~~7~~)) 10 feet ((~~2134 mm~~)) (3048 mm) above the level of the walkway.

2. Vents shall terminate at least 3 feet (914 mm) above any forced air inlet located within 10 feet (3048 mm)((~~horizontally~~)).

3. Where the vent termination is located below an adjacent roof structure, the termination point shall be located at least 3 feet (914 mm) from such structure.

4. The vent shall terminate at least 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from or 1 foot (305 mm) above any door, window or gravity air inlet for the building.

5. A vent cap shall be installed to prevent rain from entering the vent system.

6. The vent termination shall be located at least 3 feet (914 mm) horizontally from any portion of the roof structure.

* * *

Section 9. The following section of Chapter 9 of the International Mechanical Code, 2006 Edition, is amended as follows:

* * *

SECTION 908

COOLING TOWERS, EVAPORATIVE CONDENSERS AND FLUID COOLERS

* * *

908.5 Water supply. Water supplies and protection shall be as required by the ((~~*International*~~)) *Uniform Plumbing Code*.

* * *

Section 10. The following sections of Chapter 11 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 1101

GENERAL

* * *

1101.4 Water connection. Water supply and discharge connections associated with refrigeration systems shall be made in accordance with this code and the ((~~*International*~~)) *Uniform Plumbing Code*.

* * *

SECTION 1105

MACHINERY ROOM, GENERAL REQUIREMENTS

[B] 1105.1 Design and construction. Machinery rooms shall be designed and constructed in accordance with the *International Building Code* and this section.

1105.2 Openings. Ducts and air handlers in the machinery room that operate at a lower pressure than the room shall be sealed to prevent any refrigerant leakage from entering the airstream.

[F] 1105.3 Refrigerant detector. Refrigerant detectors ((~~in machinery rooms~~)) shall be provided as follows: ((~~required by Section 606.8 of the *International Fire Code*.~~))

[F]1105.3.1 Within machinery rooms. Machinery rooms shall contain a refrigerant detector connected to an alarm system utilizing listed and labeled fire alarm signaling devices capable of generating a sound level, distinctive from other alarm signals, of at least 15 dB above the operating ambient sound pressure level of the space in which they are installed and initiating an approved distinctive visual alarm.

Where continuous mechanical ventilation is provided, failure of the ventilation system shall activate an audible and visual alarm.

The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate.

The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values shown in the *International Mechanical Code* for the refrigerant classification.

Exception: Machinery room vapor detectors for ammonia system shall actuate an alarm at a detection level not to exceed 1,000 ppm and shall automatically exhaust air from the machinery room in accordance with Section 1105.6.4 for emergency conditions.

Detectors and alarms shall be placed in approved locations.

[F] 1105.3.2 Outside of machinery rooms. Where evaporators and piping containing refrigerants are located within rooms or spaces used exclusively for processing or storage of materials under refrigerated conditions, the refrigerated room or space shall be equipped with a refrigerant-vapor detector and alarm system complying with Section 1105.3.1.

Activation of the refrigerant detector shall also automatically stop the flow of refrigerant to evaporators within the space and stop the flow of refrigerant in all supply lines leaving a machinery room whenever the refrigerant vapor concentration is detected at or above 50 percent of the IDLH or 25 percent of the LFL, whichever is lower.

1105.4 Tests. Periodic tests of the mechanical ventilating system shall be performed in accordance with manufacturer's specifications and as required by the code official.

1105.5 Fuel-burning appliances. Fuel-burning appliances and equipment having open flames and that use combustion air from the machinery room shall not be installed in a machinery room.

Exceptions:

1. Where the refrigerant is carbon dioxide or water.

2. Fuel-burning appliances shall not be prohibited in the same machinery room with refrigerant-containing equipment or appliances where combustion air is ducted from outside the machinery room and sealed in such a manner as to prevent any refrigerant leakage from entering the combustion chamber, or where a refrigerant vapor detector is employed to automatically shut off the combustion process in the event of refrigerant leakage.

1105.6 Ventilation. Machinery rooms shall have continuous mechanical ventilation ((~~be mechanically ventilated~~)) to the outdoors. Mechanical ventilation shall be capable of exhausting the minimum quantity of air both at normal operating and emergency conditions. Multiple fans

or multispeed fans shall be allowed in order to produce the emergency ventilation rate and to obtain a reduced airflow for normal ventilation.

Interpretation: The requirement for continuous mechanical ventilation to the outdoors means that fire dampers are not allowed on machinery room ventilation ducts. **Exception:** Where a refrigerating system is located outdoors more than 20 feet (6096 mm) from any building opening and is enclosed by a penthouse, lean-to or other open structure, natural or mechanical ventilation shall be provided. Location of the openings shall be based on the relative density of the refrigerant to air. The free-aperture cross section for the ventilation of the machinery room shall be not less than:

$F = \sqrt{G}$ **(Equation 11-1)**

For SI: $F = 0.138\sqrt{G}$

where:

F = The free opening area in square feet (m^2).

G = The mass of refrigerant in pounds (kg) in the largest system, any part of which is located in the machinery room.

1105.6.1 Discharge location. The discharge of the air shall be to the outdoors in accordance with Chapter 5. Exhaust from mechanical ventilation systems shall be discharged not less than 20 feet (6096 mm) from a property line or openings into buildings.

1105.6.2 Makeup air. Provisions shall be made for makeup air to be drawn from the outside to replace that being exhausted. Openings for makeup air shall be located to avoid intake of exhaust

air. Supply and exhaust ducts to the machinery room shall serve no other area, shall be constructed in accordance with Chapter 5 and shall be covered with corrosion-resistant screen of not less than ¼ -inch (6.4 mm) mesh.

1105.6.3 Quantity—normal ventilation. ((~~During occupied conditions, the~~)) The mechanical ventilation system shall exhaust the larger of the following:

1. Not less than 0.5 cfm per square foot (0.0025 $m^3/s \cdot m^2$) of machinery room area or 20 cfm (0.009 m^3/s) per person; or

2. A volume required to limit the room temperature rise to 18°F (10°C) taking into account the ambient heating effect of all machinery in the room.

1105.6.4 Quantity—emergency conditions. Upon actuation of the refrigerant detector required in Section 1105.3, the mechanical ventilation system shall exhaust air from the machinery room in the following quantity:

$$Q = 100 \times \sqrt{G} \qquad \text{(Equation 11-2)}$$

For SI: $Q = 0.07 \times \sqrt{G}$

where:

Q = The airflow in cubic feet per minute (m^3/s).

G = The design mass of refrigerant in pounds (kg) in the largest system, any part of which is located in the machinery room.

[F] 1105.6.5 Standby source of power required. Where treatment, detection, continuous ventilation, or alarm systems are required, such systems shall be connected to a standby source of power to supply electrical power in the event of loss of power from the primary source. See the *International Fire Code* Section 606 and Chapter 27 and *Seattle Electrical Code* Article 701.

1105.7 Termination of relief devices. Pressure relief devices, fusible plugs and purge systems located within the machinery room shall terminate outside of the structure at a location not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or exit.

[F] For additional requirements regarding termination of relief devices for flammable refrigerants, toxic and highly toxic refrigerants, ammonia refrigerant, treatment systems, flaring systems, and ammonia diffusion systems, see Section 606.11 of the *International Fire Code.*

* * *

SECTION 1106

MACHINERY ROOM, SPECIAL REQUIREMENTS

* * *

1106.3 Ammonia room ventilation. Ventilation systems in ammonia machinery rooms shall be operated continuously at the normal ((~~emergency~~)) ventilation rate determined in accordance with Section 1105.6.3 ((~~1105.6.4~~)).

Exception((s)):

((~~1. Machinery rooms equipped with a vapor detector that will automatically start the ventilation system at the emergency rate determined in accordance with Section 1105.6.4, and that will actuate an alarm at a detection level not to exceed 1,000 ppm; or~~))

((~~2.~~)) Machinery rooms conforming to the Class 1, Division 2, hazardous location classification requirements of the ((~~ICC~~)) *Seattle Electrical Code.*

1106.4 Flammable refrigerants. Where refrigerants of Groups A2, A3, B2 and B3 are used, the machinery room shall conform to the Class 1, Division 2, hazardous location classification requirements of the ((~~ICC~~)) *Seattle Electrical Code.*

Exception: Ammonia machinery rooms, but not including ventilation fan motors.

***

[F] 1106.7 Alarm activation. Where continuous ventilation is provided, failure of the ventilation system shall automatically activate an audible and visual alarm.

SECTION 1107

REFRIGERANT PIPING

* * *

1107.4.1 Steel pipe. Carbon steel pipe with a wall thickness not less than Schedule 80 shall be used for Group A2, A3, B2 or B3 refrigerant liquid lines for sizes 1.5 inches (38 mm) and smaller. Carbon steel pipe with a wall thickness not less than Schedule 40 shall be used for Group A1 or B1 refrigerant liquid lines 6 inches (152 mm) and smaller, Group A2, A3, B2 or B3 refrigerant liquid lines sizes 2 inches (51 mm) through 6 inches (152 mm) and all refrigerant suction and discharge lines 6 inches (152 mm) and smaller. ((~~Type F steel pipe shall not be used for refrigerant~~)) Refrigerant lines having an operating temperature less than -20°F (-29°C) shall be designed to meet the requirements of ASME B31.5-2001, *Refrigeration Piping and Heat Transfer*.

* * *

1107.7.1 Liquid receivers. All systems containing 100 pounds (45 kg) or more of a refrigerant, other than systems utilizing nonpositive displacement compressors, shall have stop valves, in addition to those required by Section 1107.7, on each inlet of each liquid receiver. Stop valves shall not be required on the inlet of a receiver in a condensing unit, nor on the inlet of a receiver which is an integral part of the condenser.

Ammonia systems shall be provided with liquid receivers designed for pumpdown that have sufficient capacity to assure that the liquid does not occupy more than 90% of the volume of the receiver at 90°F.

* * *

Section 11. The following sections of Chapter 12 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 1201

GENERAL

1201.1 Scope. The provisions of this chapter shall govern the construction, installation, alteration and repair of hydronic piping systems. This chapter shall apply to hydronic piping systems that are part of heating, ventilation and air-conditioning systems. Such piping systems shall include steam, hot water, chilled water, steam condensate and ground source heat pump loop systems. Potable cold and hot water distribution systems shall be installed in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

* * *

SECTION 1204

PIPE INSULATION

1204.1 Insulation characteristics. Pipe insulation installed in buildings shall conform to the requirements of the ((~~*International Energy Conservation Code*~~)) *Washington State Energy Code with Seattle Amendments*, shall be tested in accordance with ASTM E 84, using the specimen preparation and mounting procedures of ASTM E 2231; and shall have a maximum flame spread

index of 25 and a smoke-developed index not exceeding 450. Insulation installed in an air plenum shall comply with Section 602.2.1.

Exception: The maximum flame spread index and smoke developed index shall not apply to one- and two-family dwellings.

1204.2 Required thickness. Hydronic piping shall be insulated to the thickness required by the ((~~*International Energy Conservation Code*~~)) *Washington State Energy Code with Seattle Amendments*.

* * *

SECTION 1206

PIPE INSTALLATION

* * *

1206.2 System drain down. Hydronic piping systems shall be designed and installed to permit the system to be drained. Where the system drains to the plumbing drainage system, the installation shall conform to the requirements of the ((~~*International*~~)) *Uniform Plumbing Code*.

1206.3 Protection of potable water. The potable water system shall be protected from backflow in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

* * *

Section 12. The following section of Chapter 14 of the International Mechanical Code, 2006 Edition, is amended as follows:

SECTION 1401

GENERAL

1401.1 Scope. This chapter shall govern the design, construction, installation, alteration and repair of systems, equipment and appliances intended to utilize solar energy for space heating or cooling, domestic hot water heating, swimming pool heating or process heating.

Exception: Photovoltaic solar systems that generate electricity shall be installed in accordance with *International Building Code* and Article 690 of the *Seattle Electrical Code.* Systems interconnected to the electric grid shall comply with additional requirements of Seattle City Light.

1401.2 Potable water supply. Potable water supplies to solar systems shall be protected against contamination in accordance with the ((~~*International*~~)) *Uniform Plumbing Code.*

Exception: Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the ((~~*International*~~)) *Uniform Plumbing Code*, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.

* * *

Section 13. Sections 3-55 of Ordinance 121523 and Section 1 of Ordinance

122048 are repealed.

Section 14. For a period of 60 days following the effective date of this ordinance, the Director may also accept and thereafter approve applications that are designed to comply with either the requirements of this Ordinance or the requirements of Ordinance 121523 as amended by Ordinance 122048.

Section 15. 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 1st day of October, 2007, and signed by me in open session in authentication of its passage this 1st day of October, 2007.

President _____ of the City Council

Approved by me this 11th day of October, 2007.

Gregory J. Nickels, Mayor

Filed by me this 11th day of October, 2007.

City Clerk

(Seal)

Maureen Traxler/mt
DPD – 2006 Mechanical Code FISC.doc
July 16, 2007
Version #1a

Form revised December 4, 2006

FISCAL NOTE FOR NON-CAPITAL PROJECTS

Department:	Contact Person/Phone:	DOF Analyst/Phone:
Planning and Development	Maureen Traxler/233-3892	Karen Grove/684-5805

Legislation Title:
An ordinance relating to the Seattle Mechanical Code, amending Chapter 22.400.010 of the Seattle Municipal Code, and adopting by reference Chapters 2 through 9, and Chapters 11 through 15 of the 2006 International Mechanical Code with errata published by the International Code Council, and amending certain of those chapters; adopting a new Chapter 1 related to administration, permitting and enforcement; and repealing Sections 3-55 of Ordinance 121523 and Section 1 of Ordinance 122048.

- **Summary of the Legislation:**

This Bill adopts the 2006 International Mechanical Code with Seattle amendments, and is part of a group of several companion bills that regulate construction and use of buildings in the City of Seattle. It governs installations of mechanical equipment other than equipment powered by fuel gas.

- **Background:**

The International Mechanical Code is adopted statewide according to the State Building Code Act, RCW 19.27. Seattle adds local interpretations and a chapter on administration and enforcement. Every three years a new edition of the International Code is published and adopted by the City.

- *Please check one of the following:*

_X_ This legislation does not have any financial implications.

Attachment: Changes in Seattle amendments – 2006 Seattle Mechanical Code

Changes in Seattle amendments—2006 Seattle Mechanical Code

Note: This list includes changes proposed for the Seattle amendments to the International Mechanical Code. Amendments that are carried forward from the 2003 Seattle Mechanical Code are not listed; differences between the 2003 and 2006 editions of the International Mechanical Code are not listed.

Generally.
The following Chapters have no new amendments: Chapter 7, Chapters 9 -13, and Chapter 15.

References to "smoking lounges" are stricken in multiple sections that regulate ventilation and Table 403.3, Footnote J, provides a reference to the smoking ban codified in RCW 70.160.

Chapter 1 Administration.
Several sections: The procedures for enforcing the code are modified to conform to legal requirements, including procedures for serving notices. Sections have been added to provide a mechanism for parties impacted by a stop work order, notice of violation and revocation of permit to request a review by the code official. The procedures affected are in the following sections: 108.4 stop work orders, 112.2 and 112.3 notices of violation, and 118.8 and 118.9 permit revocation.

Section 112.4 A section is added specifying that the code is enforced in Municipal Court.

112.6 This section is modified to clarify that criminal penalties are an alternative to civil enforcement means.

Section 116.2 Plans and specifications. The dollar amount of projects requiring a mechanical engineering stamp and signature was raised to $50,000 from $30,000.

Section 117.5 Suspension or revocation. Additional language is added to this section that requires the code official to serve upon the permit holder notice of suspension or revocation. The notice shall state the reason, shall be legally served and may be posted on the property. The section also provides the permit holder the means to request the code official review the suspension or revocation by following the procedure established in Section 111.5.

Chapter 2 Definitions.
The definitions under "duct" for environmental air duct and product-conveying duct are deleted. This change is made to eliminate redundancy.

The definition of environmental air is expanded to include relief air for clarification.

A definition for product-conveying air is added.

A definition of relief air is added.

Chapter 3.
Section 304.10 Clearances and encroachments in public right of way. This is a new section that requires approval of the Director of Transportation and the code official before encroachments into the right of way are allowed. The Department of Transportation assisted in the drafting of this section.

Chapter 4 Ventilation.
Section 401.1 Scope. A new paragraph is added to the scope to direct the reader to Chapter 5 for exhaust ventilation systems such as those used with clothes dryers.

Section 401.4.1 Intake openings. This section is revised to ensure adequate air movement around intake openings by requiring that when an intake opening is located under a deck, there must be at least three feet of airspace directly below the opening.

Attachment to Fiscal Note

Section 403.2 Outdoor air required. This section is revised to allow designs engineered in accordance with American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE) Standard 62.1-2004.

Section 403.3.5 Ventilation of occupied spaces accessory to the maintenance and repair of vehicles. This section requires that offices and waiting rooms associated with vehicle repair businesses be maintained at a positive pressure to prevent the infiltration of vehicular exhaust.

Section 403.3.6 Ventilation systems for Group R occupancies of more than 4 stories. This is an entirely new section to address the ventilation requirements of tall residential buildings. The section pulls together the requirements for natural ventilation and required mechanical ventilation at specific sources of moisture and odor, such as bathrooms and kitchens. The source specific requirements are modeled on the Washington Ventilation and Indoor Air Quality Code (VIAQ) and the natural ventilation requirements are taken from the Building Code. These changes allow windows to be used as the source of outdoor air rather than requiring only mechanical intake of outdoor air.

Section 404 Enclosed loading docks and parking garages. Revisions to this section include the addition of "enclosed loading docks" and descriptions of acceptable vehicle exhaust ventilation controllers. The size of garage that is not required to have gas sensors is reduced to those with a total design capacity of less than 8,000 cfm. Garage exhaust uses a great deal of electrical energy and gas sensors are now considered by national standards to be a safe way to reduce energy consumption while providing safety to garage users.

Chapter 5 Exhaust Systems.
Section 502.14 Motor vehicle operation. A sentence was added to this section requiring specific mechanical ventilation rates when a tailpipe exhaust-capture system is longer than 10 feet from the end of a tailpipe to the outside of the building.

Section 504.6.3 Protection required. This section requires that clothes dryer exhaust ducts be protected from penetration by nails or screws. The substance of the 2003 Seattle language was adopted by the State with some clarification. The state version replaces the 2003 Seattle language in both Fuel Gas and Mechanical codes.

Section 513.12 Detection and control systems. This section was revised to align with Section 907 of the Seattle Building Code for smoke control systems.

Chapter 6 Duct systems.
Section 601.3 Contamination prevention. An fourth exception was added to require insulation and sealing of clothes dryer exhaust ducts.

Chapter 8 Chimneys and vents.
Sections 804.3.4, Horizontal terminations, and 804.3.5 Vertical terminations. Both of these sections are amended to be consistent with Chapter 5 in the distances required for vent terminations.

Chapter 14 Solar Systems.
Section 1401.1 Scope. An exception was added to this section that requires installation of electricity-generating photovoltaic solar systems to comply with the International Building Code and Article 690 of the Seattle Electrical Code.

City of Seattle

Gregory J. Nickels, Mayor

Office of the Mayor

September 18, 2007

Honorable Nick Licata
President
Seattle City Council
City Hall, 2nd Floor

Dear Council President Licata:

I am pleased to transmit the attached proposed Council Bill that adopts the 2006 International Mechanical Code along with Seattle's amendments. This is one of several companion Bills that regulate the construction and use of buildings in Seattle. Six of the Codes are prepared by the Department of Planning and Development (the Seattle Building, Energy, Residential, Mechanical, Fuel Gas, and Existing Building codes), and one by the Fire Department (the 2006 Fire Code).

The State of Washington adopts various codes and Seattle adds local amendments specific to its needs. The Construction Codes Advisory Board (CCAB), which consists of representatives of the general public, and design, development, and construction industries, has approved the proposals. Drafts of the Codes were made available for public comment in January.

Thank you for your consideration of this legislation. Adoption of the new Codes will provide additional flexibility in building design, and will enhance safety of Seattle's citizens. Should you have questions, please contact Maureen Traxler at 233-3892.

Sincerely,

GREG NICKELS
Mayor of Seattle

cc: Honorable Members of the Seattle City Council

600 Fourth Avenue, 7th Floor, P.O. Box 94749, Seattle, WA 98124-4749
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An equal employment opportunity, affirmative action employer. Accommodations for people with disabilities provided upon request.

STATE OF WASHINGTON – KING COUNTY

--ss.

216520 No.

CITY OF SEATTLE,CLERKS OFFICE

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:ORDINANCE 122531

was published on

10/19/07

The amount of the fee charged for the foregoing publication is the sum of $12,382.02, which amount has been paid in full.

Affidavit of Publication

Subscribed and sworn to before me on

10/19/07

Notary public for the State of Washington,
residing in Seattle

ORDINANCE 122531

AN ORDINANCE relating to the Seattle Mechanical Code, amending Chapter 22.400.010 of the Seattle Municipal Code, and adopting by reference Chapters 2 through 9, and Chapters 11 through 15 of the 2006 International Mechanical Code with errata published by the International Code Council, and amending certain of those chapters; adopting a new Chapter 1 related to administration, permitting and enforcement; and repealing Sections 3-55 of Ordinance 121523 and Section 1 of Ordinance 122048.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 22.400.010 of the Seattle Municipal Code is amended as follows:

22.400.010 Adoption of International Mechanical Code.

The Seattle Mechanical Code ((~~shall consist~~)) consists of: 1) the following portions of the ((~~2003~~)) 2006 edition of the International Mechanical Code ((~~as~~)) published by the International Code Council, as amended by City Council by ordinance, and all errata published by the International Code Council after February 1, 2006[((~~together with the amendments and additions thereto adopted~~)): Chapters 2 through 9, Chapters 11 ((~~, and Chapters 13~~)) through 15, and 2) Chapter 1 relating to administration, permitting and enforcement adopted by City Council ordinance. One copy of the ((~~2003~~)) 2006 International Mechanical Code is filed with the City Clerk in C.F. ((~~306758~~)) 308940.

Section 2. Chapter 1 of the Seattle Mechanical Code is adopted to read as follows:

CHAPTER 1

ADMINISTRATION

SECTION 101

TITLE

101.1 Title. These regulations shall be known as the "Seattle Mechanical Code," may be cited as such, and are referred to herein as "this code." All references to the *International Mechanical Code* contained in this code mean the *Seattle Mechanical Code*.

SECTION 102

PURPOSE

102.1 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, and maintenance or use of heating, ventilating, cooling, refrigeration systems, incinerators and other miscellaneous heat–producing appliances within the City.

The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

SECTION

103 SCOPE

103.1 Applicability. The provisions of this code apply to the erection, installation, alteration, repair, relocation, replacement, addition to, use or maintenance of any heating, ventilating, cooling, refrigeration systems, incinerators or other miscellaneous heat-producing appliances within the City. The design and testing of equipment regulated by this code are subject to the approval of the code official.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane with a separate means of egress and their accessory structures shall comply with the *International Residential Code*.

2. The standards for liquefied petroleum gas installations are the 2004 edition of NFPA 58 (Liquefied Petroleum Gas Code) and the 2006 edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code), as amended.

103.2 Alterations. Additions, alterations, repairs and replacement of equipment or systems shall comply with the provisions for new equipment and systems except as otherwise provided in Section 104 of this code.

103.3 Most restrictive. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. Where there is a conflict between a general requirement and a specific requirement, the specific requirement is applicable.

[W][1]103.4 Conflict with Ventilation Code. In the case of conflict between the ventilation requirements of this code and the ventilation requirements of Washington Administrative Code Chapter 51-13 the Washington State Ventilation and Indoor Air Quality Code (VIAQ) the provisions of the VIAQ govern.

103.5 Referenced codes and standards. The codes and standards referenced in this code are part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply.

[1] [W] preceding a section number indicates that the section incorporates a provision of the Washington State Mechanical Code.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions apply.

103.6 Appendices. Provisions in the *International Mechanical Code* appendices do not apply unless specifically adopted.

103.7 Metric units. Wherever in this ordinance there is a conflict between metric units of measurement and English units, the English units govern.

SECTION 104

APPLICATION TO EXISTING MECHANICAL SYSTEMS

104.1 Additions, alterations or repairs. Additions, alterations, renovations or repairs may be made to any mechanical system without requiring the existing mechanical system to comply with all the requirements of this code, if the addition, alteration, renovation or repair conforms to the standards required for a new mechanical system. Additions, alterations, renovations or repairs shall not cause an existing system to become unsafe, unhealthy or overloaded.

Minor additions, alterations, renovations, and repairs to existing mechanical systems may be installed in accordance with the law in effect at the time the original installation was made, if approved by the code official.

104.2 Existing installations. Mechanical systems lawful at the time of the adoption of this code may continue their use, be maintained or repaired, be converted to another type of fuel, or have components replaced if the use, maintenance, repair, conversion of fuel, or component replacement is done in accordance with the basic original design and location, and no hazard to life, health or property has been or is created by such mechanical system.

104.3 Changes in building occupancy. Mechanical systems that are a part of a building or structure undergoing a change in use or occupancy as defined in the Building Code shall comply with all requirements of this code that are applicable to the new use or occupancy.

104.4 Maintenance. All mechanical systems, materials, equipment, appurtenances and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards that were required by a code in effect when the mechanical system was installed shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent is responsible for maintenance of mechanical systems and equipment. To determine compliance with this subsection, the code official may cause a mechanical system or equipment to be reinspected.

The fire chief and the code official each have authority to obtain compliance with the requirements of this subsection.

Exception: The code official may modify the requirements of this section where all or a portion of the building is unoccupied.

104.5 Moved buildings. Building or structures moved into or within the City shall comply with standards adopted by the code official. No building shall be moved into or within the City unless, prior to moving, the code official has inspected the building for compliance with this code and the permit holder has agreed to correct all deficiencies found and has been issued a building permit for the work. A bond or cash deposit in an amount sufficient to abate or demolish the building shall be posted prior to issuance of a permit. See Section 117 for information required on plans. Any moved building that is not in complete compliance with standards for moved buildings within eighteen months from the date of permit issuance and is found to be a public nuisance may be abated.

104.6 Historic buildings and structures. The code official may modify the specific requirements of this code as it applies to landmarks and require in lieu thereof alternate requirements that, in the opinion of the code official, will result in a reasonable degree of safety to the public and the occupants of those buildings.

For purposes of this section a landmark is a building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation or has been designated for preservation by the City Landmarks Preservation Board, or that has been designated for preservation by the State of Washington, or has been listed or determined eligible to be listed in the National Register of Historic Places, or is a structure in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of the structure.

SECTION 105

ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION

105.1 Alternate materials and methods. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been approved and its use authorized by the code official. The code official may approve an alternate, provided the code official finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. The code official may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The code official may, but is not required to, record the approval of alternates and any relevant information in the files of the code official or on the approved permit plans.

SECTION 106

MODIFICATIONS

106.1 Modifications. The code official may modify the provisions of this code for individual cases if the code official finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of fire protection and structural integrity when considered together with other safety features of the building or other relevant circumstances. The code official may, but is not required to, record the approval of modifications and any relevant information in the files of the code official or on the approved permit plans.

SECTION 107

TESTS

107.1 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code or evidence that any material or method of construction does not conform to the requirements of this code, the code official may require tests as proof of compliance, to be made at no expense to the City.

Test methods shall be as specified in this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the code official shall determine the test procedures. All tests shall be made by an approved agency. Reports of such tests shall be retained by the code official.

SECTION 108

JURISDICTION AND POWERS AND DUTIES OF CODE OFFICIAL

108.1 Jurisdiction. The Department of Planning and Development is authorized to administer and enforce this code. The Department of Planning and Development is under the administrative and operational control of the Director, who is the code official.

108.2 Deputies. The code official may appoint such officers, inspectors, assistants and other employees as are authorized from time to time. The code official may authorize such employees as may be necessary to carry out the functions of the code official.

108.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the code official may enter a building or premises at any reasonable time to perform the duties imposed by this code.

108.4 Stop work orders. The code official may issue a stop work order whenever any work is being done contrary to the provisions of this code, or in the event of dangerous or unsafe conditions related to equipment or construction. The stop work order shall identify the violation and may prohibit work or other activity on the site.

108.4.1 Service of stop work order. The code official may serve the stop work order by posting it in a conspicuous place at the site, if posting is physically possible. If posting is not physically possible, then the stop work order may be served in the manner set forth in RCW 4.28.080 for service of a summons or by sending it by first class mail to the last known address of: the property owner, the person doing or causing the work to be done, and the holder of a permit if work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or city holiday, the period runs until 5:00 p.m. on the next business day.

108.4.2 Effective date of stop work order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section 108.4.1 is served.

108.4.3 Review by the code official for stop work orders.

108.4.3.1 Any person aggrieved by a stop work order may obtain a review of the order by delivering to the code official a request in writing within 2 business days of the date of service of the stop work order.

The review shall occur within 2 business days after receipt by the code official of the request for review unless the requestor agrees to a longer time.

Any person aggrieved by or interested in the stop work order may submit additional information to the code official for consideration as part of the review at any time prior to the review.

The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

a. Sustain the stop work order;

b. Withdraw the stop work order;

c. Modify the stop work order; or

d. Continue the review to a date certain for receipt of additional information.

108.4.3.2 The code official shall issue an order of the code official containing the decision within 2 business days after the review and shall cause the order to be sent by first class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order. The City and all parties shall be bound by the order.

108.5 Authority to disconnect utilities in emergencies. The code official has the authority to disconnect fuel-gas utility service or energy supplies to a building, structure, premises or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official may enter any building or premises to disconnect utility service. The code official shall, whenever possible, notify the serving utility, the owner and the occupant of the building, structure or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner and occupant of the building, structure or premises in writing of such disconnection immediately thereafter.

108.6 Authority to condemn equipment. Whenever the code official determines that any equipment or portion thereof regulated by this code is hazardous to life, health or property, the code official shall order in writing that such equipment either be disconnected, removed or restored to a safe or sanitary condition, as appropriate. The written notice shall fix a date certain for compliance with such order. It is a violation for any person to use or maintain defective equipment after receiving such notice.

When any equipment or installation is to be disconnected, the code official shall give written notice of such disconnection and causes therefor within 24 hours to the serving utility, the owner and the occupant of the building, structure or premises. When any equipment is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the code official shall institute any appropriate action to prevent, restrain, correct or abate the violation.

person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order. The City and all parties shall be bound by the order.

108.5 Authority to disconnect utilities in emergencies. The code official has the authority to disconnect fuel-gas utility service or energy supplies to a building, structure, premises or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official may enter any building or premises to disconnect utility service. The code official shall, whenever possible, notify the serving utility, the owner and the occupant of the building, structure or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner and occupant of the building, structure or premises in writing of such disconnection immediately thereafter.

108.9 Cooperation of other officials and officers. The code official may request, and shall receive so far as is required in the discharge of the code official's duties, the assistance and cooperation of other officials of the City of Seattle.

SECTION 109

UNSAFE EQUIPMENT AND HAZARD CORRECTION ORDER

109.1 Unsafe equipment. Any equipment regulated by this code that constitutes a fire or health hazard or is otherwise dangerous to human life is, for the purpose of this section, unsafe. Any use of equipment regulated by this code constituting a hazard to safety, health or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard, disaster, damage or abandonment is, for the purpose of this section, an unsafe use. Any such unsafe equipment is hereby declared to be a public nuisance and may be abated.

109.2 Hazard correction order. Whenever the code official finds that unsafe equipment exists, the code official may issue a hazard correction order specifying the conditions causing the equipment to be unsafe and directing the owner or other person responsible for the unsafe equipment to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the code official analyzing said conditions and establishing that the equipment is, in fact, safe. The code official may require that the report or analysis be prepared by a licensed engineer. It is a violation of this code for any person to fail to comply with a hazard correction order as specified in this subsection.

SECTION 110

APPEALS

110.1 Appeals to the Construction Codes Advisory Board. Except for where this code provides for review by the code official, appeals of the code official's interpretations of this code may be made to the Construction Codes Advisory Board by sending a request in writing to the code official. The review shall be conducted by three or more members of the Construction Codes Advisory Board, chosen by the Chair. The issue of the appeal shall be taken into account by the Chair when selecting members to hear an appeal. The decision of the review panel is advisory only. The final decision on any appealable matter is made by the building official.

SECTION 111

RESPONSIBILITY FOR COMPLIANCE

111.1 General. Compliance with the requirements of this code is the obligation of the owner of the building, structure or premises, the duly authorized agent of the owner, or other person responsible for the condition or work, and not of the City or any of its officers or employees.

SECTION 112

VIOLATIONS AND PENALTIES

112.1 Violations. It is a violation of this code for any person to:

1. install, erect, construct, enlarge, alter, repair, replace, remodel, move, improve, remove, convert or demolish, equip, occupy, use or maintain any mechanical system or equipment or cause or permit the same to be done in the City, contrary to or in violation of any of the provisions of this code.

2. use any material or install any device, appliance or equipment that is subject to this code and has not been approved by the code official.

3. knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to violate or fail to comply with this code.

4. violate or fail to comply with any final order issued by the code official pursuant to the provisions of this code.

5. remove, mutilate, destroy or conceal any notice or order issued or posted by the code official pursuant to the provisions of this code, or any notice or order issued or posted by the code official in response to a natural disaster or other emergency.

112.2 Notice of violation. If, after investigation, the code official determines that standards or requirements of this code have been violated or that orders or requirements have not been complied with, the code official may serve a notice of violation upon the owner, agent, 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, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be served by posting it in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail. The notice of violation shall be considered an order of the code official if no request for review

SECTION 107

TESTS

107.1 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code or evidence that any material or method of construction does not conform to the requirements of this code, the code official may require tests as proof of compliance, to be made at no expense to the City.

Test methods shall be as specified in this code or by other recognized test standards. If there are no recognized and accepted test methods for the proposed alternate, the code official shall determine the test procedures. All tests shall be made by an approved agency. Reports of such tests shall be retained by the code official.

SECTION 108

JURISDICTION AND POWERS AND DUTIES OF CODE OFFICIAL

108.1 Jurisdiction. The Department of Planning and Development is authorized to administer and enforce this code. The Department of Planning and Development is under the administrative and operational control of the Director, who is the code official.

108.2 Deputies. The code official may appoint such officers, inspectors, assistants and other employees as are authorized from time to time. The code official may authorize such employees as may be necessary to carry out the functions of the code official.

108.3 Right of entry. With the consent of the owner or occupier of a building or premises, or pursuant to a lawfully issued warrant, the code official may enter a building or premises at any reasonable time to perform the duties imposed by this code.

108.4 Stop work orders. The code official may issue a stop work order whenever any work is being done contrary to the provisions of this code, or in the event of dangerous or unsafe conditions related to equipment or construction. The stop work order shall identify the violation and may prohibit work or other activity on the site.

108.4.1 Service of stop work order. The code official may serve the stop work order by posting it in a conspicuous place at the site, if posting is physically possible. If posting is not physically possible, then the stop work order may be served in the manner set forth in RCW 4.28.080 for service of a summons or by sending it by first class mail to the last known address of: the property owner, the person doing or causing the work to be done, and the holder of a permit if work is being stopped on a permit. For purposes of this section, service is complete at the time of posting or of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or city holiday, the period runs until 5:00 p.m. on the next business day.

108.4.2 Effective date of stop work order. Stop work orders are effective when posted, or if posting is not physically possible, when one of the persons identified in Section 108.4.1 is served.

108.4.3 Review by the code official for stop work orders.

108.4.3.1 Any person aggrieved by a stop work order may obtain a review of the order by delivering to the code official a request in writing within 2 business days of the date of service of the stop work order.

The review shall occur within 2 business days after receipt by the code official of the request for review unless the requestor agrees to a longer time.

Any person aggrieved by or interested in the stop work order may submit additional information to the code official for consideration as part of the review at any time prior to the review.

The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

a. Sustain the stop work order;

b. Withdraw the stop work order;

c. Modify the stop work order; or

d. Continue the review to a date certain for receipt of additional information.

108.4.3.2 The code official shall issue an order of the code official containing the decision within 2 business days after the review and shall cause the order to be sent by first class mail to the person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order. The City and all parties shall be bound by the order.

108.5 Authority to disconnect utilities in emergencies. The code official has the authority to disconnect fuel-gas utility service or energy supplies to a building, structure, premises or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official may enter any building or premises to disconnect utility service. The code official shall, whenever possible, notify the serving utility, the owner and the occupant of the building, structure or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner and occupant of the building, structure or premises in writing of such disconnection immediately thereafter.

108.6 Authority to condemn equipment. Whenever the code official determines that any equipment or portion thereof regulated by this code is hazardous to life, health or property, the code official shall order in writing that such equipment either be disconnected, removed or restored to a safe or sanitary condition, as appropriate. The written notice shall fix a date certain for compliance with such order. It is a violation for any person to use or maintain defective equipment after receiving such notice.

When any equipment or installation is to be disconnected, the code official shall give written notice of such disconnection and causes therefor within 24 hours to the serving utility, the owner and the occupant of the building, structure or premises. When any equipment is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the code official shall institute any appropriate action to prevent, restrain, correct or abate the violation.

person or persons requesting the review, any person on whom the stop work order was served, and any other person who requested a copy before issuance of the order. The City and all parties shall be bound by the order.

108.5 Authority to disconnect utilities in emergencies. The code official has the authority to disconnect fuel-gas utility service or energy supplies to a building, structure, premises or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official may enter any building or premises to disconnect utility service. The code official shall, whenever possible, notify the serving utility, the owner and the occupant of the building, structure or premises of the decision to disconnect prior to taking such action, and shall notify the serving utility, owner and occupant of the building, structure or premises in writing of such disconnection immediately thereafter.

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When any equipment or installation is to be disconnected, the code official shall give written notice of such disconnection and causes therefor within 24 hours to the serving utility, the owner and the occupant of the building, structure or premises. When any equipment is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the code official shall institute any appropriate action to prevent, restrain, correct or abate the violation.

108.7 Connection after order to disconnect. No person shall make connections from any energy, fuel or power supply nor supply energy or fuel to any equipment regulated by this code that has been disconnected or ordered to be disconnected by the code official, or the use of which has been ordered to be discontinued by the code official until the code official authorizes the reconnection and use of such equipment.

108.8 Liability. Nothing in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of the City, or its officers, employees or agents, for any injury or damage resulting from the failure of equipment to conform to the provisions of this code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or 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 by its officers, employees or agents.

This code shall not be construed to lessen or relieve the responsibility of any person owning, operating or controlling any equipment, building or structure for any damages to persons or property caused by defects, nor shall the Department of Planning and Development or the City of Seattle be held to have assumed any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

108.9 Cooperation of other officials and officers. The code official may request, and shall receive so far as is required in the discharge of the code official's duties, the assistance and cooperation of other officials of the City of Seattle.

SECTION 109

UNSAFE EQUIPMENT AND HAZARD CORRECTION ORDER

109.1 Unsafe equipment. Any equipment regulated by this code that constitutes a fire or health hazard or is otherwise dangerous to human life is, for the purpose of this section, unsafe. Any use of equipment regulated by this code constituting a hazard to safety, health or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard, disaster, damage or abandonment is, for the purpose of this section, an unsafe use. Any such unsafe equipment is hereby declared to be a public nuisance and may be abated.

109.2 Hazard correction order. Whenever the code official finds that unsafe equipment exists, the code official may issue a hazard correction order specifying the conditions causing the equipment to be unsafe and directing the owner or other person responsible for the unsafe equipment to correct the condition by a date certain. In lieu of correction, the owner may submit a report or analysis to the code official analyzing said conditions and establishing that the equipment is, in fact, safe. The code official may require that the report or analysis be prepared by a licensed engineer. It is a violation of this code for any person to fail to comply with a hazard correction order as specified in this subsection.

SECTION 110

APPEALS

110.1 Appeals to the Construction Codes Advisory Board. Except for where this code provides for review by the code official, appeals of the code official's interpretations of this code may be made to the Construction Codes Advisory Board by sending a request in writing to the code official. The review shall be conducted by three or more members of the Construction Codes Advisory Board, chosen by the Chair. The issue of the appeal shall be taken into account by the Chair when selecting members to hear an appeal. The decision of the review panel is advisory only. The final decision on any appealable matter is made by the building official.

SECTION 111

RESPONSIBILITY FOR COMPLIANCE

111.1 General. Compliance with the requirements of this code is the obligation of the owner of the building, structure or premises, the duly authorized agent of the owner, or other person responsible for the condition or work, and not of the City or any of its officers or employees.

SECTION 112

VIOLATIONS AND PENALTIES

112.1 Violations. It is a violation of this code for any person to:

1. install, erect, construct, enlarge, alter, repair, replace, remodel, move, improve, remove, convert or demolish, equip, occupy, use or maintain any mechanical system or equipment or cause or permit the same to be done in the City, contrary to or in violation of any of the provisions of this code.

2. use any material or install any device, appliance or equipment that is subject to this code and has not been approved by the code official.

3. knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to violate or fail to comply with this code.

4. violate or fail to comply with any final order issued by the code official pursuant to the provisions of this code.

5. remove, mutilate, destroy or conceal any notice or order issued or posted by the code official pursuant to the provisions of this code, or any notice or order issued or posted by the code official in response to a natural disaster or other emergency.

112.2 Notice of violation. If, after investigation, the code official determines that standards or requirements of this code have been violated or that orders or requirements have not been complied with, the code official may serve a notice of violation upon the owner, agent, 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, agent or other responsible person by personal service or regular first class mail addressed to the last known address of such person, or if no address is available after reasonable inquiry, the notice may be served by posting it in a conspicuous place on the premises. The notice may also be posted if served by personal service or first class mail. The notice of violation shall be considered an order of the code official if no request for review before the code official is made pursuant to Section 112.3.

Nothing in this section limits or precludes any action or proceeding to enforce this chapter, and nothing obligates or requires the code official to issue a notice of violation prior to the imposition of civil or criminal penalties.

112.3 Review by the code official for notice of violation

112.3.1 Any person affected by a notice of violation issued pursuant to Section 112.2 may obtain a review of the notice by making a request 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 runs until 5:00 p.m. of the next business day.

The review shall occur not less than ten nor more than twenty days after the request is received by the code official unless otherwise agreed by the person requesting the review.

Any person aggrieved by or interested in the notice of violation may submit additional information to the code official.

112.3.2 The review shall be made by a representative of the code official who will review any additional information that is submitted and the basis for issuance of the notice of violation. The reviewer may request clarification of the information received and a site visit. After the review, the code official shall:

1. Sustain the notice; or

2. Withdraw the notice; or

3. Continue the review to a date certain; or

4. Amend the notice.

112.3.3 The code official shall issue an order containing the decision within 15 days of the date that the review is completed and shall cause the order to be mailed by regular first class mail to the persons requesting the review and the persons named on the notice of violation, addressed to their last known address.

112.4 Civil enforcement. Because civil actions to enforce Title 22 SMC are brought in Seattle Municipal Court pursuant to Section 112.5.2, orders of the code official issued under this chapter are not subject to judicial review pursuant to chapter 36.70C RCW.

112.5 Civil penalties.

112.5.1. Any person violating or failing to comply with the provisions of this code is 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 code 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.

112.5.2. Civil actions to enforce this chapter shall be brought exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any civil action for a penalty, the City has the burden of proving by a preponderance of the evidence that a violation exists or existed; the issuance of the notice of violation or of an order following a review by the Code official is not itself evidence that a violation exists.

112.6 Alternative criminal penalty. Anyone who violates or fails to comply with any order issued by the code official pursuant to this code or who removes, mutilates, destroys or conceals a notice issued or posted by the code official shall, upon conviction thereof, be punished by a fine of not more than $5000 or by imprisonment for not more than 365 days, or by both such fine and imprisonment. Each day's violation or failure to comply shall constitute a separate offense.

112.7 Additional relief. The code official may seek legal or equitable relief to enjoin any acts or practices and abate any condition when necessary to achieve compliance.

SECTION 113

RECORDING OF ORDERS AND NOTICES

113.1 Recording. The code official may record a copy of any order or notice with the Department of Records and Elections of King County. The code official may record with the Department of Records and Elections of King County a notice that a permit has expired without a final inspection after reasonable efforts have been made to provide a final inspection.

SECTION 114

RULES OF THE CODE OFFICIAL

114.1 Authority. The code official has authority to issue interpretations of this code and to adopt and enforce rules and regulations supplemental to this code as may be deemed necessary to clarify the application of the provisions of this code. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of this code.

114.2 Procedure for adoption of rules. The code official shall promulgate, adopt and issue rules according to the procedures specified in the Administrative Code, Chapter 3.02 of the Seattle Municipal Code.

SECTION 115

CONSTRUCTION CODES ADVISORY BOARD

115.1 CCAB committee. A committee of the Construction Codes Advisory Board may examine proposed administrative rules, appeals and amendments relating to this code and related provisions of other codes and make recommendations to the code official and to the City Council for changes in this code. The committee will be called on as needed by the Construction Codes Advisory Board.

SECTION 116

PERMITS

116.1 Permits required. Except as otherwise specifically provided in this code, a permit shall be obtained from the code official prior to each installation, alteration, repair, replacement or remodel of any equipment or mechanical system regulated by this code. A separate mechanical permit is required for each separate building or structure.

116.2 Work exempt from permit.

116.2.1 Mechanical. A mechanical permit is not required for the work listed below.

1. Any portable heating appliance, portable ventilating equipment, or portable cooling unit, if the total capacity of these portable appliances does not exceed 40 percent of the cumulative heating, cooling or ventilating requirements of a building or dwelling unit and does not exceed 3 kW or 10,000 Btu input.

2. Any closed system of steam, hot or chilled water piping within heating or cooling equipment regulated by this code.

3. Minor work or the replacement of any component part of a mechanical system that does not alter its original approval and complies with other applicable requirements of this code.

116.2.2 Refrigeration. A mechanical permit is not required for the following refrigerant equipment:

1. Any self-contained refrigerating equipment for which an operating permit is not required.

2. Any self-contained refrigeration system that does not exceed three horsepower rating.

SECTION R1201

GENERAL

[W] M1201.1 Scope. The provisions of Chapters 12 through 24 shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions within buildings. These chapters shall also regulate those mechanical systems, system components, equipment and appliances specifically addressed in this code.

Exception: The standards for liquefied petroleum gas installations shall be the 2004 Edition of NFPA 58 (Liquefied Petroleum Gas Code) and the 2006 Edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code).

***

Section 11. The following sections of Chapter 20 of the International Residential Code, 2006 Edition, are amended as follows:

((~~**SECTION M2001**~~

~~**BOILERS**~~

~~**M2001.1 Installation.** In addition to the requirements of this code, the installation of boilers shall conform to the manufacturer's instructions. The manufacturer's rating data, the nameplate and operating instructions of a permanent type shall be attached to the boiler. Boilers shall have all controls set, adjusted and tested by the installer. A complete control diagram together with complete boiler operating instructions shall be furnished by the installer. Solid and liquid fuel-burning boilers shall be provided with combustion air as required by Chapter 17.~~

~~**M2001.1.1 Standards.** Oil-fired boilers and their control systems shall be listed and labeled in accordance with UL 726. Electric boilers and their control systems shall be listed in accordance with UL 834. Boilers shall be designed and constructed in accordance with the requirements of ASME CSD-1 and as applicable, the ASME *Boiler and Pressure Vessel Code*, Sections I and IV. Gas-fired boilers shall conform to the requirements listed in Chapter 24.~~

~~**M2001.2 Clearance.** Boilers shall be installed in accordance with their listing and label.~~

~~**M2001.3 Valves.** Every boiler or modular boiler shall have a shutoff valve in the supply and return piping. For multiple boiler or multiple modular boiler installations, each boiler or modular boiler shall have individual shutoff valves in the supply and return piping.~~

~~**Exception:** Shutoff valves are not required in a system having a single low-pressure steam boiler.~~

~~**M2001.4 Flood-resistant installation.** In areas prone to flooding as established in Table R301.2(1), boilers, water heaters and their control systems shall be located or installed in accordance with Section R323.1.5.~~

~~**SECTION M2002**~~

~~**OPERATING AND SAFETY CONTROLS**~~

~~**M2002.1 Safety controls.** Electrical and mechanical operating and safety controls for boilers shall be listed and labeled.~~

~~**M2002.2 Hot water boiler gauges.** Every hot water boiler shall have a pressure gauge and a temperature gauge, or combination pressure and temperature gauge. The gauges shall indicate the temperature and pressure within the normal range of the system's operation.~~

~~**M2002.3 Steam boiler gauges.** Every steam boiler shall have a water gauge glass and a pressure gauge. The pressure gauge shall indicate the pressure within the normal range of the system's operation. The gauge glass shall be installed so that the midpoint is at the normal water level.~~

~~**M2002.4 Pressure relief valve.** Boilers shall be equipped with pressure relief valves with minimum rated capacities for the equipment served. Pressure relief valves shall be set at the maximum rating of the boiler. Discharge shall be piped to drains by gravity to within 18 inches (457 mm) of the floor or to an open receptor.~~

~~**M2002.5 Boiler low-water cutoff.** All steam and hot water boilers shall be protected with a low-water cutoff control. The low-water cutoff shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer.~~

~~**SECTION M2003**~~

~~**EXPANSION TANKS**~~

~~**M2003.1 General.** Hot water boilers shall be provided with expansion tanks. Nonpressurized expansion tanks shall be securely fastened to the structure or boiler and supported to carry twice the weight of the tank filled with water. Provisions shall be made for draining nonpressurized tanks without emptying the system.~~

~~**M2003.1.1 Pressurized expansion tanks.** Pressurized expansion tanks shall be consistent with the volume and capacity of the system. Tanks shall be capable of withstanding a hydrostatic test pressure of two and one-half times the allowable working pressure of the system.~~

~~**M2003.2 Minimum capacity.** The minimum capacity of expansion tanks shall be determined from Table M2003.2.~~

~~**TABLE M2003.2**~~
~~**EXPANSION TANK MINIMUM CAPACITY[a] FOR FORCED HOT WATER SYSTEMS**~~

~~SYSTEM VOLUME[b] (gallons)~~	~~PRESSURIZED DIAPHRAGM TYPE~~	~~NONPRESSURIZED TYPE~~
~~10~~	~~1.0~~	~~1.5~~
~~20~~	~~1.5~~	~~3.0~~
~~30~~	~~2.5~~	~~4.5~~
~~40~~	~~3.0~~	~~6.0~~
~~50~~	~~4.0~~	~~7.5~~
~~60~~	~~5.0~~	~~9.0~~
~~70~~	~~6.0~~	~~10.5~~
~~80~~	~~6.5~~	~~12.0~~
~~90~~	~~7.5~~	~~13.5~~
~~100~~	~~8.0~~	~~15.0~~

~~For SI: 1 gallon = 3.785 L, 1 pound per square inch gauge = 6.895 kPa, °C = [(°F)-32]/1.8.~~

~~a. Based on average water temperature of 195°F, fill pressure of 12 psig and a maximum operating pressure of 30 psig.~~

~~b. System volume includes volume of water in boiler, convectors and piping, not including the expansion tank.~~))

Section 12. Sections 2 -27 of Ordinance 121521 and Sections 1-5 and 7-11 of Ordinance 122047 are repealed.

Section 13. The provisions of this ordinance are declared to be separate and severable. The invalidity of any clause, sentence, paragraph, subdivision, section or portion of this ordinance, or the invalidity of the application thereof to any person, owner, or circumstance shall not affect the validity of the remainder of this ordinance, or the validity of its application to other persons, owners, or circumstances.

Section 14. For a period of 60 days following the effective date of this ordinance, the Director may also accept and thereafter approve applications that are designed to comply with either the requirements of this Ordinance or the requirements of Ordinance 121521 as amended by Ordinance 122047.

Section 15. 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 1st day of October, 2007, and signed by me in open session in authentication of its passage this 1st day of October, 2007.

NICK LICATA

President _____ of the City Council

Approved by me this 11th day of October, 2007.

Gregory J. Nickels, Mayor

Filed by me this 11th day of October, 2007.

JUDITH E. PIPPIN

City Clerk

Date of first publication in the Seattle Daily Journal of Commerce, October 19, 2007.

10/19 (216519)

ORDINANCE 122531

AN ORDINANCE relating to the Seattle Mechanical Code, amending Chapter 22.400.010 of the Seattle Municipal Code, and adopting by reference Chapters 2 through 9, and Chapters 11 through 15 of the 2006 International Mechanical Code with errata published by the International Code Council, and amending certain of those chapters; adopting a new Chapter 1 related to administration, permitting and enforcement; and repealing Sections 3-55 of Ordinance 121523 and Section 1 of Ordinance 122048.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 22.400.010 of the Seattle Municipal Code is amended as follows:

22.400.010 Adoption of International Mechanical Code.

The Seattle Mechanical Code ((~~shall consist~~)) consists of: 1) the following portions of the ((~~2003~~)) 2006 edition of the International Mechanical Code ((~~as~~)) published by the International Code Council, as amended by City Council by ordinance, and all errata published by the International Code Council after February 1, 2006 ((~~together with the amendments and additions thereto adopted~~)): Chapters 2 through 9, Chapters 11 ((~~, and Chapters 13~~)) through 15, and 2) Chapter 1 relating to administration, permitting and enforcement adopted by City Council ordinance. One copy of the ((~~2003~~)) 2006 International Mechanical Code is filed with the City Clerk in C.F. ((~~306758~~)) 308940.

Section 2. Chapter 1 of the Seattle Mechanical Code is adopted to read as follows:

CHAPTER 1

ADMINISTRATION

SECTION 101

TITLE

101.1 Title. These regulations shall be known as the "Seattle Mechanical Code," may be cited as such, and are referred to herein as "this code." All references to the *International Mechanical Code* contained in this code mean the *Seattle Mechanical Code*.

SECTION 102

PURPOSE

102.1 Purpose. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation, and maintenance or use of heating, ventilating, cooling, refrigeration systems, incinerators and other miscellaneous heat-producing appliances within the City.

The purpose of this code is to provide for and promote the health, safety and welfare of the general public, and not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code.

SECTION

103 SCOPE

103.1 Applicability. The provisions of this code apply to the erection, installation, alteration, repair, relocation, replacement, addition to, use or maintenance of any heating, ventilating, cooling, refrigeration systems, incinerators or other miscellaneous heat-producing appliances within the City. The design and testing of equipment regulated by this code are subject to the approval of the code official.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane with a separate means of egress and their accessory structures shall comply with the *International Residential Code*.
2. The standards for liquefied petroleum gas installations are the 2004 edition of NFPA 58 (Liquefied Petroleum Gas Code) and the 2006 edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code), as amended.

103.2 Alterations. Additions, alterations, repairs and replacement of equipment or systems shall comply with the provisions for new equipment and systems except as otherwise provided in Section 104 of this code.

103.3 Most restrictive. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive governs. Where there is a conflict between a general requirement and a specific requirement, the specific requirement is applicable.

[W][1]103.4 Conflict with Ventilation Code. In the case of conflict between the ventilation requirements of this code and the ventilation requirements of Washington Administrative Code Chapter 51-13 the Washington State Ventilation and Indoor Air Quality Code (VIAQ) the provisions of the VIAQ govern.

103.5 Referenced codes and standards. The codes and standards referenced in this code are part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code apply.

[1] [W] preceding a section number indicates that the section incorporates a provision of the Washington State Mechanical Code.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions apply.

103.6 Appendices. Provisions in the *International Mechanical Code* appendices do not apply unless specifically adopted.

103.7 Metric units. Wherever in this ordinance there is a conflict between metric units of measurement and English units, the English units govern.

SECTION 104

APPLICATION TO EXISTING MECHANICAL SYSTEMS

104.1 Additions, alterations or repairs. Additions, alterations, renovations or repairs may be made to any mechanical system without requiring the existing mechanical system to comply with all the requirements of this code, if the addition, alteration, renovation or repair conforms to the standards required for a new mechanical system. Additions, alterations, renovations or repairs shall not cause an existing system to become unsafe, unhealthy or overloaded.

Minor additions, alterations, renovations, and repairs to existing mechanical systems may be installed in accordance with the law in effect at the time the original installation was made, if approved by the code official.

104.2 Existing installations. Mechanical systems lawful at the time of the adoption of this code may continue their use, be maintained or repaired, be converted to another type of fuel, or have components replaced if the use, maintenance, repair, conversion of fuel, or component replacement is done in accordance with the basic original design and location, and no hazard to life, health or property has been or is created by such mechanical system.

104.3 Changes in building occupancy. Mechanical systems that are a part of a building or structure undergoing a change in use or occupancy as defined in the Building Code shall comply with all requirements of this code that are applicable to the new use or occupancy.

104.4 Maintenance. All mechanical systems, materials, equipment, appurtenances and all parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and hazard-free condition. All devices or safeguards that were required by a code in effect when the mechanical system was installed shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent is responsible for maintenance of mechanical systems and equipment. To determine compliance with this subsection, the code official may cause a mechanical system or equipment to be reinspected.

The fire chief and the code official each have authority to obtain compliance with the requirements of this subsection.

Exception: The code official may modify the requirements of this section where all or a portion of the building is unoccupied.

104.5 Moved buildings. Building or structures moved into or within the City shall comply with standards adopted by the code official. No building shall be moved into or within the City unless, prior to moving, the code official has inspected the building for compliance with this code and the permit holder has agreed to correct all deficiencies found and has been issued a building permit for the work. A bond or cash deposit in an amount sufficient to abate or demolish the building shall be posted prior to issuance of a permit. See Section 117 for information required on plans. Any moved building that is not in complete compliance with standards for moved buildings within eighteen months from the date of permit issuance and is found to be a public nuisance may be abated.

104.6 Historic buildings and structures. The code official may modify the specific requirements of this code as it applies to landmarks and require in lieu thereof alternate requirements that, in the opinion of the code official, will result in a reasonable degree of safety to the public and the occupants of those buildings.

For purposes of this section a landmark is a building or structure that is subject to a requirement to obtain a certificate of approval from the City Landmarks Preservation Board before altering or making significant changes to specific features or characteristics, that has been nominated for designation or has been designated for preservation by the City Landmarks Preservation Board, or that has been designated for preservation by the State of Washington, or has been listed or determined eligible to be listed in the National Register of Historic Places, or is a structure in a landmark or special review district subject to a requirement to obtain a certificate of approval before making a change to the external appearance of the structure.

SECTION 105

ALTERNATE MATERIALS AND METHODS OF CONSTRUCTION

105.1 Alternate materials and methods. This code does not prevent the use of any material, design or method of construction not specifically allowed or prohibited by this code, provided the alternate has been approved and its use authorized by the code official. The code official may approve an alternate, provided the code official finds that the proposed alternate complies with the provisions of this code and that the alternate, when considered together with other safety features of the building or other relevant circumstances, will provide at least an equivalent level of strength, effectiveness, fire resistance, durability, safety and sanitation. The code official may require that sufficient evidence or proof be submitted to reasonably substantiate any claims regarding the use or suitability of the alternate. The code official may, but is not required to, record the approval of alternates and any relevant information in the files of the code official or on the approved permit plans.

SECTION 106

MODIFICATIONS

106.1 Modifications. The code official may modify the provisions of this code for individual cases if the code official finds: (1) there are practical difficulties involved in carrying out the provisions of this code; (2) the modification is in conformity with the intent and purpose of this code; and (3) the modification will provide a reasonable level of fire protection and structural integrity when considered together with other safety features of the building or other relevant circumstances. The code official may, but is not required to, record the approval of modifications and any relevant information in the files of the code official or on the approved permit plans.

116.3 Compliance required. Exemption from the permit requirements of this code does not authorize any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of the City.

116.4 Flood hazard areas. In addition to the permit required by this section, all work to be performed in areas of special flood hazard identified in the report entitled "Flood Insurance Study for King County, Washington and Incorporated Areas" and the accompanying Flood Insurance Rate Maps, both filed in C.F. 296948, is subject to additional standards and requirements set forth in Chapter 25.06, the Seattle Floodplain Development Ordinance.

116.5 Emergency repairs. In the case of an emergency, the installation, alteration or repair of any refrigeration system or equipment may be made without a permit, provided that application for a permit is made within the later of twenty-four hours or one working day from the time when the emergency work was started.

SECTION 117

APPLICATION FOR PERMIT AND INFORMATION ON PLANS AND SPECIFICATIONS

117.1 Application. To obtain a permit, the applicant shall first file an application in writing on a form furnished by the Department of Planning and Development for that purpose. Every such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.

2. Describe the land on which the proposed work is to be done by legal description, property address or similar description that will readily identify and definitely locate the proposed building or work.

3. Provide the contractor's business name, address, phone number and current contractor registration number (required if contractor has been selected). To obtain a permit for work on a refrigeration system, the applicant shall also provide the number of the refrigeration contractor license issued by the City.

4. Be accompanied by plans, diagrams, computations and specifications, equipment schedules and other data as required in Sections 117.2 and 117.3.

5. State the valuation of the mechanical work to be done. The valuation of the mechanical work is the estimated current value of all labor and material, whether actually paid for or not, for which the permit is sought.

6. Be signed by the owner of the property or building, or the owner's authorized agent, who may be required to submit evidence to indicate such authority.

7. Give such other data and information as may be required by the code official.

8. Indicate the name of the owner and contractor and the name, address and phone number of a contact person.

117.2 Plans and specifications. Plans, engineering calculations, diagrams and other data shall be submitted in one or more sets with each application for a permit. The code official may require plans, computations and specifications to be prepared and designed by an engineer or architect licensed by the state to practice as such. Projects having a total mechanical valuation of $50,000 or larger shall have a mechanical engineering stamp and signature on each sheet.

Exception: A mechanical engineer's stamp or submission of plans, calculations or other data is not required if the code official finds that the nature of the work applied for is such that review of plans is not necessary to obtain compliance with this code.

117.3 Information on plans and specifications.

117.3.1 Clarity of plans. Plans shall be drawn to a clearly indicated and commonly accepted scale upon substantial paper such as blueprint quality or standard drafting paper. Tissue paper, posterboard or cardboard will not be accepted. The plans shall be of microfilm quality and limited to a minimum size of 18 inches by 18 inches and a maximum size of 41 inches by 54 inches. Plans and specifications shall be of sufficient clarity to show that the proposed installation will conform to the provisions of this code and to the provisions of all applicable laws, ordinances, rules, regulations and orders.

117.3.2 Fire-resistive notes. The code official may require that plans for buildings more than two stories in height of other than Group R-3 and Group U occupancies indicate how required structural and fire-resistive integrity will be maintained where a penetration will be made for electrical, mechanical, plumbing and communication conduits, pipes and similar systems.

117.3.3 Information required on plans. The plans or specifications shall show the following:

1. Layout for each floor with dimensions of all working spaces and a legend of all symbols used.

2. Location, size and material of all piping.

3. Location, size and materials of all air ducts, air inlets and air outlets.

4. Location of all fans, warm-air furnaces, boilers, absorption units, refrigerant compressors and condensers and the weight of all pieces of such equipment weighing 200 pounds or more.

5. Rated capacity or horsepower and efficiency rating of all boilers, warm-air furnaces, heat exchangers, blower fans, refrigerant compressors and absorption units. See also the *Washington State Energy Code with Seattle Amendments*.

6. Location, size and material of all combustion products vents and chimneys.

7. Location and area of all ventilation and combustion air openings and ducts.

8. Location of all air dampers and fire shutters.

9. The first sheet of each set of plans and specifications shall show the address of the proposed work and the name and address of the owner or lessee of the premises.

10. Architectural drawings, typical envelope cross sections and other drawings or data may be required to support system sizing calculations or other thermal requirements of this code or the *Washington State Energy Code with Seattle Amendments*.

SECTION 118

PERMIT REVIEW AND ISSUANCE

118.1 Issuance.

118.1.1 General. The application, plans, specifications, and other data filed by an applicant for permit shall be reviewed by the code official. Such plans may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction.

118.1.2 Decision and issuance of permit. If the code official finds that the work as described in an application for a permit and the plans, specifications and other data filed therewith substantially conforms to the requirements of this code and other pertinent laws and ordinances and that the fees specified in the Fee Subtitle have been paid, the code official shall issue a permit to the applicant, who then becomes the permit holder or authorized agent.

Exception: The code official may issue a permit for the construction of part of a building or structure before complete plans for the whole building or structure have been submitted or approved, if the proposed project complies with the State Environmental Policy Act (Chapter 25.05 of the Seattle Municipal Code) as amended and the Land Use Code as amended; and if adequate information and plans have been filed and checked to assure compliance with all pertinent requirements of this and other pertinent codes. The holder of such a permit shall proceed at the holder's own risk without assurance that a permit for the entire building or structure will be granted.

118.1.3 Compliance with approved plans and permit. When the code official issues a permit, the code official shall endorse the permit in writing and endorse in writing or stamp the plans "APPROVED." Such approved plans and permit shall not be changed, modified or altered without authorization from the code official, and all work shall be done in accordance with the approved plans and permit except as the code official may require during field inspection to correct errors or omissions.

118.2 Amendments to the permit. When substitutions or changes to the approved work are made during construction approval of the code official shall be obtained prior to execution. The building inspector may approve minor modifications and changes for work not reducing the structural strength or fire and life safety of the structure. The building inspector shall determine if it is necessary to revise the approved plans. All other changes, modifications, or clarifications shall be shown on two sets of plans which shall be submitted to and approved by the code official, accompanied by appropriate fees as specified in the Fee Subtitle prior to occupancy. These substitutions and changes shall conform to the requirements of this code and other pertinent laws and ordinances.

Minor substitutions or changes shall not incur additional fees if these substitutions and/or changes do not (1) add to the general scope of work; (2) change the basic design concept; (3) involve major relocation of equipment, ducts, or pipes; (4) substantially alter approved equipment size; or (5) require extensive re-review of the plans and specifications.

118.3 Cancellation of permit applications. Applications may be cancelled if no permit is issued by the earlier of the following: (1) twelve months following the date of application; or (2) sixty days after the date of written notice that the permit is ready to be issued. After cancellation, plans and other data submitted for review may be returned to the applicant or destroyed by the code official.

The code official shall notify the applicant in writing at least thirty days before the application is cancelled. The notice shall specify a date by which a request for extension must be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the date on which the application will be cancelled.

118.4 Extensions prior to permit issuance. At the discretion of the code official, applications for projects that require more than twelve months to review and approve may be extended for a period that provides reasonable time to complete the review and approval process, but in no case longer than twenty-four months from the date of the original application. No application may be extended more than once. After cancellation, the applicant shall submit a new application and pay a new fee to restart the application process.

Notwithstanding other provisions of this code, applications may be extended where issuance of the permit is delayed by litigation, preparation of environmental impact statements, appeals, strikes or other causes related to the application that are beyond the applicant's control, or while the applicant is making progress toward issuance of a master use permit.

See the Fee Subtitle for possible fee refunds.

118.5 Retention of plans. One set of approved plans, which may be on microfilm, shall be retained by the code official. One set of approved plans shall be returned to the applicant and shall be kept at the site of the building or work for use by the inspection personnel at all times when the work authorized is in progress.

118.6 Validity of permit. The issuance or granting of a permit or approval of plans shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or other pertinent laws and ordinances.

The issuance of a permit based upon plans shall not prevent the code official from requiring the correction of errors in said plans, or from preventing building operations being carried on thereunder when in violation of this code or of other pertinent laws and ordinances of the City.

The issuance of a mechanical permit shall not prevent the code official from requiring correction of conditions found to be in violation of this code or other pertinent laws and ordinances of the City, nor shall the period of time for which any such permit is issued be construed to extend or otherwise affect any period of time for compliance specified in any notice or order issued by the code official or other administrative authority requiring the correction of any such conditions.

118.7 Permit expiration and renewal.

118.7.1 Expiration. Authority to do the work authorized by a permit or a renewed permit expires eighteen months from the date of issuance.

Exceptions:

1. Initial permits for major construction projects that require more than eighteen months to complete, according to a construction schedule submitted by the applicant, may be issued for a period that provides reasonable time to complete the work but in no case longer than three years.

2. Permits that expire in less than eighteen months may be issued where the code official determines a shorter period is appropriate to complete the work.

118.7.2 Renewal of permits. Permits may be renewed and renewed permits may be further renewed by the code official, if the following conditions are met:

1. Application for renewal is made within the thirty-day period immediately preceding the date of expiration of the permit;

2. If the project has had an associated discretionary Land Use review, the land use approval has not expired per Seattle Municipal Code 23.76. 032; and

3. If an application for renewal is made either more than eighteen months after the date of mandatory compliance with a new or revised edition of this code or after the effective date of an amendment to applicable provisions of the Land Use Code, the permit shall not be renewed unless:

3.1 The code official determines that the permit complies, or is modified to comply with the code or codes in effect on the date of application renewal; or

3.2 The work authorized by the permit is substantially underway and progressing at a rate approved by the building official. "Substantially underway" means that work such as excavation, inspections, and installation of framing, electrical, mechanical and finish work is being completed on a continuing basis.

Permits may also be renewed where commencement or completion of the work authorized by the permit is delayed by litigation, appeals, strikes or other causes related to the work authorized by the permit, beyond the permit holder's control.

118.7.3 Reestablishment. A new permit is required to complete work if a permit has expired and was not renewed.

Exception: A permit that expired less than one year prior to the date of a request for reestablishment may be reestablished upon approval of the code official if it complies with Items 2 and 3 of Section 118.7.2.

118.8 Revocation.

118.8.1 Standards for revocation. A permit may be revoked if:

1. The code or the permit has been or is being violated and issuance of a notice of violation or stop work order has been or would be ineffective to secure compliance because of circumstances related to the violation;

2. The permit was obtained with false or misleading information.

118.8.2. Notice of revocation. Whenever the code official determines there are grounds for revoking a permit, the code official may issue a notice of revocation.

The notice of revocation shall identify the reason for the proposed revocation, including the violations, the conditions violated, and any alleged false or misleading information provided.

The notice of revocation shall be served on the owner of the property on which the work is occurring, the holder of a permit if different than the owner, and the person doing or causing the work to be done.

The notice of revocation shall be served in the manner set forth in RCW 4.28.080 for service of a summons or sent by first class mail. For purposes of this section, service is complete at the time of personal service, or if mailed, three days after the date of mailing. When the last day of the period so computed is a Saturday, Sunday or City holiday, the period runs until five p.m. on the next business day.

The code official shall identify in the notice of revocation a date certain on which the revocation will take effect unless review before the code official is requested and pursued pursuant to Section 118.9.

118.9 Review by the code official for notice of revocation.

118.9.1 Any person aggrieved by a notice of revocation may obtain a review by making a request in writing to the code official within 3 business days of the date of service of the notice of revocation.

The review shall occur within 5 business days after receipt by the code official of the request for review.

Any person aggrieved by or interested in the notice of revocation may submit additional information to the code official for consideration as part of the review at any time prior to the review.

118.9.2 The review will be made by a representative of the code official who will review all additional information received and may also request a site visit. After the review, the code official may:

1. Sustain the notice of revocation and set or modify the date the revocation will take effect;

2. Withdraw the notice of revocation;

3. Modify the notice of revocation and set or modify the date the revocation will take effect; or

4. Continue the review to a date certain for receipt of additional information.

118.9.2 The code official shall issue an order of the code official containing the decision within 10 days after the review and shall cause the same to be sent by first class mail to the person or persons requesting the review, any other person on whom the notice of revocation was served, and any other person who requested a copy before issuance of the order of the code official. The order of the code official is the final order of the City and the City and all parties shall be bound by the order.

Nothing in this section shall be deemed to limit or preclude any action or proceeding pursuant to Sections 108, 109 or 112 of this code.

SECTION 119

FEES

119.1 Fees. A fee for each mechanical permit and for other activities related to the enforcement of this code shall be paid as set forth in the Fee Subtitle.

SECTION 120

INSPECTIONS

120.1 General. All construction or work for which a permit is required is subject to inspection by the code official, and certain types of construction shall have special inspections by registered special inspectors specified in Section 1704 of the Building Code.

120.2 Inspection requests. It is the duty of the owner of the property or the owner's authorized agent, or the person designated by the owner/agent to do the work authorized by a permit, to notify the code official that work requiring inspection as specified in this section and Section 121 is ready for inspection.

120.3 Access for inspection. It is the duty of the permit holder and of the person requesting any inspections required by this code to provide access to and means for proper inspection of such work, including safety equipment required by the Washington Industrial Safety and Health Agency. The work shall remain accessible and exposed for inspection purposes until approved by the code official. Neither the code official nor the City shall be liable for expense entailed in the required removal or replacement of any material to allow inspection.

120.4 Inspection record. Work requiring a mechanical permit shall not be commenced until the permit holder or the permit holder's agent has posted an inspection record in a conspicuous place on the premises and in a position that allows the code official to conveniently make the required entries thereon regarding inspection of the work. This record shall be maintained in such a position by the permit holder until final approval has been granted by the code official.

120.5 Approvals required. No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the code official. Such written approval shall be given only after an inspection has been made of each successive step in the construction as indicated by each of the inspections required in this code.

Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

120.6 Final inspection. When the installation of a mechanical system is complete, an additional and final inspection shall be made.

Approval as a result of an inspection is not approval of any violation of the provisions of this code or of other pertinent laws and ordinances of the City. Inspections presuming to give authority to violate or cancel the provisions of this code or of other pertinent laws and ordinances of the City are not valid.

120.7 Operation of mechanical equipment. The requirements of this section do not prohibit the operation of any mechanical systems installed to replace existing equipment or fixtures serving an occupied portion of the building in the event a request for inspection of such equipment or fixture has been filed with the code official not more than 48 hours after such replacement work

is completed, and before any portion of such mechanical system is concealed by any permanent portion of the building.

120.8 Testing of equipment and systems. Refrigeration equipment regulated by this code shall be tested and approved as required by Chapter 11 of this code. Fuel-oil piping shall be tested and approved as required by Chapter 13 of this code.

120.9 Other inspections. In addition to the "called" inspections specified above, the code official may make or require any other inspections of any mechanical work to ascertain compliance with the provisions of this code and other laws and ordinances that are enforced by the code official.

120.10 Special investigation. If work for which a permit or approval is required is commenced or performed prior to making formal application and receiving the code official's permission to proceed, the code official may make a special investigation inspection before a permit is issued for the work. If a special investigation is made, a special investigation fee may be assessed in accordance with the Fee Subtitle.

120.11 Reinspections. The code official may require a reinspection if work for which inspection is called is not complete, corrections required are not made, the inspection record is not properly posted on the work site, the approved plans are not readily available to the inspector, access is not provided on the date for which inspection is requested, if deviations from plans that require the approval of the code official have been made without proper approval, or as otherwise required by the code official.

For the purpose of determining compliance with Section 104.4, Maintenance, the code official or the fire chief may cause any structure or system to be reinspected.

The code official may assess a reinspection fee as set forth in the Fee Subtitle for any action for which reinspection may be required. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

SECTION 121

CONNECTION APPROVAL

121.1 Energy connections. No person shall make connections from a source of energy fuel to a mechanical system or equipment regulated by this code for which a permit is required until approved by the code official.

121.2 Temporary connections. The code official may authorize temporary connection of the mechanical equipment to the source of energy fuel for the purpose of testing the equipment, or for use under a temporary certificate of occupancy.

SECTION 122

REFRIGERATION LICENSES

122.1 Refrigeration licenses. No person shall perform any of the services or activities related to refrigeration systems regulated by Chapter 11 without a license required by Chapter 6.82 of the Seattle Municipal Code, or under the direct supervision of a person holding a required license.

SECTION 123

OPERATING PERMITS FOR REFRIGERATION SYSTEMS

123.1 An operating permit issued by the code official is required to operate any refrigeration system meeting any one of the following criteria:

1. Any system over 50 horsepower, or
2. Any system over 50 tons of refrigerant effect, or
3. Any system that contains over 150 pounds of refrigerant, or
4. Any system that includes a refrigerant containing a pressure vessel over six inches in diameter with a capacity of more than 5 cubic feet and a design working pressure under 250 psig, or
5. Any system that includes a refrigerant containing a pressure vessel over six inches in diameter having a capacity of one and one-half cubic feet and a design working pressure over 250 psig.

123.2 The operating permit will not be issued until the system has been inspected and approved by the code official as safe to operate and in compliance with the provisions of this code. The permit is valid for a period of one year, renewable annually. The permit shall be displayed in a conspicuous place adjacent to the refrigeration system.

Section 3. The following sections of Chapter 2 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 201

GENERAL

* * *

201.3 Terms defined in other codes. Where terms are not defined in this code and are defined in the *International Building Code*, ((ICC)) *Seattle Electrical Code*, *International Fire Code*, *International Fuel Gas Code* or the ((*International*)) *Uniform Plumbing Code*, such terms have meanings ascribed to them as in those codes.

* * *

201.5 References to other codes. Whenever an International, National or Uniform Code is referenced in this code, it means the Seattle edition of that code, including local amendments. References to the "Building Code", "Fuel Gas Code", "Fire Code", "Residential Code" and "Plumbing Code" mean the Seattle editions of those codes.

SECTION 202

GENERAL DEFINITIONS

* * *

((**AUTOMATIC BOILER.** Any class of boiler that is equipped with the controls and limit devices specified in Chapter 10.))

* * *

BOILER. A closed heating appliance intended to supply hot water or steam for space heating, processing or power purposes. ((Low-pressure boilers operate at pressures less than or equal to 15 pounds per square inch (psi) (103 kPa) for steam and 160 psi (1103 kPa) for water. High-pressure boilers operate at pressures exceeding those pressures.))

BOILER CODE. The *Seattle Boiler and Pressure Vessel Code.*

* * *

CODE. These regulations, subsequent amendments thereto, or any emergency rule or regulation that ((the administrative authority having jurisdiction)) has been lawfully adopted.

CODE OFFICIAL. ((The officer or other designated authority charged with the administration and enforcement of this code,)) Director of the Department of Planning and Development or a duly authorized representative.

* * *

CONDITIONED SPACE. ((An area, room or space being heated or cooled by any equipment or appliance.)) A cooled space, heated space (fully heated), heated space (semi-heated), or indirectly conditioned space.

* * *

CONTAINER (REFRIGERANT). A cylinder for the transportation of refrigerant.

* * *

CRITICAL PRESSURE, CRITICAL TEMPERATURE, AND CRITICAL VOLUME. Terms given to the state points of a substance at which liquid and vapor have identical properties. Above the critical pressure or critical temperature there is no line of demarcation between liquid and gaseous phases.

DAMPER. A manually or automatically controlled device to regulate draft or the rate of flow of air or combustion gases.

Backdraft damper. A damper installed to restrict introduction of unconditioned air from an unconditioned space to a conditioned space.

Barometric damper. Any listed device that freely allows the flow of air in one direction, but does not allow conditioned air to escape. All installed combustion air dampers shall meet the installation requirements of the manufacturer.

Chimney Damper. A movable valve or plate within the chimney connector for controlling the draft or flow of combustion gases.

Fire damper. See "fire damper".

Smoke damper. See "smoke damper".

Volume damper. A device that, when installed, will restrict, retard or direct the flow of air in a duct, or the products of combustion in a heat-producing appliance, its vent connector, vent or chimney therefrom.

* * *

DIRECT REFRIGERATION SYSTEM. A system in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. See Figure 2-1.

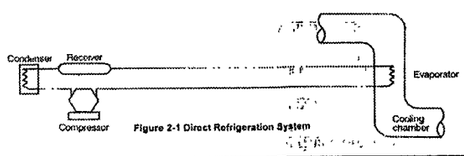

Figure 2-1 Direct Refrigeration System

Double direct refrigeration system. A system in which an evaporative refrigerant is used in a secondary circuit to condense or cool a refrigerant in a primary circuit. For the purpose of this code, each system enclosing a separate body of an evaporative refrigerant is considered a separate direct system. See Figure 2-2.

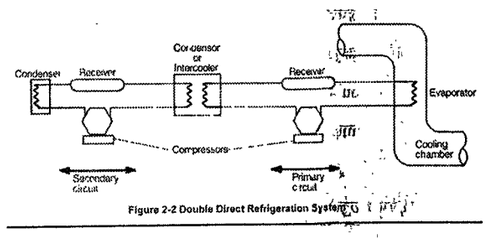

Figure 2-2 Double Direct Refrigeration System

* * *

ENERGY CODE. The *Washington State Energy Code with Seattle Amendments.*

* * *

ENVIRONMENTAL AIR. Air that is, at temperatures not exceeding 250°F (121°C), conveyed to or from occupied areas through ducts which are not part of the heating or air-conditioning system, such as ventilation for human usage, relief air, domestic kitchen range exhaust, bathroom exhaust, ((and)) domestic clothes dryer exhaust, parking garage exhaust, and elevator exhaust.

* * *

[B] FIRE DAMPER. A listed device installed in ducts and air transfer openings designed to close automatically upon detection of heat and resist the passage of flame. Fire dampers are classified for use in either static systems that will automatically shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic fire damper is tested and rated for closure under elevated temperature airflow.

* * *

[F] GAS ROOM. A separately ventilated, fully enclosed room in which only compressed gases and associated equipment and supplies are stored or used.

* * *

HOOD. An air-intake device used to capture by entrapment, impingement, adhesion or similar means, grease and similar contaminants before they enter a duct system.

Type I. A kitchen hood for collecting and removing grease vapors and smoke generated from medium-duty, heavy-duty, extra-heavy-duty, and some light-duty cooking appliances.

Type II. A general kitchen hood for collecting and removing steam, vapor, heat and odors generated from some light-duty cooking appliances.

* * *

INDIRECT REFRIGERATION SYSTEM. A system in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated. See Figure 2-3. Indirect systems are distinguished by the method of application shown below:

Closed system. A system in which a secondary fluid is either cooled or heated by the refrigerating system and then circulated within a closed circuit in indirect contact with the air or other substance to be cooled or heated.

Double-indirect open-spray system. A system in which the secondary substance for an indirect open-spray system is heated or cooled by an intermediate coolant circulated from a second enclosure.

Open-spray system. A system in which a secondary coolant is cooled or heated by the refrigerating system and then circulated in direct contact with the air or other substance to be cooled or heated.

Vented closed system. A system in which a secondary coolant is cooled or heated by the refrigerating system and then passed through a closed circuit in the air or other substance to be cooled or heated, except that the evaporator or condenser is placed in an open or appropriately vented tank.

* * *

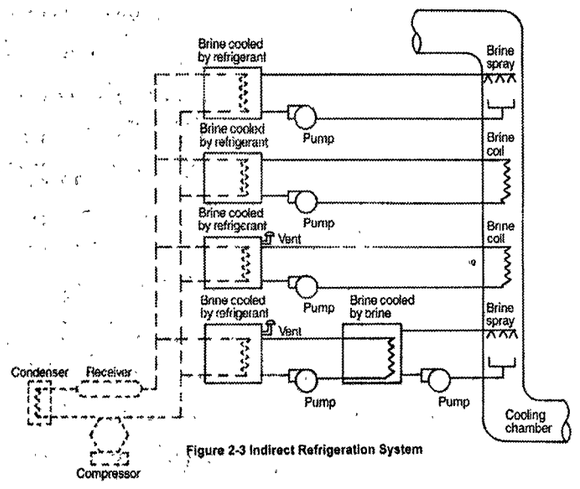

Figure 2-3 Indirect Refrigeration System

LIGHT-DUTY COOKING APPLIANCE. Light-duty cooking appliances include gas and electric ovens of a maximum 6 kW or 20,000 Btu/h capacity (including standard, bake, roasting, coffee roasting, revolving, retherm, convection, combination convection/steamer, conveyor, deck or deck-style pizza, and pastry), electric and gas steam-jacketed kettles, electric and gas compartment steamers (both pressure and atmospheric) and electric and gas cheesemelters.

* * *

MEDIUM-DUTY COOKING APPLIANCE. Medium-duty cooking appliances include electric discrete element ranges (with or without oven), electric and gas hot-top ranges, electric and gas griddles, electric and gas double-sided griddles, electric and gas fryers (including open deep fat fryers, donut fryers, kettle fryers, and pressure fryers), ((electric and gas pasta cookers, electric and gas conveyor pizza ovens)), electric and gas tilting skillets (braising pans) and electric and gas rotisseries.

* * *

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

* * *

((**POWER BOILER.** See "Boiler."))

* * *

((**PRESSURE VESSELS.** Closed containers, tanks or vessels that are designed to contain liquids or gases, or both, under pressure.))

* * *

PRODUCT-CONVEYING AIR. Air used for conveying solid particulates, such as refuse, dust, fumes and smoke; liquid particulate matter, such as spray residue, mists and fogs; vapors, such as vapors from flammable or corrosive liquids; noxious and toxic gases; and air at temperatures exceeding 250°F (121°C). Examples of product-conveying air include, but are not limited to, those that serve a combustion engine, industrial vacuum system, chemical booth, paint booth, paint enclosure and photo lab exhaust.

* * *

RELIEF AIR. Exhausted return air from a system that provides ventilation for human usage.

* * *

SATURATION PRESSURE. The pressure at which there is a stable coexistence of the vapor and liquid or the vapor and solid phases of a refrigerant.

* * *

SLEEVE. A factory-built chimney fitting designed to protect combustible materials when it is necessary to penetrate a combustible wall to connect a chimney.

* * *

((**STEAM-HEATING BOILER.** A boiler operated at pressures not exceeding 15 psi (103 kPa) for steam.))

* * *

THIMBLE. A listed fitting designed to be installed in the opening in a masonry chimney through which the chimney connector passes.

* * *

UNUSUALLY TIGHT CONSTRUCTION. Construction meeting the following requirements:

1. Walls exposed to the outdoor atmosphere having a continuous water vapor retarder with a rating of 1 perm [57 ng/(s• m^2 • Pa)] or less with openings gasketed or sealed; and
2. Openable windows and doors meeting the air leakage requirements of the *International Energy Conservation Code*, Section 402.4.2; and
3. Caulking or sealants are applied to areas, such as joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical and gas lines and at other openings; ((.))-or

[W] 4. Buildings built in compliance with the 1986 or later editions of the Washington State Energy Code, WAC 51-11; Northwest Energy Code; or Super Good Cents weatherization standards or equivalent.

Interpretation: 1986 and later editions of the Washington State Energy Code with Seattle Amendments, and Seattle City Light's Built Smart program are considered equivalent standards for unusually tight construction.

* * *

WATER HEATER. Any heating appliance or equipment, not exceeding a pressure of 160 psi (1103 kPa), a volume of 120 gallons and a heat input of 200,000 Btu/hr, that heats potable water and supplies such water to the potable hot water distribution system.

Section 4. The following sections of Chapter 3 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 301

GENERAL

301.1 Scope. This chapter shall govern the approval and installation of all equipment and appliances that comprise parts of the building mechanical systems regulated by this code in accordance with Section 103.1. ((101.2))

301.2 Energy utilization. Heating, ventilating and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with the ((*International Energy Conservation Code*)) *Washington State Energy Code with Seattle Amendments*.

* * *

301.4 Listed and labeled. Appliances regulated by this code shall be listed and labeled for the application in which they are installed and used, unless otherwise approved in accordance with Sections 105, 106 or 107.

Exception: Listing and labeling of equipment and applications used for refrigeration shall be in accordance with Section 1101.2.

* * *

301.7 Electrical. Electrical wiring, controls and connections to equipment and appliances regulated by this code shall be in accordance with the ((~~*ICC*~~)) *Seattle Electrical Code*.

301.8 Plumbing connections. Potable water supply and building drainage system connections to equipment and appliances regulated by this code shall be in accordance with the ((~~*International*~~)) *Uniform Plumbing Code*.

* * *

SECTION 303

EQUIPMENT AND APPLIANCE LOCATION

* * *

303.3 Prohibited locations. Fuel-fired appliances shall not be located in, or obtain combustion air from, any of the following rooms or spaces:

1. Sleeping rooms.
2. Bathrooms.
3. Toilet rooms.
4. Storage closets.
5. Surgical rooms.

Exception: This section shall not apply to the following appliances:

1. Direct-vent appliances that obtain all combustion air directly from the outdoors.
2. Solid fuel-fired appliances, provided that the room is not a confined space and the building is not of unusually tight construction.
3. Appliances installed in a dedicated enclosure in which all combustion air is taken directly from the outdoors, in accordance with Section 703. Access to such enclosure shall be through a solid door, weather-stripped in accordance with the exterior door air leakage requirements of the ((~~*International Energy Conservation Code*~~)) *Washington State Energy Code with Seattle Amendments* and equipped with an approved self-closing device.

* * *

303.7 Pit locations. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil. The sides of the pit or excavation shall be held back a minimum of 12 inches (305 mm) from the appliance, and a minimum of 30 inches (762 mm) on the control side. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry. Such concrete or masonry shall extend a minimum of 4 inches (102 mm) above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse. The appliance shall be protected from flooding in an approved manner.

[B] 303.8 ((~~Elevator shafts. Mechanical systems shall not be located in an elevator shaft.~~))

Installation of pipes or ducts conveying gases, vapors or liquids in hoistways, machine rooms, or machinery spaces. Pipes and ducts conveying gases, vapors or liquids shall not be installed in hoistways, machine rooms, and machinery spaces.

Exceptions:

1. Only ducts for heating, cooling, ventilating, and venting these spaces are permitted to be installed in the hoistway, machine room, and machinery space.
2. Ducts and electrical conduit may pass through an elevator machine room or machinery space if they are separated from the room or space by construction equal to the rated construction of the room or space and located so that all required clearances are maintained.

If a vented machine room is not vented directly to the outside of the building, the vent shall be enclosed within a fire barrier with at least a one-hour fire-resistance rating, or as required for a shaft where it passes through occupied floors.

3. Standard sprinkler protection conforming to the requirements of NFPA 13 shall be permitted to be installed in these spaces, subject to rules promulgated by the code official.
4. Subject to the approval of the code official, pipes protected with double containment and pipes with threaded or welded joints are permitted. Pipes shall not be located less than 7 feet above the floor in machine rooms.

[B] 303.9 Exit Enclosures. Mechanical systems shall not be located in exit enclosures. Penetrations passing entirely through both protective membranes are prohibited.

Exceptions:

1. Equipment allowed or required by the *International Building Code* to serve the exit enclosure such as:
   1.1 ductwork and equipment necessary for independent stairway pressurization,
   1.2 sprinkler piping,
   1.3 standpipes,
   1.4 electrical conduit terminating in a listed box not exceeding 16 square inches (10 323 mm^2) in area, and
   1.5 piping used exclusively for the drainage of rainfall runoff from roof areas provided the roof is not used for a helistop or heliport.
2. Unfired heaters allowed by the *International Building Code* for freeze protection of fire protection equipment may penetrate one protective membrane. The conduit serving the heater may penetrate both protective membranes.

Penetrations shall be protected as required by the *International Building Code*. Penetrations and openings communicating between exit enclosures in the same building are not permitted regardless of their protection.

* * *

SECTION 304

INSTALLATION

* * *

304.3 Elevation of ignition source. Equipment and appliances having an ignition source and located in hazardous locations and public garages, private garages, repair garages, automotive motor-fuel-dispensing facilities and parking garages shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor surface on which the equipment or appliance rests. Such equipment and appliances shall not be installed in Group H occupancies or control areas where open use, handling or dispensing of combustible, flammable or explosive materials occurs. For the purpose of this section, rooms or spaces that are not part of the living space of a dwelling unit and that communicate directly with a private garage through openings shall be considered to be part of the private garage.

304.3.1 Parking garages. Connection of a parking garage with any room in which there is a fuel-fired appliance shall be by means of a vestibule providing a two-doorway separation, except that a single door is permitted where the sources of ignition in the appliance are elevated in accordance with Section 304.3.

Exception: This section shall not apply to appliance installations complying with Section 304.5 or to equipment having an internal combustion engine.

* * *

304.10 Clearances and encroachments in the public right of way. All encroachments of equipment and appliances on, over or under sidewalks, streets, alleys and other public property are subject to approval by the Director of Transportation and the code official. Encroachments shall comply with this code and other codes as determined by the Director of Transportation and the code official.

Note: The Department of Transportation publishes the "Seattle Right-of-Way Improvement Manual" that contains detailed information on clearances, encroachments and required SDOT street use permits. The Department of Transportation discourages encroachments into the public right-of-way by mechanical equipment.

[B] 304.11 ((~~304.10~~)) Guards. Guards shall be provided where appliances, equipment, fans or other components that require service and roof hatch openings are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such appliances, equipment, fans, components and roof hatch openings and the top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*.

304.12 ((~~304.11~~)) Area served. Appliances serving different areas of a building other than where they are installed shall be permanently marked in an approved manner that uniquely identifies the appliance and the area it serves.

* * *

SECTION 306

ACCESS AND SERVICE SPACE

* * *

306.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the appliance location in accordance with the ((~~ICC~~)) *Seattle Electrical Code*.

* * *

306.4.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the appliance location in accordance with the ((~~ICC~~)) *Seattle Electrical Code*.

* * *

306.5.2 Electrical requirements. A receptacle outlet shall be provided at or near the equipment location in accordance with the ((~~ICC~~)) *Seattle Electrical Code*.

* * *

SECTION 309

TEMPERATURE CONTROL

[B] 309.1 Space-heating systems. Interior spaces intended for human occupancy shall be provided with active or passive space-heating systems capable of maintaining ((~~a minimum~~)) an average indoor temperature of 68°F (20°C) at a point 3 feet (914 mm) above floor ((~~on the design heating day~~)) when the outside temperature is 24°F. The installation of portable space heaters shall not be used to achieve compliance with this section.

Exception: Interior spaces where the primary purpose is not associated with human comfort.

* * *

SECTION 312

HEATING AND COOLING LOAD CALCULATIONS

312.1 Load calculations. Heating and cooling system design loads for the purpose of sizing systems, appliances and equipment shall be determined in accordance with the procedures described in the ((~~ASHRAE Handbook of Fundamentals~~)) *Washington State Energy Code with Seattle Amendments*. ((~~Heating and cooling loads shall be adjusted to account for load reductions that are achieved when energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE Handbook - HVAC Systems and Equipment. Alternatively, design loads shall be determined by an approved equivalent computation procedure, using the design parameters specified in Chapter 3 of the International Energy Conservation Code.~~))

Section 5. The following sections of Chapter 4 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 401

GENERAL

401.1 Scope. This chapter shall govern the ventilation of spaces within a building intended to be occupied. This chapter does not govern the requirements for smoke control systems.

See Chapter 5 for mechanical exhaust systems serving clothes dryers and cooking appliances; hazardous exhaust systems; dust, stock and refuse conveyor systems; subslab soil exhaust systems; smoke control systems; energy recovery ventilation systems; and other systems specified in Section 502.

401.2 Ventilation required. Every occupied space shall be ventilated.

401.2.1 Group R occupancies four stories or less. Ventilation in Group R occupancies four stories or less shall be provided in accordance with the *Washington State Ventilation and Indoor Air Quality Code*.

401.2.2 Group R occupancies over four stories. Ventilation in Group R occupancies over four stories shall be provided in accordance with Section 403.3.6.

401.2.3 All other occupancies. All other occupancies shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403.

401.3 When required. Ventilation shall be provided during the periods that the room or space is occupied.

401.4 Opening location. Outdoor air exhaust and intake openings shall be located a minimum of 10 feet (3048 mm) from lot lines or buildings on the same lot. Where openings front on a street or public way, the distance shall be measured to the ((~~centerline~~)) opposite side of the street or public way.

Exceptions:

1. Group R-3.
2. Exhaust outlets for environmental air exhaust openings shall be located not less than 3 feet (914 mm) from property lines and not less than 3 feet (914 mm) from openings into the building.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

401.4.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a source of contaminant is located within 10 feet (3048 mm) horizontally of an intake opening, such opening shall be located a minimum of 2 feet (610 mm) below the contaminant source.

The exhaust from a bathroom, clothes dryer or kitchen in a residential dwelling shall not be considered to be a hazardous or noxious contaminant.

Intake openings shall not be located:

1. In a crawlspace;
2. Less than one foot (305 mm) above a roof, adjacent grade, or other surface directly below the intake; or
3. Under a deck having a surface height less than three feet above grade or other surface directly below the intake.

401.4.2 Exhaust openings. Outdoor exhaust openings shall be located ((~~so as not to create a nuisance~~)) in accordance with Chapter 5. Exhaust air shall not be directed onto walkways in such a manner that the users of the walkway are subjected to the exhaust air stream.

Note: Seattle Land Use Code (Municipal Code Title 23) requires that the venting of odors, vapors, smoke, cinders, dust, gas and fumes shall be at least 10 feet (3048 mm) above finished sidewalk grade, and directed away as much as possible from residential uses within 50 feet (15 240 mm) of the vent. This requirement has been interpreted to apply to garage exhaust systems.

[B] 401.4.3 Flood hazard. For structures located in flood hazard areas, outdoor exhaust openings shall be at or above the design flood elevation.

SECTION 402

NATURAL VENTILATION

402.1 Natural ventilation. Natural ventilation of an occupied space shall be designed to occur through windows, doors, louvers or other openings to the outdoors. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants.

Exception: Automatically controlled natural ventilation systems do not require ready access and control by building occupants.

* * *

SECTION 403

MECHANICAL VENTILATION

* * *

403.2 Outdoor air required. The minimum ventilation rate of outdoor air shall be determined in accordance with Section 403.3.

Exception: Where the registered design professional demonstrates that an engineered ventilation system ((~~design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor air ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.~~)) is designed in accordance with ASHRAE Standard 62.1-2004.

403.2.1 Recirculation of air. The air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

1. Ventilation air shall not be recirculated from one dwelling to another or to dissimilar occupancies.
2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces.
3. Where mechanical exhaust is required by Note b in Table 403.3, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.

((~~4. Where mechanical exhaust is required by Note h in Table 403.3, mechanical exhaust is required and recirculation is prohibited where 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces.~~))

4. Building HVAC air used as transfer air for heat removal may be recirculated.

403.2.2 Transfer air. Except where recirculation from such spaces is prohibited by Table 403.3, air transferred from occupied spaces is not prohibited from serving as makeup air for required exhaust systems in such spaces as kitchens, baths, toilet rooms, and elevators ((~~and smoking lounges~~)). The amount of transfer air and exhaust air shall be sufficient to provide the flow rates as specified in Sections 403.3 and 403.3.1. The required outdoor air rates specified in Table 403.3 shall be introduced directly into such spaces or into the occupied spaces from which air is transferred or a combination of both.

403.2.3 Outdoor air delivery. The outdoor air shall be ducted in a fully enclosed path directly to every air handling unit in each zone not provided with sufficient operable opening area for natural ventilation to occur.

Exception: Ducts may terminate within 12 inches of the intake to an HVAC unit if they are physically fastened so that the outside air duct is directed into the unit intake.

403.3 Ventilation rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate determined in accordance with Table 403.3 based on the occupancy of the space and the occupant load or other parameter as stated therein. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the estimated maximum occupant load rate indicated in Table 403.3. Ventilation rates for occupancies not represented in Table 403.3 shall be determined by an approved engineering analysis. The ventilation system shall be designed to supply the required rate of ventilation air continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

Exception: ((~~The occupant load is not required to be determined, based on the estimated maximum occupant load rate indicated in Table 403.3 where approved statistical data document the accuracy of an alternate anticipated occupant density.~~)) Where occupancy density is known and documented in the plans, the outside air rate may be based on the design occupant density. Under no circumstance shall the occupancies used result in outside air less than one-half that resulting from application of Table 403.3 estimated maximum occupancy rates.

403.3.1 System operation. The minimum flow rate of outdoor air that the ventilation system must be capable of supplying during its operation shall be permitted to be based on the rate per person indicated in Table 403.3 and the actual number of occupants present.

403.3.2 Common ventilation system. Where spaces having different ventilation rate requirements are served by a common ventilation system, the ratio of outdoor air to total supply air for the system shall be determined based on the space having the largest outdoor air requirement or shall be determined in accordance with the following formula:

$$Y = \frac{X}{(1+X-Z)} \qquad \text{(Equation 4-1)}$$

Where

$Y = V_{ot}/V_{st}$ = Corrected fraction of outdoor air in system supply.

$X = V_{on}/V_{st}$ = Uncorrected fraction of outdoor air in system supply.

$Z = V_{oc}/V_{sc}$ = Fraction of outdoor air in critical space. The critical space is that space with the greatest required fraction of outdoor air in the supply to this space.

V_{ot} = Corrected total outdoor airflow rate.

V_{st} = Total supply flow rate, i.e., the sum of all supply for all branches of the system.

V_{on} = Sum of outdoor airflow rates for all branches on system.

V_{oc} = Outdoor airflow rate required in critical spaces.

V_{sc} = Supply flow rate in critical space.

403.3.3 Variable air volume system control. Variable air volume air distribution systems, other than those designed to supply only 100-percent outdoor air, shall be provided with controls to regulate the flow of outdoor air. Such control system shall be designed to maintain the flow of outdoor air at a rate of not less than that required by Section 403 over the entire range of supply air operating rates. Calculations and a description of controls operation shall be submitted with the permit drawings.

403.3.4 Balancing. Ventilation systems shall be balanced by an approved method. Such balancing shall verify that the ventilation system is capable of supplying the airflow rates required by Section 403.

403.3.5 Ventilation of occupied spaces accessory to the maintenance and repair of vehicles. Offices and waiting rooms connected to buildings used for the maintenance and repair of vehicles shall be maintained at a positive pressure and shall be provided with ventilation in accordance with Section 403.

403.3.6 Ventilation systems for Group R occupancies over 4 stories. Each dwelling unit or guest room in a building over 4 stories shall be equipped with source specific and whole house ventilation systems and shall comply with Sections 403.3.6.1 through 403.3.6.7.

403.3.6.1 Compliance and commissioning. Compliance with Section 403.3.6 shall be demonstrated through engineering calculations. Documentation of calculations shall be submitted on the permit plan sets.

Testing and commissioning shall be performed and documented in accordance with Section 1416 of the *Washington State Energy Code with Seattle Amendments.*

403.3.6.2 Minimum ventilation performance. Ventilation systems shall be designed and installed to satisfy the ventilation requirements of Table 403.3.

403.3.6.3 Controls. Ventilation system controls shall be readily accessible by the dwelling unit occupants.

1. Source specific ventilation systems shall be controlled by manual switches, dehumidistats, timers, or other approved means.

2. Whole house ventilation system controls shall be capable of operating the ventilation system without energizing other energy-consuming appliances. Intermittently operated whole house ventilation systems shall be capable of continuous operation. The system shall have a manual control and an automatic control, such as a clock timer. At the time of final inspection, the automatic control shall be set to operate the whole house fan for no less than 8 hours a day. A label shall be affixed to the control that reads "Whole House Ventilation (see operating instructions)."

403.3.6.4 Source specific ventilation requirements. Source specific exhaust ventilation as required in Table 403.3 shall be provided in each kitchen, bathroom, water closet, laundry area, indoor swimming pool, spa, and other rooms where excess water vapor or cooking odor is produced. Source specific ventilation ducts shall terminate outdoors. Outlets shall comply with Section 401.4. Exhaust ducts in systems that are designed to operate intermittently shall be equipped with back-draft dampers.

403.3.6.5 Whole house ventilation requirements. Whole house ventilation systems shall be capable of providing the volume of outdoor ventilation air required in Table 403.3.

Outdoor air shall be distributed to each habitable space. Outdoor air distribution is permitted to be provided through the use of individual inlets, separate duct systems or a forced-air system. Where outdoor air supplies are separated from exhaust vents by doors, air distribution to separated habitable spaces is permitted to use distribution ducts, installed grilles, transoms, doors undercut to a minimum of 1/2-inch above the surface of the finish floor covering, or similar means where permitted by the *International Building Code.*

403.3.6.5.1 Outdoor air. A mechanical system shall supply the volume of outdoor air required in Table 403.3. The mechanical system is permitted to consist of exhaust fans, supply fans, or both.

Exhaust-fan-only ventilation systems shall provide outdoor air through one of the following methods.

1. Operable windows, doors and other openings shall have a minimum openable area to the outdoors of 4 percent of the floor area being ventilated. Exit doors that open into a corridor, court or public way shall not be used to provide outdoor air. For adjoining spaces without openings to the outdoors, the opening to the adjoining room shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet; or

2. Air inlets installed in walls or windows shall have controllable, secure openings and shall be designed to not compromise the thermal properties of the building envelope. Inlets shall provide not less than 4 square inches of net free area of opening for each 10 cfm of outdoor air required in Table 403.3. Inlets shall also comply with Section 401. Any inlet or combination of inlets that provides 10 cfm at 10 Pascals as determined by the Home Ventilation Institute Air Flow Test Standard (HVI 901 [November 1996]) are deemed equivalent to 4 square inches of net free area.

403.3.6.5.2 Ventilation integrated with forced-air systems. Where outdoor air is provided by a forced-air system, the outdoor air connection to the return air stream shall be located upstream of the forced-air system blower and, in order to prevent thermal shock to the heat exchanger, shall not be connected directly to the furnace cabinet.

403.3.6.6 Corridors. Air movement in corridors shall comply with Section 601 of this code and the *International Building Code.*

403.3.6.7 Fan noise. Whole house fans located 4 feet or less from the interior grille shall have a sone rating of 1.5 or less measured at 0.10 inches water gauge. Manufacturer's noise ratings shall be determined according to HVI 915 (October 1995). Remotely mounted fans shall be acoustically isolated from the structural elements of the building and from attached ductwork using insulated flexible duct or other approved material.

Exception: Whole house ventilation systems that are integrated with forced-air heating systems or heat-recovery ventilation systems are exempt from the sone rating requirements of this section.

TABLE 403.3

REQUIRED OUTDOOR VENTILATION AIR

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[a]
Correctional facilities		
Cells		
without plumbing fixtures	20	20
with plumbing fixtures [g((,h))]	20	20
Dining halls	100	15
Guard stations	40	15
Dry Cleaners, laundries		
Coin-operated dry cleaner	20	15
Coin-operated laundries	20	15
Commercial dry cleaner	30	30
Commercial laundry	10	25
Storage, pick up	30	35
Education		
Auditoriums	150	15
Classrooms	50	15
Corridors	--	0.10 cfm/ft^2
Laboratories	30	20
Libraries	20	15
Locker rooms[((k))]	--	0.50 cfm/ft^2
Music rooms	50	15
~~Smoking lounges[b,e]~~ [j]	((70))	((60))
Training shops	30	20
Food and beverage service		
Bars, cocktail lounges	100	30
Cafeteria, fast food	100	20
Dining rooms	70	20
Kitchens (cooking) [f, g]	20	15
Hospitals, nursing and convalescent homes		
Autopsy rooms[b]	--	0.50 cfm/ft^2
Medical procedure rooms	20	15
Operating rooms	20	30
Patient rooms	10	25
Physical therapy	20	15
Recovery and ICU	20	15
Hotels, motels, resorts and dormitories		
Assembly rooms	120	15

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[a]
Bathrooms [g ((,e))]	--	35
Bedrooms	--	30 cfm per room
Conference rooms	50	20
Dormitory sleeping areas	20	15
Gambling casinos	120	30
Living rooms	--	30 cfm per room
Lobbies	30	15
Offices		
Conference rooms	50	20
Office spaces	7	20
Reception areas	60	15
Telecommunication centers and data entry	60	20
Private dwellings, single and multiple		
Garages, common for multiple units[b]	10	((1.5)) 1.0 cfm/ft^2
Garages, separate for each dwelling	--	100 cfm per car
Kitchens [g]	--	100 cfm intermittent or 25 cfm continuous
Living areas ((e))	Based upon number of bedrooms, first bedroom: 2; each additional bedroom: 1	0.35 air changes per hour[a] or 15 cfm per person, whichever is greater
Toilet rooms ((and)), bathrooms [g ((,h))] and laundry areas [k]	--	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous
Public spaces		
Corridors and utilities	--	0.05 cfm/ft^2
Elevator car [g]	--	1.00 cfm/ft^2
Locker rooms	--	0.5 cfm/ft^2
Shower rooms (per shower head) [g,h]	--	50 cfm intermittent or 20 cfm continuous
~~((Smoking lounges[b,e]))~~ [j]	((70))	((60))
Toilet rooms [g]	--	75 cfm per water closet or urinal
Retail stores, sales floors and showroom floors		
Basement and street	--	0.30 cfm/ft^2
Dressing rooms	--	0.20 cfm/ft^2
Malls and arcades	--	0.20 cfm/ft^2
Shipping and receiving	--	0.15 cfm/ft^2
~~((Smoking lounges[b,e]))~~ [j]	((70))	((60))
Storage rooms	--	0.15 cfm/ft^2
Upper floors	--	0.20 cfm/ft^2
Warehouses	--	0.05 cfm/ft^2
Specialty shops		
Automotive motor-fuel-dispensing stations	--	1.5 cfm/ft^2
Barber	25	15

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[a]
Beauty	25	25
Clothiers, furniture	--	0.30 cfm/ft^2
Embalming room[b]	8	2.0 cfm/ft^2
Florists	8	15
Hardware, drugs, fabrics	--	15
Nail salon [b, i]		50 cfm intermittent or 20 cfm continuous per station
Pet shops	--	1.00 cfm/ft^2
Reducing salons	20	15
Supermarkets	8	15
Sports and amusement		
Ballrooms and discos	100	25
Bowling alleys (seating areas)	70	25
Game rooms	70	25
Ice arenas	--	0.50 cfm/ft^2
Playing floors (gymnasiums)	30	20
Spectator areas	150	15
Swimming pools (pool and deck area)	--	0.50 cfm/ft^2
Storage		
~~((Repair garages, enclosed))~~	--	1.5 cfm/ft^2
Enclosed loading docks [d]	--	1.0 cfm/ft^2
Enclosed parking garages [d]	--	1.5 cfm/ft^2
Repair garages	--	0.05 cfm/ft^2
Warehouses	--	0.05 cfm/ft^2
Non-retail storage spaces (>100 ft^2) [g]	--	
Theaters		
Auditoriums	150	15
Lobbies	150	20
Stages, studios	70	15
Ticket booths	60	20
Transportation		
Platforms	100	15
Vehicles	150	15
Waiting rooms	100	15
Workrooms		
Bank vaults	5	15
Darkrooms	--	0.50 cfm/ft^2
Duplicating, printing	--	0.50 cfm/ft^2
Meat processing [c]	10	15
Pharmacy	20	15
Photo studio	10	15

For SI: 1 cubic foot per minute= 0.0004719 m^3/s, 1 ton= 908 kg.

1 cubic foot per minute per square foot= 0.00508 m^3/(s•m^2), °C= [(°F) – 32]/1.8, 1 square foot = 0.0929 m^2.

a. Based upon net floor area.

b. Mechanical exhaust required and the recirculation of air from such spaces as permitted by Section 403.2.1 is prohibited (see Section 403.2.1, Items 1 and 3).

c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

d. Ventilation systems ((in enclosed parking garages)) shall comply with Section 404.

e. Where the ventilation rate is expressed in cfm/ft^2, such rate is based upon cubic feet per minute per square foot of the floor area being ventilated.

f. The sum of the outdoor and transfer air from adjacent spaces shall be sufficient to provide an exhaust rate of not less than 1.5 cfm/ft^2.

g. Transfer air permitted in accordance with Section 403.2.2.

h. [W] Reserved. ((Mechanical exhaust is required and recirculation is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces (see Section 403.2.1, Items 2 and 4).))

i. The required exhaust system shall capture the contaminants and odors at their source.

j. RCW 70.160.030 states: "No person may smoke in a public place or in any place of employment."

k. A laundry area contained within a kitchen or bathroom is not required to have source specific exhaust. When door(s) separate the area from the room, the door(s) shall be louvered.

OCCUPANCY CLASSIFICATION	ESTIMATED MAXIMUM OCCUPANT LOAD, PERSONS PER 1,000 SQUARE FEET[a]	OUTDOOR AIR [Cubic feet per minute (cfm) per person] UNLESS NOTED[a]

SECTION 404

ENCLOSED LOADING DOCKS AND PARKING GARAGES

404.1 Enclosed loading dock and parking garage((s)) exhaust ventilation systems. Mechanical ventilation systems for enclosed loading docks and parking garages shall be permitted to operate intermittently where the system is equipped with a control device that ((is arranged to)) operates the system automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices. Each of the following types of controllers shall be capable of shutting off fans or modulating fan speed:

1. Gas sensor controllers used to activate the exhaust ventilation system shall stage or modulate fan speed upon detection of specified gas levels. All equipment used in sensor controlled systems shall be designed for the specific use and installed in accordance with the manufacturer's recommendations. The following are minimum gas sensor system requirements:

1.1. Garages and loading docks used predominantly by gasoline-powered vehicles shall be equipped with a controller and a full array of carbon monoxide (CO) sensors set to maintain levels of carbon monoxide below 35 parts per million (ppm). Spacing and location of the sensors shall be in accordance with manufacturer specifications.

1.2. Where more than 20 percent of the vehicles using the garage or loading dock are powered by non-gasoline fuels, the area exposed to non-gasoline fueled vehicle exhaust shall be equipped with a controller and fuel-appropriate sensors. The set-point for the non-gasoline sensors shall be no less than the standard used by OSHA for eight hour exposure. The controller shall activate the ventilation system when sensor set-point is reached. Spacing and location of the sensors shall be in accordance with manufacturer specifications.

2. Automatic time clocks used to activate the system during occupied periods shall be capable of scheduling multiple start and stop times for each day of the week, varying the daily schedule, and retaining programming for a 10-hour period during loss of power.

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

404.1.1 System activation devices for enclosed loading docks. Ventilation systems for enclosed loading docks shall be activated by one of the following:

Gas sensors, or

Time clock and manual over-ride switch located in the dock area that is accessible to persons in the loading dock area.

404.1.2 System activation devices for enclosed parking garages. Ventilation systems for enclosed parking garages shall be activated by gas sensors.

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

404.1.3 Ventilation makeup air. Ventilation makeup air shall be mechanically supplied to levels of enclosed loading docks and parking garages more than 3 stories above or below the nearest garage or loading dock entrance or exit.

404.1.4 Exhaust termination point. The termination point or exhaust outlet for enclosed loading dock and garage exhaust ducts discharging to the atmosphere shall be located using the following minimum distances: 10 feet from property lines, 10 feet from operable openings into buildings, and 10 feet from mechanical air intakes. Exhaust outlets extending to the roof shall extend 3 feet (914 mm) above the roof surface.

404.2 Minimum ventilation. Where a time clock is used as the only control device for the automatic operation of the exhaust ventilation system, fans shall be staged to maintain continuous operation of the system. The minimum ventilation rate shall not be reduced below the requirements of 404.2.1 and 404.2.2.

404.2.1 Enclosed parking garages. Automatic operation of the exhaust ventilation system for enclosed parking garages shall not reduce the minimum ventilation rate below 0.05 cfm per square foot (0.00025 m^3/s •m^2) of the garage floor area and the system shall be capable of producing a ventilation rate of ((~~1.5~~)) 1.0 cfm per square foot ((~~0.0076 m^3/s •m~~)) (0.00508 m^3/s •m^2) of floor area.

404.2.2 Enclosed loading docks. Automatic operation of the exhaust ventilation system for enclosed loading docks shall not reduce the minimum ventilation rate below 1.0 cfm per square foot (0.00508 m^3/s •m^2) of the loading dock floor area and the system shall be capable of producing a ventilation rate of 1.5 cfm per square foot (0.0076 m^3/s •m) of floor area.

404.3 Occupied spaces accessory to public garages. Connecting offices, waiting rooms, ticket booths and similar uses that are accessory to a public garage shall be maintained at a positive pressure and shall be provided with ventilation in accordance with Section 403.3.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

Interpretation: In certain land use zones, the Seattle Land Use Code (Municipal Code Title 23) requires that the venting of odors, vapors, smoke, cinders, dust, gas and fumes shall be at least 10 feet (3048 mm) above finished sidewalk grade, and directed away as much as possible from residential uses within 50 feet (15 240 mm) of the vent. This requirement has been interpreted to apply to garage exhaust system terminations.

SECTION 405

SYSTEMS CONTROL

405.1 General. Mechanical ventilation systems shall be provided with manual or automatic controls that will operate such systems whenever the spaces are occupied. Air-conditioning systems that supply required ventilation air shall be provided with controls designed to automatically maintain the required outdoor air supply rate during occupancy. Additional mechanical system control requirements are contained in the *Washington State Energy Code with Seattle Amendments.*

SECTION 406

VENTILATION OF UNINHABITED SPACES

406.1 General. ((~~Uninhabited spaces, such as~~)) Crawl spaces and attics((,)) shall be provided with natural ventilation openings as required by the *International Building Code* or shall be provided with a mechanical exhaust and supply air system. The mechanical exhaust rate shall be not less than 0.02 cfm per square foot (0.00001 m^3/s • m^2) of horizontal area and shall be automatically controlled to operate when the relative humidity in the space served exceeds 60 percent.

Section 6. The following sections of Chapter 5 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 501

GENERAL

501.2 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a nuisance and not less than the distances specified in Section 501.2.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or crawl space.

Exceptions:

1. Whole-house ventilation-type attic fans shall be permitted to discharge into the attic space of dwelling units having private attics.

2. Commercial cooking recirculating systems.

501.2.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade

Interpretation: Item 1 includes carpentry shop exhaust, industrial chemical lab, paint shop and sandblasting exhaust systems.

For other product-conveying outlets: 10 feet (3048 mm) from ((~~the~~)) property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.

Interpretation: Item 2 includes central vacuum systems, dry cleaner, photo lab, school chemical lab and combustion engine exhaust.

3. For environmental air duct exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes.

[W] Exceptions:

1. The separation between an air intake and exhaust outlet on a single listed package HVAC unit.

2. Exhaust from environmental air systems other than garages may be discharged into an open parking garage.

3. Except for Group I occupancies, where ventilation system design circumstances require building HVAC air to be relieved, such as during economizer operation, such air may be relieved into an open or enclosed parking garage within the same building.

[W] 4. For specific systems: for clothes dryer exhaust, see Section 504.4; for kitchen hoods, see Section 506.3; ((~~and~~)) for dust, stock and refuse conveying systems, see Section 511.2; for subslab soil exhaust systems, see Section 512.4; for enclosed parking garage exhaust systems, see Section 404; for transformer vaults, see Seattle Building Code Section 422.

501.4 Ducts. Where exhaust duct construction is not specified in this chapter, such construction shall comply with Chapter 6.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

Note: Seattle Land Use Code (Municipal Code Title 23) requires that the venting of odors, vapors, smoke, cinders, dust, gas and fumes shall be at least 10 feet (3048 mm) above finished sidewalk grade, and directed away as much as possible from residential uses within 50 feet (15 240 mm) of the vent in some locations.

SECTION 502

REQUIRED SYSTEMS

* * *

502.1 General. An exhaust system shall be provided, maintained and operated as specifically required by this section and for all occupied areas where machines, vats, tanks, furnaces, forges, salamanders and other appliances, equipment and processes in such areas produce or throw off dust or particles sufficiently light to float in the air, or which emit heat, odors, fumes, spray, gas or smoke, in such quantities so as to be irritating or injurious to health or safety.

502.1.1 Exhaust inlet location. The inlet to an exhaust system shall be located in the area of heaviest concentration of contaminants.

[F] 502.1.2 Fuel-dispensing areas. The bottom of an air inlet or exhaust opening in fuel-dispensing areas shall be located not more than 18 inches (457 mm) above the floor.

502.1.3 Equipment, appliance and service rooms. Equipment, appliance and system service rooms that house sources of odors, fumes, noxious gases, smoke, steam, dust, spray or other contaminants shall be designed and constructed so as to prevent spreading of such contaminants to other occupied parts of the building.

[F] 502.1.4 Hazardous exhaust. The mechanical exhaust of high concentrations of dust or hazardous vapors shall conform to the requirements of Section 510.

* * *

[F] 502.7 Application of flammable finishes. Mechanical exhaust as required by this section shall be provided for operations involving the application of flammable finishes.

Spray finishing operations conducted in Group A, E, I or R occupancies shall be located in a spray room separated vertically and horizontally from other areas in accordance with the *International Building Code*. In other occupancies, spray-finishing operations shall be conducted in a spray room, spray booth or limited spraying area approved for such use.

* * *

502.14 Motor vehicle operation. In areas where motor vehicles operate, mechanical ventilation shall be provided in accordance with Section 403. Additionally, areas in which stationary motor vehicles are operated shall be provided with a source capture system that connects directly to the motor vehicle exhaust systems. When the source capture system extends more than 10 feet from the tailpipe connection to the outdoors, the system shall exhaust at a rate of 600 cfm for heavy-duty diesel vehicles and at a rate of 300 cfm for all other vehicles.

Exceptions:

1. This section shall not apply where the motor vehicles being operated or repaired are electrically powered.

2. This section shall not apply to one- and two-family dwellings.

3. This section shall not apply to motor vehicle service areas where engines are operated inside the building only for the duration necessary to move the motor vehicles in and out of the building.

* * *

502.18 Specific rooms. Specific rooms, including bathrooms, locker rooms, ((~~smoking lounges~~)) and toilet rooms, shall be exhausted in accordance with the ventilation requirements of Chapter 4.

Interpretation: RCW 70.160.030 states: "No person may smoke in a public place or in any place of employment." A public place is defined in RCW 70.160.020 in part as: "...A public place does not include a private residence unless the private residence is used to provide licensed child care, foster care, adult care, or other similar social service care on the premises. . . . This chapter is not intended to restrict smoking in private facilities which are occasionally open to the public except upon the occasions when the facility is open to the public."

* * *

SECTION 504

CLOTHES DRYER EXHAUST

* * *

504.4 Exhaust installation. Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or chimney. ((~~Clothes dryer exhaust ducts shall not extend into or through ducts or plenums.~~))

* * *

504.6 Domestic clothes dryer ducts. Exhaust ducts for domestic clothes dryers shall be constructed of metal and shall have a smooth interior finish. The exhaust duct shall be a minimum nominal size of 4 inches (102 mm) in diameter. The entire exhaust system shall be supported and secured in place. The male end of the duct at overlapped duct joints shall extend in the direction of airflow. Clothes dryer transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) and shall be listed and labeled for the application. Transition ducts shall not be concealed within construction.

504.6.1 Maximum length. The maximum length of a clothes dryer exhaust duct shall not exceed 25 feet (7620 mm) from the dryer location to the outlet terminal. The maximum length of the duct shall be reduced 2½ feet (762 mm) for each 45 degree (0.79 rad) bend and 5 feet (1524 mm) for each 90 degree (1.6 rad) bend. The maximum length of the exhaust duct does not include the transition duct.

Exceptions:

1. Where the make and model of the clothes dryer to be installed is known and the manufacturer's installation instructions for such dryer are provided to the code official, the maximum length of the exhaust duct, including any transition duct, shall be permitted to be in accordance with the dryer manufacturer's installation instructions.

2. The maximum length of the duct may be increased in an engineered exhaust system when a listed and labeled dryer exhaust booster fan is installed in accordance with the manufacturer's installation instructions.

504.6.2 Rough-in required. Where a compartment or space for a domestic clothes dryer is provided, an exhaust duct system shall be installed in accordance with Sections 504.6 and 504.6.1.

[W] 504.6.3 Protection required. Plates or clips shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Plates or clips shall be placed on the finish face of all framing members where there is less than 1¼ inch (32 mm) between the duct and the finish face of the framing material. The plate or clip shall be steel not less than 1/16 inch (1.59 mm) in thickness and of sufficient width to protect the duct.

* * *

SECTION 505

DOMESTIC KITCHEN EXHAUST EQUIPMENT

505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are located within dwelling units, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls and shall be air tight and equipped with a backdraft damper. Domestic kitchen exhaust systems shall be exhausted separately from domestic clothes dryer and bathroom vent systems.

Exceptions:

Where installed in accordance with the manufacturer's installation instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.

Interpretation: When a recirculating hood is used in a domestic kitchen, the kitchen shall have environmental air exhaust that complies with Table 403.3 and Section 501.

2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe provided that the installation complies with all of the following:

2.1. The duct shall be installed under a concrete slab poured on grade.

2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.

2.3. The PVC duct shall extend not greater than 1 inch (25 mm) above the indoor concrete floor surface.

2.4. The PVC duct shall extend not greater than 1 inch (25 mm) above grade outside of the building.

2.5. The PVC ducts shall be solvent cemented.

SECTION 506

COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST EQUIPMENT

* * *

[W] 506.3.3.1 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed ((~~in the presence of the code official~~)). Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test. A light test or an approved equivalent test method shall be performed to determine that all welded and brazed joints are liquid tight. A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of duct work to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls.

A test shall be performed for the entire duct system, including the hood-to-duct connection. The ductwork shall be permitted to be tested in sections, provided that every joint is tested.

* * *

506.3.10 Grease duct enclosure. A grease duct serving a Type I hood that penetrates a ceiling, wall or floor shall be enclosed from the point of penetration to the outlet terminal. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code*. Ducts shall be enclosed in accordance with the *International Building Code* requirements for shaft construction. The duct enclosure shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings. Clearance from the duct to the interior surface of enclosures of combustible construction shall be not less than 18 inches (457 mm). Clearance from the duct to the interior surface of enclosures of noncombustible construction or gypsum wall board attached to noncombustible structures shall be not less than ((~~6~~)) 3 inches (((~~152 mm~~)) 76 mm). The duct enclosure shall serve a single grease exhaust duct system and shall not contain any other ducts, piping, wiring or systems.

Exceptions:

1. The shaft enclosure provisions of this section shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated and where the surface of the duct is continuously covered on all sides from the point at which the duct penetrates a ceiling, wall or floor to the outlet terminal with a classified and labeled material, system, method of construction or product specifically evaluated for such purpose, in accordance with ASTM E 2336. Exposed duct wrap systems shall be protected where subject to physical damage.

2. The shaft enclosure provisions of this section shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated and where a prefabricated grease duct enclosure assembly is protected on all sides from the point at which the duct penetrates a ceiling, wall or floor to the outlet terminal with a classified and labeled prefabricated system specifically valuated for such purposes in accordance with UL 2221.

A duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.

* * *

506.3.12 Exhaust outlets serving Type I hoods. Exhaust outlets for grease ducts serving Type I hoods shall conform to the requirements of Sections 506.3.12.1 through 506.3.12.3.

506.3.12.1 Termination above the roof. Exhaust outlets that terminate above the roof shall have the discharge opening located not less than 40 inches (1016 mm) above the roof surface.

506.3.12.2 Termination through an exterior wall. Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors, and odors in the discharge from such terminations do not create a public nuisance or a fire hazard. Such terminations shall not be located where protected openings are required by the *International Building Code*. Other exterior openings shall not be located within ((~~3~~)) 10 feet (((~~914 mm~~)) 3048 mm) of such terminations.

Note: See Director's Rule 6-2005, or any rule superseding Director's Rule 6-2005 for additional requirements.

506.3.12.3 Termination location. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from parts of the same or contiguous buildings, adjacent buildings, adjacent property lines and air intake openings into any building and shall be located not less than 10 feet (3048 mm) above the adjoining grade level.

Exception: Exhaust outlets shall terminate not less than 5 feet (1524 mm) from parts of the same or contiguous building, an adjacent building, adjacent property line and air intake openings into a building where air from the exhaust outlet discharges away from such locations.

Interpretation: For purposes of this section, property line includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

506.4 Ducts serving Type II hoods. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. Commercial kitchen exhaust systems serving Type II hoods shall comply with Sections 506.4.1 and 506.4.2.

506.4.1 Type II exhaust outlets. Exhaust outlets for ducts serving Type II hoods shall comply with Sections 401.4 and 401.4.2. Such outlets shall be protected against local weather conditions and shall meet the provisions for exterior wall opening protectives in accordance with the *International Building Code*.

506.4.2 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials. Duct construction, installation, bracing and supports shall comply with Chapter 6. A duct serving a Type II hood that penetrates a fire-resistance-rated ceiling, floor or wall shall be enclosed in a duct enclosure from the point of penetration to the outlet terminal. Ducts subject to positive pressure and ducts conveying moisture-laden or waste-heat-laden air shall be constructed, joined and sealed in an approved manner.

* * *

SECTION 507

COMMERCIAL KITCHEN HOODS

* * *

507.2 Where required. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2.1 and 507.2.2. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed.

507.2.1 Type I hoods. Type I hoods shall be installed ((~~where~~)) for collecting and removing grease and smoke generated from cooking appliances ((~~produce grease or smoke~~)), such as occurs with griddles, fryers, broilers, ovens, ranges and wok ranges.

507.2.1.1 Operation. Type I hood systems shall be designed and installed to automatically activate the exhaust fan whenever cooking operations occur. The activation of the exhaust fan shall occur through an interlock with the cooking appliances, by means of heat sensors or by means of other approved methods.

507.2.2. Type II hoods. Type II hoods shall be installed ((~~where~~)) for collecting and removing steam, vapor, heat or odors from cooking or dishwashing appliances ((~~produce heat, steam, or products of combustion and do not produce grease or smoke~~)), such as steamers, kettles, pasta cookers, pastry ovens, pizza ovens, coffee roaster ovens, roasting ovens of maximum 6 kW (20,000 Btu/h) capacity, and dishwashing machines above 140°F (60° C) maximum water temperature.

Exceptions:

1. Under-counter-type commercial dishwashing machines.

2. A Type II hood is not required for dishwashers and potwashers that are provided with heat and water vapor exhaust systems that are supplied by the appliance manufacturer and are installed in accordance with the manufacturer's instructions.

3. A single light-duty electric convection, bread, retherm or microwave oven. The additional heat and moisture loads generated by such appliances shall be accounted for in the design of the HVAC system.

4. A Type II hood is not required for the following electrically heated appliances: toasters, steam tables, popcorn poppers, hot dog cookers, coffee makers, rice cookers, egg cookers, holding/warming ovens. The additional heat and moisture loads generated by such appliances

shall be accounted for in the design of the HVAC system.

507.2.3 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliances and processes in accordance with Sections 507.2, 507.2.1 and 507.2.2.

507.2.4 Extra-heavy-duty. Type I hoods for use over extra-heavy-duty cooking appliances shall not cover other appliances that require fire extinguishing equipment and such hoods shall discharge to an exhaust system that is independent of other exhaust systems.

Note: The definition of extra-heavy-duty cooking appliance includes appliances using solid fuel.

Interpretation: The table below summarizes the types of hoods that are required for different types of appliances.

TYPE OF APPLIANCE[1]	TYPE OF HOOD REQUIRED[2]		
	TYPE I[3]	TYPE II	NONE
Baking oven	Solid fuel	≥ 6 kW	≤ 6 kW
Charbroiler	All sizes		
Coffee maker		≥ 6 kW	≤ 6 kW
Coffee roaster[4]		All sizes	
Convection ovens (electric)		≥ 6 kW	≤ 6 kW
Deep-fat fryer	All sizes		
Dishwasher		≥ 140°F	≤ 140°F
Grill	All sizes		
Hot dog display heater		≥ 6 kW	≤ 6 kW
Microwave oven			All sizes
Pastry oven		≥ 6 kW	≤ 6 kW
Pizza oven	Solid fuel	≥ 6 kW	≤ 6 kW
Popcorn maker		≥ 6 kW	≤ 6 kW
Roasting oven[5]	≥ 6 kW	≤ 6 kW	
Roll warmer		≥ 6 kW	≤ 6 kW
Solid-fuel burning appliances	All sizes & all food products		
Soup warmer, soup preparation cooking unit		≥ 6 kW	≤ 6 kW
Steam reconstitution device		≥ 6 kW	≤ 6 kW
Steam table		≥ 6 kW	≤ 6 kW
Steamer		≥ 6 kW	≤ 6 kW
Toaster		≥ 6 kW	≤ 6 kW
Warming oven		≥ 6 kW	≤ 6 kW

The code official shall determine hood requirements for appliances not listed in the table.
Section 507.2 defines Type I and Type II kitchen hoods.
The definition of extra-heavy-duty cooking appliance includes all appliances utilizing solid fuel.
Puget Sound pollution control requires an after-burner for particulates.
Roasting ovens are used to cook raw or partially cooked food.

* * *

507.13. Capacity of hoods. Commercial food service hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections 507.13.1 through 507.13.4. The net quantity of exhaust air shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood. Where any combination of heavy-duty, medium-duty and light-duty cooking appliances are utilized under a single hood, the exhaust rate required by this section for the heaviest duty appliance covered by the hood shall be used for the entire hood.

507.13.1 Extra-heavy-duty (solid fuel) cooking appliances. The minimum net airflow for Type I hoods used for extra-heavy-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	Not allowed
Double island canopy (per side)	550
Eyebrow	Not allowed
Single island canopy	700
Wall-mounted canopy	550

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.2 Heavy-duty cooking appliances. The minimum net airflow for Type I hoods used for heavy-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	400
Double island canopy (per side)	400
Eyebrow	Not allowed
Single island canopy	600
Wall-mounted canopy	400

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.3 Medium-duty cooking appliances. The minimum net airflow for Type I hoods used for medium-duty cooking appliances shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	300
Double island canopy (per side)	300
Eyebrow	250
Single island canopy	500
Wall-mounted canopy	300

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.4 Light-duty cooking appliances. The minimum net airflow for Type I hoods used for light duty cooking appliances and food service preparation and cooking operations approved for use under a Type II hood shall be determined as follows:

Type of Hood	CFM per linear foot of hood
Backshelf/pass-over	250
Double island canopy (per side)	250
Eyebrow	250
Single island canopy	400
Wall-mounted canopy	200

For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.

507.13.5 Dishwashing appliances. The minimum net airflow for Type II hoods used for dishwashing appliances shall be 100 CFM per linear foot of hood length.

Exception: Dishwashing appliances and equipment installed in accordance with Section 507.2.2, Exception 2.

* * *

SECTION 508

COMMERCIAL KITCHEN MAKEUP AIR

508.1 Makeup air. Makeup air shall be supplied during the operation of commercial kitchen exhaust systems that are provided for commercial cooking appliances. ((~~The amount of makeup air supplied shall be approximately equal to the amount of exhaust air.~~)) A separate makeup air system for the kitchen shall supply not less than 90 percent of the air to be exhausted. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both. For mechanical makeup air systems, the exhaust and all systems providing makeup air ((~~systems~~)) shall be electrically interlocked to insure that makeup air is provided whenever the exhaust system is in operation. Exterior windows and doors shall not be used to provide commercial kitchen makeup air. When individual kitchen hoods are designed to exhaust greater than 5000 cfm, refer to *Washington State Energy Code* with Seattle Amendments Section 1439.1 for additional makeup air system requirements. Makeup air intake opening locations shall comply with Sections 401.4 and 401.4.1.

Exceptions:

1. The total makeup air for the exhaust system is less than 400 cfm; or

2. Occupant ventilation air that would otherwise exfiltrate or be exhausted by other mechanical exhaust systems may be used to provide all makeup air, or a portion of makeup air when a direct path through permanent openings exists for occupant ventilation air to transfer to the kitchen hood area. That portion of air not supplied by occupant ventilation air shall be provided by a separate makeup air system. The combined air quantity provided by a separate makeup air system and occupant ventilation air shall provide 100 percent of the air to be exhausted.

508.1.1 Makeup air temperature. The temperature differential between makeup air and the air in the conditioned space shall not exceed 10°F (6°C) if the amount of makeup air supply exceeds 2,500 cfm (1180 L/s) per space.

Exceptions:

1. Makeup air that is part of the air-conditioning system.

2. Makeup air that does not decrease the comfort conditions of the occupied space.

* * *

SECTION 510

HAZARDOUS EXHAUST SYSTEMS

* * *

510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.

2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.

3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.

((~~**Exception:** Laboratories, as defined in Section 510.1, except where the concentrations listed in Item 1 are exceeded or a vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2, 3 or 4 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.~~))

Laboratories are permitted to comply with rules promulgated by the code official and the fire code official in lieu of this section.

Note: See Director's Rule 30-2005, or any rule superseding Director's Rule 30-2005 for alternate provisions for research and education laboratories.

* * *

510.7 Suppression required.

510.7.1 Ducts. Ducts shall be protected with an approved automatic fire suppression system installed in accordance with the *International Building Code*.

Exceptions:

1. An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists and vapors that are nonflammable and noncombustible under all conditions and at any concentrations.

2. An approved automatic fire suppression system shall not be required in ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).

3. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required in laboratory hoods or exhaust systems.

4. An approved automatic fire suppression system is not required in metallic ducts if all fume hoods served by the duct are equipped with an approved fire suppression system.

510.7.2 Fume Hoods. Approved automatic fire suppression shall be installed in fume hoods within which operations are conducted involving hazardous materials that have the potential to create a flammable vapor, gas, fume, mist, or dust in concentrations exceeding 25 percent of the lower flammability limit of the substance or mixture for the expected room temperature in the absence of the fume hood and under normal operating conditions.

* * *

SECTION 511

DUST, STOCK AND REFUSE CONVEYING SYSTEMS

* * *

511.1.1 Collectors and separators. Collectors and separators involving such systems as centrifugal separators, bag filter systems and similar devices, and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe that extends above the highest part of any roof with a distance of 30 feet (9144 mm).

Exceptions:

1. Collectors such as "Point of Use" collectors, close extraction weld fume collectors, spray finishing booths, stationary grinding tables, sanding booths, and integrated or machine-mounted collectors shall be permitted to be installed indoors provided the installation is in accordance with the *International Fire Code* and the ((~~ICC~~)) *Seattle Mechanical Code*.

2. Collectors in independent exhaust systems handling combustible dusts shall be permitted to be installed indoors provided that such collectors are installed in compliance with the *International Fire Code* and the ((~~ICC~~)) *Seattle Mechanical Code*.

* * *

SECTION 512

SUBSLAB SOIL EXHAUST SYSTEMS

* * *

512.2 Materials. Subslab soil exhaust system duct material shall be air duct material listed and labeled to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the ((~~International~~)) *Uniform Plumbing Code* as building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper pipe; copper tube of a weight not less than that of copper drainage tube, Type DWV; and plastic piping.

* * *

SECTION 513

SMOKE CONTROL SYSTEMS

* * *

[F] 513.3 Special inspection and test requirements. In addition to the ordinary inspection and test requirements which buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 of the *International Building Code* shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the construction documents shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same terms as found in Section 1704 of the *International Building Code*.

Note: See SFD Administrative Rules 9.01.010 and 9.02.04 for further specific requirements.

* * *

[F] 513.11 Power systems. The smoke control system shall be supplied with two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an approved ((~~standby~~)) emergency source complying with the ((~~ICC~~)) *National Electrical Code*. The ((~~standby~~)) emergency power source and its transfer switches shall be in a separate room from the normal power transformers and switch gear and shall be enclosed in a room constructed of not less than 1-hour fire-resistance-rated fire barriers, ventilated directly to and from the exterior. Power distribution from the two sources shall be by independent routes. Transfer to full ((~~standby~~)) emergency power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with the ((~~ICC~~)) *Seattle Electrical Code*.

[F] 513.11.1 Power sources and power surges. Elements of the smoke management system relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span 15-minute primary power interruption. Elements of the smoke management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other approved means.

[F] 513.11.2 Wiring. In addition to meeting requirements of the *National Electrical Code*, all wiring regardless of voltage, shall have fire-resistance-rated protection of at least two hours or as required in rules promulgated by the code official.

Exception: Subject to the approval of the code official, fire-resistance-rating is not required for wiring located in a parking garage.

[F] 513.12 Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Chapter 9 of the *International Building Code* and NFPA 72. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control equipment.

Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, the presence of power downstream of all disconnects and, through a preprogrammed weekly test sequence, report abnormal conditions audibly, visually and by printed report.

[F] 513.12.1 Wiring. ((~~In addition to meeting the requirements of the ICC Electrical Code, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.~~)) See Section 513.11.

[F] 513.12.2 Activation. Smoke control systems shall be activated in accordance with the *International Building Code*.

[F] 513.12.3 Automatic control. Where completely automatic control is required or used, the automatic control sequences shall be initiated from an appropriately zoned automatic sprinkler system complying with Section 903.3.1.1 of the *International Fire Code* or from manual controls that are readily accessible to the fire department, and any smoke detectors ((~~required by engineering analysis~~)).

* * *

SECTION 514

ENERGY RECOVERY VENTILATION SYSTEMS

514.1 General. Energy recovery ventilation systems shall be installed in accordance with this section. Where required for purposes of energy conservation, energy recovery ventilation systems shall also comply with the ((~~International Energy Conservation Code~~)) *Washington State Energy Code* with Seattle Amendments

* * *

Section 7. The following sections of Chapter 6 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 601

GENERAL

[B] 601.2 Air movement in egress elements. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.

Exceptions:

1. Use of a corridor as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, ((~~smoking lounges~~)) and janitor closets, shall be permitted, provided that each such corridor is directly supplied with ((~~outdoor~~)) air at a rate greater than the rate of makeup air taken from the corridor.

2. Where located within a dwelling unit, the use of corridors for conveying return air shall not be prohibited.

3. Where located within tenant spaces of 1,000 square feet (93 m^2) or less in area, utilization of corridors for conveying return air is permitted.

[W] 4. Where such air is part of an engineered smoke control system.

[W] 5. Make up or relief air in corridors of Group I-2 occupancies.

[W] 6. Corridors serving residential occupancies shall be permitted to be supplied without specific mechanical exhaust subject to the following:

6.1 The supply air is 100% outdoor air; and

6.2 The units served by the corridor have conforming ventilation independent of the air supplied to the corridor, and

6.3 For other than high-rise buildings, the supply fan will automatically shut off upon activation of corridor smoke detectors that shall be spaced at no more than 30 feet (9144 mm) on center along the corridor, or

6.4 For high-rise buildings, corridor smoke detector activation will close required smoke/fire dampers at the supply inlet to the corridor at the floor receiving the alarm.

[B] 601.2.1 Corridor ceiling. Use of the space between the corridor ceiling and the floor or roof structure above as a return air plenum is permitted for one or more of the following conditions:

1. The corridor is not required to be of fire-resistance-rated construction;

2. The corridor is separated from the plenum by fire-resistance-rated construction;

3. The air-handling system serving the corridor is shut down upon activation of the air-handling unit smoke detectors required by this code;

4. The air-handling system serving the corridor is shut down upon detection of sprinkler waterflow where the building is equipped throughout with an automatic sprinkler system; or

5. The space between the corridor ceiling and the floor or roof structure above the corridor is used as a component of an approved engineered smoke control system.

* * *

601.4 Contamination prevention. Exhaust ducts under positive pressure, chimneys, and vents shall not extend into or pass through ducts or plenums.

[W] **Exception:** Exhaust ducts conveying environmental air shall be permitted to pass through a duct or plenum where one of the following conditions is satisfied.

1. The duct is maintained under sufficient negative pressure to prevent leakage of exhaust air into the surrounding duct or plenum;

2. If maintained under a positive pressure with respect to the surrounding duct or plenum, the exhaust duct is sealed to prevent leakage;

3. The surrounding air stream is an exhaust air stream that is not recirculated to the building and cross contamination of the two air streams will not create a hazardous condition;

4. The duct is an insulated and sealed clothes dryer exhaust duct.

SECTION 602

PLENUMS

* * *

602.2 Construction. Plenum enclosures shall be constructed of materials permitted for the type of construction classification of the building.

The use of gypsum boards to form plenums shall be limited to systems where the air temperatures do not exceed 125°F (52°C) and the building and mechanical system design conditions are such that the gypsum board surface temperature will be maintained above the airstream dew-point temperature as determined by the design engineer. Air plenums formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

* * *

602.2.1.1 Wiring. Combustible electrical or electronic wiring methods and materials, optical fiber cable, and optical fiber raceway exposed within a plenum shall have a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread not greater than 5 feet (1524 mm) when tested in accordance with NFPA 262. Only type OFNP (plenum rated nonconductive optical fiber cable) shall be installed in plenum-rated optical fiber raceways. Wiring, cable, and raceways addressed in this section shall be listed and labeled as plenum rated and shall be installed in accordance with ((~~ICC~~)) *l PaUPs .ectrica. CCde.*

* * *

SECTION 603

DUCT CONTRUCTION AND INSTALLATION

* * *

603.5 Nonmetallic ducts. Nonmetallic ducts shall be constructed with Class 0 or Class 1 duct material in accordance with UL 181. Fibrous duct construction shall conform to the SMACNA *i ibrCuS G,aSS r uct COnStructiOn l tandardS* or NAIMA *i ibrCuS G.aSS r uct COnStructiOn l tandardS.* The maximum air temperature within nonmetallic ducts shall not exceed 250°F (121°C).

603.5.1 Gypsum ducts. The use of gypsum boards to form air shafts (ducts) shall be limited to return air systems where the air temperatures do not exceed 125°F (52°C) and the gypsum board surface temperature is maintained above the airstream dew-point temperature as determined by the design engineer. Air ducts formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

Exceptions:

1. Gypsum boards coated on the inside with epoxy paint may be used for supply or exhaust air ducts.

* * *

2. Foil-backed gypsum boards may be used for supply or exhaust air ducts.

3. Gypsum boards may be used for ducts that are used only for stairway or elevator pressurization air.

* * *

603.9 Joints, seams and connections. All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC *r uct DOnstructiOn l tanparps—o etal anp i lexible,* SMACNA *i ibrCus Glass r uct COnsUuctiOn l Uandards,* and NAIMA *i ibrCus G.ass r ucUCOnsUuctiOn l Uandards.* All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes. Tapes and mastics used to seal ductwork listed and labeled in accordance with UL 181A shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Tapes and mastics used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-M" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked "181B-C". Unlisted duct tape is not permitted as a sealant on any metal ducts.

603.10 Supports. Ducts shall be supported with approved hangers at intervals not exceeding 10 feet (3048 mm) or by other approved duct support systems designed in accordance with the *InUPrnaUOna. dui.ding CCdP.* Flexible and other factory-made ducts shall be supported in accordance with the manufacturer's installation instructions.

603.10.1 Seismic bracing of ducts. Longitudinal and transverse bracing is required for ducts 6 square feet (0.56 m^2) and larger, including round ducts with a diameter of 34 inches (864 mm) or more, and on all duct systems used for life safety and smoke control installed in either the horizontal or vertical position.

603.10.1.1 Transverse bracing. Transverse bracing shall occur at maximum intervals of 30 feet (9144 mm), at each duct turn and at the end of a duct run. Walls, including non-bearing fixed partitions, that have ducts running through them may replace a transverse brace.

603.10.1.2 Longitudinal bracing. Longitudinal bracing shall occur at maximum intervals of 60 feet (18 288 mm). Transverse bracing for one duct section may also act as longitudinal bracing for a duct section connected perpendicular to it, if bracing is installed within four feet (1219 mm) of the intersection and sized and installed on the larger duct.

603.10.2 Grouping of ducts. Groups of ducts may be combined in a larger size frame using overall dimensions and maximum weight of ducts. At least 2 sides of each duct shall be connected to the angles of the brace.

603.10.3 Seismic loads. Bracing for ducts shall be designed to resist seismic loading, using accepted engineering practices and Chapter 16 of the *International Building Code.*

Exception: No bracing is required if the duct is suspended by hangers 12 inches (305 mm) or less in length as measured from the top of the duct to the bottom of the support where the hanger is attached. Hangers shall be positively attached to the duct within 2 inches (51 mm) of the top of the duct with a minimum of two #10 sheet metal screws.

Interpretation: Duct bracing that complies with the SMACNA guideline "Seismic Restraint Manual Guidelines for Mechanical Systems" is deemed to comply with Section 603.10.1.

* * *

603.15 Mechanical protection. Ducts installed in locations where they are exposed to mechanical damage by vehicles or from other causes shall be protected by approved barriers. Ducts in parking garages shall not interfere with the headroom requirements specified by the *InternatiOna. dui.dinR CCde.*

* * *

SECTION 604

INSULATION

604.1 General. Duct insulation shall conform to the requirements of ((~~Sections 604.2 through 604.13 and the InUPrnaUOna. EnPgy COnsPrvaUOn CCdP~~)) the *WaStingtOn l tate Energy CCde witu l eattle AmendmentS.*

* * *

SECTION 606

SMOKE DETECTION SYSTEMS CONTROL

* * *

606.2 Where required. Smoke detectors shall be installed where indicated in Sections 601.2, 606.2.1 through 606.2.3.

Exception: Smoke detectors shall not be required where air distribution systems are incapable of spreading smoke beyond the enclosing walls, floors and ceilings of the room or space in which the smoke is generated.

606.2.1 Return air systems. Smoke detectors shall be installed in return air systems with a design capacity greater than 2,000 cfm (0.9 m^3/s), in the return air duct or plenum upstream of any filters, exhaust air connections, outdoor air connections, or decontamination equipment and appliances.

Exception: Smoke detectors are not required in the return air system where all portions of the building served by the air distribution system are protected by area smoke detectors connected to a fire alarm system in accordance with the *InUPrnaUOna. i irPCCdP.* The area smoke detection system shall comply with Section 606.4.

606.2.2 Common supply and return air systems. Where multiple air-handling systems share common supply or return air ducts or plenums with a combined design capacity greater than 2,000 cfm (0.9 m^3/s), the return air system shall be provided with smoke detectors in accordance with Section 606.2.1.

Exception: Individual smoke detectors shall not be required for each fan-powered terminal unit, provided that such units do not have an individual design capacity greater than 2,000 cfm (0.9 m^3/s) and will be shut down by activation of one of the following:

1. Smoke detectors required by Sections 601.2, 606.2.1 and 606.2.3.

2. An approved area smoke detector system located in the return air plenum serving such units.

3. An area smoke detector system as prescribed in the exception Section 606.2.1.

In all cases, the smoke detectors shall comply with Sections 606.4 and 606.4.1.

606.2.3 Return air risers. Where return air risers serve two or more stories and serve any portion of a return air system having a design capacity greater than 15,000 cfm (7.1 m^3/s), smoke detectors shall be installed at each story. Such smoke detectors shall be located upstream of the [illegible] connection between the return air riser and any air ducts or plenums.

Interpretation: The fan-powered terminal units may be shut down by the building automation system upon activation of smoke detection described in Section 606.2.2 items 1, 2, or 3. The building automation system is not required to be listed as a smoke control system, nor comply with UL Standard 864 Standard for Control Units and Accessories for Fire Alarm Systems.

* * *

606.4 Controls operation. Upon activation, the smoke detectors shall shut down all operational capabilities of the air distribution system in accordance with the listing and labeling of appliances used in the system. Air distribution systems that are part of a smoke control system shall switch to the smoke control mode upon activation of a detector.

606.4.1 Supervision. The duct smoke detectors shall be connected to the building's fire alarm control panel as a supervisory signal when a fire alarm system is provided. Duct detectors shall not activate a fire alarm signal. The actuation of a duct smoke detector shall activate a visible and audible supervisory signal at a constantly attended location.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where the duct smoke detector activates the building's alarm-indicating appliances.

2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an approved location. Duct smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.

SECTION 607

DUCT AND TRANSFER OPENINGS

* * *

607.5.5 Shaft enclosures. Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with listed fire and smoke dampers installed in accordance with their listing.

Exceptions:

1. Fire dampers are not required at penetrations of shafts where:

1.1. Steel exhaust subducts extend at least 22 inches (559 mm) vertically in exhaust shafts provided that there is a continuous airflow upward to the outdoors;

1.2. Penetrations are tested in accordance with ASTM E 119 as part of the fire-resistance-rated assembly;

1.3. Ducts are used as part of an approved smoke control system in accordance with Section 909 of the *InUPrnaUOna. dui.ding CCdP,* and where the fire damper will interfere with the operation of the smoke control system; or

1.4. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.

2. In Group B and R occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *InUPrnaUOna. dui.ding CCdP,* smoke dampers are not required at penetrations of shafts where kitchen, clothes ((,)) dryer, bathroom and toilet room exhaust openings with steel exhaust subducts, having a wall thickness of at least 0.019 inch (0.48 mm) extend at least 22 inches (559 mm) vertically and the exhaust fan at the upper terminus is powered continuously in accordance with the provisions of Section 909.11 of the *InUPrnaUOna. dui.ding CCdP,* and maintains airflow upward to the outdoors.

3. Smoke dampers are not required at penetration of exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour fire-resistance-rated construction.

4. Smoke dampers are not required at penetrations of shafts where ducts are used as part of an approved mechanical smoke control system designed in accordance with Section 909 of the *InUPrnaUOna. dui.ding CCdP* and where the smoke damper will interfere with the operation of the smoke control system.

Note: See Director's Rules for additional information about combining smoke and fire dampers in a single shaft.

607.6 Horizontal assemblies. Penetrations by air ducts of a floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall be protected by a shaft enclosure that complies with Section 707 and Sections 716.6.1 through 716.6.3 of the *InternatiOna. dui.dinR CCde* or shall comply with Sections 607.6.1 through 607.6.3.

607.6.1 Through penetrations. In occupancies other than Groups I-2 and I-3, a duct constructed of approved materials in accordance with Section 603 that penetrates a fire-resistance-rated floor/ceiling assembly that connects not more than two stories is permitted without shaft enclosure protection provided that a listed fire damper is installed at the floor line or the duct is protected in accordance with Section 712.4 of the *InternatiOna. dui.dinR CCde.* For air transfer openings, see Exception 7 to Section 707.2 ((~~702.2~~)) of the *InternatiOnal duilping DCpe.*

Exception: A duct is permitted to penetrate three floors or less without a fire damper at each floor provided it meets all of the following requirements.

1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel not less than 0.019 inch (0.48 mm) (26 gage) in thickness.

2. The duct shall open into only one dwelling unit or sleeping unit and the duct system shall be continuous from the unit to the exterior of the building.

3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m^2) for any 100 square feet (9.3 m^2) of the floor area.

4. The annular space around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E 119 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

5. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a listed ceiling radiation damper installed in accordance with Section 607.6.2.

* * *

Section 8. The following section of Chapter 8 of the International Mechanical Code, 2006 Edition, is amended as follows:

* * *

SECTION 804

DIRECT-VENT, INTEGRAL VENT AND MECHANICAL DRAFT SYSTEMS

* * *

804.3.3 Termination. The termination of chimneys or vents equipped with power exhausters shall be located a minimum of 10 feet (3048 mm) from the lot line or from adjacent buildings. The exhaust shall be directed away from the building.

804.3.4 Horizontal terminations. Horizontal terminations shall comply with the following requirements:

1. Where located adjacent to walkways, the termination of mechanical draft systems shall be not less than ((~~7~~)) 10 feet ((~~2134 mm~~)) (3048 mm) above the level of the walkway.

2. Vents shall terminate at least 3 feet (914 mm) above any forced air inlet located within 10 feet (3048 mm).

3. The vent system shall terminate at least 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from or 1 foot (305 mm) above any door, window or gravity air inlet into the building.

4. The vent termination point shall not be located closer than 3 feet (914 mm) to an interior corner formed by two walls perpendicular to each other.

5. The vent termination shall not be mounted directly above or within 3 feet (914 mm) horizontally from an oil tank vent or gas meter.

6. The bottom of the vent termination shall be located at least 12 inches (305 mm) above finished grade.

804.3.5 Vertical terminations. Vertical terminations shall comply with the following requirements:

1. Where located adjacent to walkways, the termination of mechanical draft systems shall be not less than ((~~7~~)) 10 feet ((~~2134 mm~~)) (3048 mm) above the level of the walkway.

2. Vents shall terminate at least 3 feet (914 mm) above any forced air inlet located within 10 feet (3048 mm)((~~horizontally~~)).

3. Where the vent termination is located below an adjacent roof structure, the termination point shall be located at least 3 feet (914 mm) from such structure.

4. The vent shall terminate at least 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from or 1 foot (305 mm) above any door, window or gravity air inlet for the building.

5. A vent cap shall be installed to prevent rain from entering the vent system.

6. The vent termination shall be located at least 3 feet (914 mm) horizontally from any portion of the roof structure.

* * *

Section 9. The following section of Chapter 9 of the International Mechanical Code, 2006 Edition, is amended as follows:

* * *

SECTION 908

COOLING TOWERS, EVAPORATIVE CONDENSERS AND FLUID COOLERS

* * *

908.5 Water supply. Water supplies and protection shall be as required by the ((~~InUPrnaUOna.~~)) *nigOrm P.umbinR CCde.*

* * *

Section 10. The following sections of Chapter 11 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 1101

GENERAL

* * *

1101.4 Water connection. Water supply and discharge connections associated with refrigeration

systems shall be made in accordance with this code and the ((~~International~~)) _nigCrm Plumbing DCpe.

* * *

SECTION 1105

MACHINERY ROOM, GENERAL REQUIREMENTS

[B] 1105.1 Design and construction. Machinery rooms shall be designed and constructed in accordance with the *InUPrnaUCna. dui.ding CCdP* and this section.

1105.2 Openings. Ducts and air handlers in the machinery room that operate at a lower pressure than the room shall be sealed to prevent any refrigerant leakage from entering the airstream.

[F] 1105.3 Refrigerant detector. Refrigerant detectors ((~~in machinery rooms~~)) shall be provided as follows: ((~~required by Section 606.8 of the International Fire Code.~~))

[F]1105.3.1 Within machinery rooms. Machinery rooms shall contain a refrigerant detector connected to an alarm system utilizing listed and labeled fire alarm signaling devices capable of generating a sound level, distinctive from other alarm signals, of at least 15 dB above the operating ambient sound pressure level of the space in which they are installed and initiating an approved distinctive visual alarm.

Where continuous mechanical ventilation is provided, failure of the ventilation system shall activate an audible and visual alarm.

The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate.

The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values shown in the *International Mechanical Code* for the refrigerant classification.

Exception: Machinery room vapor detectors for ammonia system shall actuate an alarm at a detection level not to exceed 1,000 ppm and shall automatically exhaust air from the machinery room in accordance with Section 1105.6.4 for emergency conditions.

Detectors and alarms shall be placed in approved locations.

[F] 1105.3.2 Outside of machinery rooms. Where evaporators and piping containing refrigerants are located within rooms or spaces used exclusively for processing or storage of materials under refrigerated conditions, the refrigerated room or space shall be equipped with a refrigerant-vapor detector and alarm system complying with Section 1105.3.1.

Activation of the refrigerant detector shall also automatically stop the flow of refrigerant to evaporators within the space and stop the flow of refrigerant in all supply lines leaving a machinery room whenever the refrigerant vapor concentration is detected at or above 50 percent of the IDLH or 25 percent of the LFL, whichever is lower.

1105.4 Tests. Periodic tests of the mechanical ventilating system shall be performed in accordance with manufacturer's specifications and as required by the code official.

1105.5 Fuel-burning appliances. Fuel-burning appliances and equipment having open flames and that use combustion air from the machinery room shall not be installed in a machinery room.

Exceptions:

1. Where the refrigerant is carbon dioxide or water.
2. Fuel-burning appliances shall not be prohibited in the same machinery room with refrigerant-containing equipment or appliances where combustion air is ducted from outside the machinery room and sealed in such a manner as to prevent any refrigerant leakage from entering the combustion chamber, or where a refrigerant vapor detector is employed to automatically shut off the combustion process in the event of refrigerant leakage.

1105.6 Ventilation. Machinery rooms shall have continuous mechanical ventilation ((~~be mechanically ventilated~~)) to the outdoors. Mechanical ventilation shall be capable of exhausting the minimum quantity of air both at normal operating and emergency conditions. Multiple fans or multispeed fans shall be allowed in order to produce the emergency ventilation rate and to obtain a reduced airflow for normal ventilation.

Interpretation: The requirement for continuous mechanical ventilation to the outdoors means that fire dampers are not allowed on machinery room ventilation ducts. **Exception:** Where a refrigerating system is located outdoors more than 20 feet (6096 mm) from any building opening and is enclosed by a penthouse, lean-to or other open structure, natural or mechanical ventilation shall be provided. Location of the openings shall be based on the relative density of the refrigerant to air. The free-aperture cross section for the ventilation of the machinery room shall be not less than:

$$A = \sqrt{G} \qquad \text{(Equation 11-1)}$$

For SI: $A = 0.13\sqrt{G}$

where:

A = The free opening area in square feet (m^2).

G = The mass of refrigerant in pounds (kg) in the largest system, any part of which is located in the machinery room.

1105.6.1 Discharge location. The discharge of the air shall be to the outdoors in accordance with Chapter 5. Exhaust from mechanical ventilation systems shall be discharged not less than 20 feet (6096 mm) from a property line or openings into buildings.

1105.6.2 Makeup air. Provisions shall be made for makeup air to be drawn from the outside to replace that being exhausted. Openings for makeup air shall be located to avoid intake of exhaust air. Supply and exhaust ducts to the machinery room shall serve no other area, shall be constructed in accordance with Chapter 5 and shall be covered with corrosion-resistant screen of not less than ¼ -inch (6.4 mm) mesh.

1105.6.3 Quantity—normal ventilation. ((~~During occupied conditions, the~~)) The mechanical ventilation system shall exhaust the larger of the following:

1. Not less than 0.5 cfm per square foot (0.0025 $m^3/s \cdot m^2$) of machinery room area or 20 cfm (0.009 m^3/s) per person; or
2. A volume required to limit the room temperature rise to 18°F (10°C) taking into account the ambient heating effect of all machinery in the room.

1105.6.4 Quantity—emergency conditions. Upon actuation of the refrigerant detector required in Section 1105.3, the mechanical ventilation system shall exhaust air from the machinery room in the following quantity:

$$Q = 100\sqrt{G} \qquad \text{(Equation 11-2)}$$

For SI: $Q = 0.07\sqrt{G}$

where:

t = The airflow in cubic feet per minute (m^3/s).

G = The design mass of refrigerant in pounds (kg) in the largest system, any part of which is located in the machinery room.

[F] 1105.6.5 Standby source of power required. Where treatment, detection, continuous ventilation, or alarm systems are required, such systems shall be connected to a standby source of power to supply electrical power in the event of loss of power from the primary source. See the *InUPrnaUCna. i irP CCdP* Section 606 and Chapter 27 and *I PaUUP E.PcUica. CCdP* Article 701.

1105.7 Termination of relief devices. Pressure relief devices, fusible plugs and purge systems located within the machinery room shall terminate outside of the structure at a location not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or exit.

[F] For additional requirements regarding termination of relief devices for flammable refrigerants, toxic and highly toxic refrigerants, ammonia refrigerant, treatment systems, flaring systems, and ammonia diffusion systems, see Section 606.11 of the *InternatiCna. i ire CCde.*

* * *

SECTION 1106

MACHINERY ROOM, SPECIAL REQUIREMENTS

* * *

1106.3 Ammonia room ventilation. Ventilation systems in ammonia machinery rooms shall be operated continuously at the normal ((~~emergency~~)) ventilation rate determined in accordance with Section 1105.6.3 ((~~1105.6.4~~)).

Exception((s)):

((~~1. Machinery rooms equipped with a vapor detector that will automatically start the ventilation system at the emergency rate determined in accordance with Section 1105.6.4, and that will actuate an alarm at a detection level not to exceed 1,000 ppm; or~~))

((~~2.~~)) Machinery rooms conforming to the Class 1, Division 2, hazardous location classification requirements of the ((~~ICC~~)) *Seattle Electrical Code.*

1106.4 Flammable refrigerants. Where refrigerants of Groups A2, A3, B2 and B3 are used, the machinery room shall conform to the Class 1, Division 2, hazardous location classification requirements of the ((~~ICC~~)) *Seattle Electrical Code.*

Exception: Ammonia machinery rooms, but not including ventilation fan motors.

***

[F] 1106.7 Alarm activation. Where continuous ventilation is provided, failure of the ventilation system shall automatically activate an audible and visual alarm.

SECTION 1107

REFRIGERANT PIPING

* * *

1107.4.1 Steel pipe. Carbon steel pipe with a wall thickness not less than Schedule 80 shall be used for Group A2, A3, B2 or B3 refrigerant liquid lines for sizes 1.5 inches (38 mm) and smaller. Carbon steel pipe with a wall thickness not less than Schedule 40 shall be used for Group A1 or B1 refrigerant liquid lines 6 inches (152 mm) and smaller, Group A2, A3, B2 or B3 refrigerant liquid lines sizes 2 inches (51 mm) through 6 inches (152 mm) and all refrigerant suction and discharge lines 6 inches (152 mm) and smaller. ((~~Type F steel pipe shall not be used for refrigerant~~)) Refrigerant lines having an operating temperature less than -20°F (-29°C) shall be designed to meet the requirements of ASME B31.5-2001, *I egrigeratiCn Piping and a eat TranSer.*

* * *

1107.7.1 Liquid receivers. All systems containing 100 pounds (45 kg) or more of a refrigerant, other than systems utilizing nonpositive displacement compressors, shall have stop valves, in addition to those required by Section 1107.7, on each inlet of each liquid receiver. Stop valves shall not be required on the inlet of a receiver in a condensing unit, nor on the inlet of a receiver which is an integral part of the condenser.

Ammonia systems shall be provided with liquid receivers designed for pumpdown that have sufficient capacity to assure that the liquid does not occupy more than 90% of the volume of the receiver at 90°F.

* * *

Section 11. The following sections of Chapter 12 of the International Mechanical Code, 2006 Edition, are amended as follows:

SECTION 1201

GENERAL

1201.1 Scope. The provisions of this chapter shall govern the construction, installation, alteration and repair of hydronic piping systems. This chapter shall apply to hydronic piping systems that are part of heating, ventilation and air-conditioning systems. Such piping systems shall include steam, hot water, chilled water, steam condensate and ground source heat pump loop systems. Potable cold and hot water distribution systems shall be installed in accordance with the ((~~International~~)) _nigCrm Plumbing DCpe.

* * *

SECTION 1204

PIPE INSULATION

1204.1 Insulation characteristics. Pipe insulation installed in buildings shall conform to the requirements of the ((~~International Energy DCservatiCn DCpe~~)) *WasuingtCn I UdUP EnPrgy CCdP wiUi I PaUUP AmPndmPnU*, shall be tested in accordance with ASTM E 84, using the specimen preparation and mounting procedures of ASTM E 2231; and shall have a maximum flame spread index of 25 and a smoke-developed index not exceeding 450. Insulation installed in an air plenum shall comply with Section 602.2.1.

Exception: The maximum flame spread index and smoke developed index shall not apply to one- and two-family dwellings.

1204.2 Required thickness. Hydronic piping shall be insulated to the thickness required by the ((~~InUPrnaUCna. EnPrgy CCnsPrvaUCn CCdP~~)) *WasuingtCn I UdUP EnPrgy CCdP, iUi I PaUUP AmendmentS*

* * *

SECTION 1206

PIPE INSTALLATION

* * *

1206.2 System drain down. Hydronic piping systems shall be designed and installed to permit the system to be drained. Where the system drains to the plumbing drainage system, the installation shall conform to the requirements of the ((~~InternatiCnal~~)) _nifCrm P.umbing CCdP.

1206.3 Protection of potable water. The potable water system shall be protected from backflow in accordance with the ((~~InUPrnaUCna.~~)) _nigCrm Plumbing CCde.

* * *

Section 12. The following section of Chapter 14 of the International Mechanical Code, 2006 Edition, is amended as follows:

SECTION 1401

GENERAL

1401.1 Scope. This chapter shall govern the design, construction, installation, alteration and repair of systems, equipment and appliances intended to utilize solar energy for space heating or cooling, domestic hot water heating, swimming pool heating or process heating.

Exception: Photovoltaic solar systems that generate electricity shall be installed in accordance with *InUPrnaUCna. dui.ding CCdP* and Article 690 of the *I PaUUP E.PcUica. CCdP.* Systems interconnected to the electric grid shall comply with additional requirements of Seattle City Light.

1401.2 Potable water supply. Potable water supplies to solar systems shall be protected against contamination in accordance with the ((~~InUPrnaUCnal~~)) _nifCrm P.umbing CCdP.

Exception: Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the ((~~InUPrnaUCna.~~)) _nigCrm Plumbing CCde, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.

* * *

Section 13. Sections 3-55 of Ordinance 121523 and Section 1 of Ordinance 122048 are repealed.

Section 14. For a period of 60 days following the effective date of this ordinance, the Director may also accept and thereafter approve applications that are designed to comply with either the requirements of this Ordinance or the requirements of Ordinance 121523 as amended by Ordinance 122048.

Section 15. 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 1st day of October, 2007, and signed by me in open session in authentication of its passage this 1st day of October, 2007.

NICK LICATA
President _____ of the City Council

Approved by me this 11th day of October, 2007.

Gregory J. Nickels, Mayor

Filed by me this 11th day of October, 2007.

JUDITH E. PIPPIN
City Clerk

(Seal)

Date of first publication in the Seattle Daily Journal of Commerce, October 19, 2007.

10/19 (216520)

ORDINANCE 122530

AN,ORDINANCE,relating,to,energy,efficiency,and,energy,conservation-,amending,Section, 44:9' ' :' ¼ ,of,the,Seattle,Municipal,Code,adopting,by,reference,the,4' ' –,Washington, State,Energy,Code-,amending,certain,chapters,of,the,4' ' –,Washington,State,Energy, Code-,and,repealing,Sections,4–9–,of,Ordinance,¼4¼84¼,,

BE,vI ,OGDAvNED,BY,I u E,CvI Y,Os ,HEAI I LE,AH,s OLLO' H,

, Section,¼ Section,44:9' ' :' ¼ ,of,the,Seattle,Municipal,Code,is,amended,as,follows;,

44 911 131, AdopiSon,of,iRe,~~**4116**~~**)),4116,' VIRSngion,HVie,Energy,Code,Vnd,ocVa, Vb endb enih,**

The,((~~4007~~)),4006,Washington,State,Energy,Code,(WAC,51.11)-,which,is,filed,with,the, City,Clerk,in,C:F:,((~~309491~~)),308938-,and,the,amendments,thereto,adopted,by,Council,Bill, ((~~141841~~)),11–033,that,incorporate,the,Seattle,Amendments-,are,hereby,adopted,and,by,this, reference,made,a,part,of,this,subtitle,and,((~~shall~~)),constitute,the,((~~official,Energy,Code,of,the, City~~)),Washington,State,Energy,Code,with,Seattle,amendments:,,((~~The,4001,Washington,State, Energy,Code,,and,amendments,thereto,,are,hereby,repealed:~~)),

, Section,4., The,following,section,of,Chapter,4,of,the,4006,Washington,State,Energy, Code,is,amended,as,follows:,

SectSn 201 GeneraaDefSnSSons

***,

BUILDING ENTRANCE: any doorway-, set, of, doors-, turnstile-, vestibule-, or, other, form, of, portal, that, is, ordinarily, used, to, gain, access, to, the, building, by, its, users, and, occupants:

***,

NOMvNAL,G.VALJ E/,,The,thermal,resistance,of,the,insulation,alone,as,determined,in, accordance,with,the,U:S:,Federal,Trade,Commission,R. value,rule,(CFR,Title,¼–,Part,7–'),in, units,of,h·ft^4.°FCBtu,at,a,mean,temperature,of,95°F:,,Nominal,R. value,refers,to,the,thermal, resistance,of,the,added,insulation,in,framing,cavities,or,insulated,sheathing,only,and,does,not, include,the,thermal,resistance,of,other,building,materials,or,air,films:,

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

***,

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

***,

, Section,[:, The,following,sections,of,Chapter,9,of,the,4' ' 6,Washington,State,Energy, Code,are,amended,as,follows:,

HeciSn,713,HVndVrdIr,,The,following,standards,shall,apply,to,Chapters,1,through,4' :,The, standards,and,portions,thereof-,which,are,referred,to,in,various,parts,of,this,Code,shall,be,part,of, the,Washington,State,Energy,Code,and,are,hereby,declared,to,be,a,part,of,this,Code:,

CODE,

H ANDAGD,

NO_,, I vI LE,AND,HOJ GCE,

RS.¼,,,,,,,,4' ' 5,ASHRAE,Fundamentals,Handbook:,

RS.4, ,,,,,Super,Good,Cents,Technical,Reference,(Builder's,Field,Guide):,

RS.3;,, ,,,,(Reserved:),

RS.7,, ,,,,ASHRAE,Standard,55.4' ' 7,Thermal,Environmental,Conditions,for,Human, Occupancy:,

RS.5,, ,,,,4' ' –,ASHRAE,Refrigeration,Handbook:,

RS.–, ,,,,SMACNA-,Installation,Standards,for,Residential,Heating,and,Air,Conditioning, Systems-,–th,Edition-,¼988:,

RS.9, ,,,,SMACNA-,HVAC,Duct,Construction,Standards,Metal,and,Flexible-,4nd,Edition-, ¼995:,

RS.8,, ,,,,SMACNA-,Fibrous,Glass,Duct,Construction,Standards-,–th,Edition-,¼994:,

RS.9,, ,,,,ASHRAE(IESNA,Standard,9' :¼4' ' 7-,Energy,Standard,for,Buildings,Except,Low. Rise,Residential,Buildings:,

RS.¼ ,,,,,4' ' 7,ASHRAE,Systems,&,Equipment,Handbook:,

RS.¼4,,,,,4' ' 3,ASHRAE,HVAC,Applications,Handbook:,

RS.¼4,through,RS.48;,,(Reserved:),

RS.49,,,,,,Nonresidential,Building,Design,by,Systems,Analysis:,

RS.3' ,,,,,Title,¼ -,Code,of,Federal,Regulations,(CFR)-,Part,73' ,(March,¼7-,¼988):,

RS.3¼,,,,,National,Fenestration,Rating,Council,(NFRC),Standard,¼ ' .4' ' 7:,

RS.34, ,,,,Seattle,EnvStd,4' ' –,available,for,download,at,the,Seattle,Energy,Code,homepage,at:,, http:(0vww:seattle:gov0lpd0energy

ACCREDITED AUTHORITATIVE AGENCIES

, ANHy,refers,to,the,American,National,Standards,Institute-,Inc:-,¼4West,74nd,Street-,New, York-,NY,¼ ' 3–,

Phone,(4¼4),–74.79' ' ,,Fax,(4¼4),398.' ' 43-,Internet,www:ansi:org

, AGv,refers,to,the,Air.Conditioning,and,Refrigeration,Institute-,73' ¼N:,Fairfax,Dr:-,Suite, 745-,Arlington-,VA,444' 3,

Phone,(9' 3),547:88' ' ,,Fax,(9' 3),548.38¼–,Internet,www:ari:org

, AHu GAE,refers,to,the,American,Society,of,Heating-,Refrigerating,and,Air.Conditioning, Engineers-,Inc:-,1991,Tullie,Circle-,N:E:-,Atlanta-,GA,30349,

Phone,(707),636.8700,,Fax,(707),341.5798-,Internet,www:ashrae:org

, AHI M,refers,to,the,American,Society,for,Testing,and,Materials-,100,Barr,Harbor,Drive-, West,Conshohocken-,PA,19748.4959,

Phone,(610),834.9585,,Fax,(610),834.9555-,Internet,www:astm:org

, CI I,refers,to,the,Cooling,Tower,Institute-,530,Wells,Fargo,Drive-,Suite,418-,Houston-,TX, 99090,

Phone,(481),583.7089,,Fax,(481),539.1941-,Internet,www:cti:org

, vESNA,refers,to,the,Illuminating,Engineering,Society,of,North,America-,140,Wall,Street-, Floor,17-,New,York-,NY,10005.7001,

Phone,(414),478.5000,,Fax,(414),478.5017-,Internet,www:iesna:org

, Ns GC,refers,to,the,National,Fenestration,Rating,Council-,Inc:-,8787,Georgia,Avenue-,Suite, 340-,Silver,Spring-,Maryland,40910,

Phone,(301),589.1996,,,Fax,(301),589.3887((588.–857))-,Internet,www:nfrc:org

, HMACNA,refers,to,the,Sheet,Metal,and,Air,Conditioning,Contractors,National,Association-, Inc:-,4401,Lafayette,Center,Drive-,R:O:,Box,441430-,Chantilly-,VA,40153.1430,,

Phone,(9' 3),8' 3.498' ,,Fax,(9' 3),8' 3.3934-,Internet,www:smacna:org

, Section,7:, The,following,sections,of,Chapter,¼ ,of,the,4' ' –,Washington,State,Energy, Code,are,amended,as,follows;,

3113,,t enerVa,

3113 [,,*AS,,s Sb h/,,,Default,R.values,used,for,air,films,shall,be,as,follows;

R.Value Condition

' :19 All,exterior,surfaces

0: 1 Interior,horizontal,surfaces ,heat,flow,up

0:94 Interior,horizontal,surfaces ,heat,flow,down

0:68 Interior,vertical,surfaces)),,Reserved:

3113.7,,BuSdSng,MaierSas:,,Default,R.values,used,for,building,materials,shall,be,as,shown,in Table,10.B:

I ABLE,31.B,,DEs AULI ,R.VALUES,s OR,BUILDINt ,MAI ERIALS

Material	Nominal Size (in.)	Actual Size (in.)	R-Value (Heat Capacity)
Air cavity (unventilated), between metal studs at 16 inches on center[1]	:	:	0 79
Air cavity (unventilated), all other depths and framing materials[1]	:	:	0 91
Airfilm, exterior surfaces[2]	:	:	0 17
Airfilm, interior horizontal surfaces, heat flow up[2]	:	:	0 61
Airfilm, interior horizontal surfaces, heat flow down[2]	:	:	0 92
Airfilm, interior vertical surfaces[2]	:	:	0 68
Brick at R-0.12/in.	4	:	0 48
Carpet and rubber pad	:	:	1.23
Concrete at R-0.0625/in.	:	2	0.13 (HC-4 8)
	:	4	0.25 (HC-9.6)
	:	6	0.38 (HC-14.4)
	:	8	0 50 (HC-19.2)
	:	10	0.63 (HC-24 0)
	:	12	0.75 (HC-28 8)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft³)	6	:	0.80 (HC-11.4)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft³)	6	:	0 51 (HC-13 2)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft³)	6	:	1 33 (HC-6.7)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft³)	6	:	0.82 (HC-9.0)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft³)	8	:	1.05 (HC-15 5)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft³)	8	:	0.69 (HC-17.9)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft³)	8	:	1.44 (HC-9 6)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft³)	8	:	0.98 (HC-12.0)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft³)	10	:	1 30 (HC-19.7)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft³)	10	:	0.87 (HC-22 6)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft³)	10	:	1.61 (HC-11 9)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft³)	10	:	1 11 (HC-14.8)
Concrete masonry units, solid grouted, lightweight (95 lbs/ft³)	12	:	1 53 (HC-23 9)
Concrete masonry units, solid grouted, normal weight (135 lbs/ft³)	12	:	1.06 (HC-27.2)
Concrete masonry units, partly grouted, lightweight (95 lbs/ft³)	12	:	1.75 (HC-14.2)
Concrete masonry units, partly grouted, normal weight (135 lbs/ft³)	12	:	1 23 (HC-17 5)
Flooring, wood subfloor	:	0.75	0 94
Gypsum board	:	0 5	0.45
	:	0 625	0.56
Metal deck	:	:	0
Roofing, built-up	:	0 375	0 33
Sheathing, vegetable fiber board, 0.78 in	:	0.78	2.06
Soil at R-0.104/in	:	12	1.25
Steel, mild		1	0 0031807
Stucco	:	0 75	0 08
Wood, 2 x 4 at R-1 25/in	4	3.5	4.38
Wood, 2 x 6 at R-1 25/in	6	5 5	6.88
Wood, 2 x 8 at R-1 25/in.	8	7.25	9.06
Wood, 2 x 10 at R-1 25/in.	10	9 25	11 56
Wood, 2 x 12 at R-1 25/in.	12	11.25	14 06
Wood, 2 x 14 at R-1 25/in	14	13 25	16.56

' There is no credit for cavities that are open to outside air.

[2] Air films do not apply to air cavities within an assembly.

***

SECTION 1005 — ABOVE-GRADE WALLS

3117,3,t enerVa,,,Table,¼ .5-,¼ .5A,and,¼ .5B,list,heat,loss,coefficients,for,the,opaque,portion, of,above.grade,wood,stud,frame,walls-,metal,stud,frame,walls,and,concrete,masonry,walls, (Btu(h•ft²•°F),respectively:,,They,are,derived,from,procedures,listed,in,Standard,RS.¼,listed,in, Chapter,9:,,For,intermediate,floor,slabs,which,penetrate,the,insulated,wall-,use,the,concrete,wall, U.factors,in,Table,¼ .5B(5):,

Insulation,is,assumed,to,uniformly,fill,the,entire,cavity,and,to,be,installed,as,per, manufacturer3,directions:,,All,walls,are,assumed,to,be,finished,on,the,inside,with,¼0t,inch, gypsum,wallboard-,and,on,the,outside,with,either,beveled,wood,siding,over,¼0t,inch,plywood, sheathing,or,with,508,inch,T¼1¼4siding:,,Insulated,sheathing,(either,interior,or,exterior),is, assumed,to,cover,the,entire,opaque,wall,surface:,

Metal,building,walls,have,a,different,construction,and,are,addressed,in,Table,¼ .5A(3):

3117.[,Cob ponent,DehcrSpiSon:,,Default,coefficients,for,((four))the,following,types,of,walls, are,listed:,single.stud,walls-,((metal,stud,walls-,))strap,walls-,and,double.stud,walls-,log,walls-, stress.skin,panels-,metal,stud,walls-,metal,building,walls-:,

HSngæ.Hud,WVa,I Wch31.5*3).*8):,,Assumes,either,4x7,or,4x6,studs,framed,on,16,or,47, inch,centers:,,Headers,are,solid,for,4x7,walls,and,double,4x,for,4x6,walls-,with,either,dead.air,or rigid.board,insulation,in,the,remaining,space:,

((Metal,Stud,Wall:,,Assumes,metal,studs,spaced,on,16,or,47,inch,centers,with,insulation, installed,to,fill,wall,cavities:,,Continuous,rigid,board,insulation,is,applied,without,creating, uninsulated,voids,in,the,wall,assembly:)),

HrVp,' Va,I Wie,31.7*9¼,,Assumes,4x–,studs,framed,on,¼-,or,47,inch,centers:,,4x3,or,4x7, strapping,is,run,horizontally,along,the,interior,surface,of,the,wall,to,provide,additional,space,for, insulation:,,

Doj We.Hj d,' Va,I Wieh,31.7*31+,*33+,,Assumes,an,exterior,structural,wall,and,a,separate, interior-,non.structural,wall:,,Insulation,is,placed,in,both,wall,cavities,and,in,the,space,between, the,two,walls:,,Stud,spacing,is,assumed,to,be,on,47,inch,centers,for,both,walls:,

Log,' Va,I Wie,31.7*34).,,,

Hrelh HUSh,PVnea,I Wie,31.7*3[ ).,,,

Meiaa,Hj d,Waa,Overaa,Asseb Wy,U.s aciors-,I ,,We,31.5A*3):,,Assumes,metal,studs,spaced, on,1–,or,47,inch,centers,with,insulation,installed,to,fill,wall,cavities:,,Continuous,rigid,board, insulation,is,applied,without,creating,uninsulated,voids,in,the,wall,assembly:

MeiVa,Hud,WVa,,EffeciSve,G.VVaieh,for,Mei Vas r,Vb Sng,Vnd,CWSy,Onaw-,I Wie,31.7A*4):,, These,values,may,be,used,for,the,metal.framing(cavity,layer,in,walls,metal,studs,spaced,on,16,or 47,inch,centers,with,insulation,installed,to,fill,wall,cavities,in,lieu,of,using,the,zone,method, provided,in,Chapter,45,of,Standard,RS.1,listed,in,Chapter,9:,,

MeiVaBuSdSng,WVa,I Wie,31.7A*[ ):,,A,wall,whose,structure,consists,of,metal,spanning, panels,supported,by,steel,structural,members,(does,not,include,spandrel,glass,or,metal,panels,in, curtain,wall,systems):,,The,first,nominal,R.Value,is,for,insulation,compressed,between,metal, wall,panels,and,the,steel,structure.,,For,double.layer,installations-,the,second,rated,R.value,of, insulation,is,for,insulation,installed,from,the,inside-,covering,the,girts:,,For,continuous,insulation (e:g:-,insulation,boards),it,is,assumed,that,the,insulation,boards,are,installed,on,the,inside,of,the, girts,and,uninterrupted,by,the,framing,members:,,Insulation,exposed,to,the,conditioned,space,or, semiheated,space,shall,have,a,facing-,and,all,insulation,seams,shall,be,continuously,sealed,to, provide,a,continuous,air,barrier:

Concreie,MVnonry-,8] -,I Wie,31.7B*3V),,,Group,R,occupancy:

Concreie,MVnonry-,34] -,I Wie,31.7B*3W,,,Group,R,occupancy:

Cavy,BrSt:U,8] -,I aWe,31.5B*3c),,,Group,R,occupancy:

Concreie-,8",Poured,or,Precali-,I abæ,31.5B(3d),,,Group,R,occupancy:

PerSpRerVa,Edgeh,of,vnierb edSne,Concreie,s aworlr,I Wie,31.7B*3e),,,Group,R,occupancy, and,other,than,Group,R,occupancy:

Concreie,Vnd,MVnonry,WVah,I Wie,31.5B*4),,,Other,than,Group,R,occupancy:

I ABLP 10'5

DPFAULI UtFANI ORS FOR ABOVPtRRADP ALLS

I ABLP 10'5(1-

2 x 4 Single BBd Stud4

R111 Batt

NOTE:

Nominal,Batt,R.value:, R.11,at,3:5,inch,thickness, ,

Installed,Batt,R.value:, R.11,in,3.5,inch,cavity,

Siding X ateBal/FEaming I ype				
	Lapped ood		T1-11	
R-value of Foam Board	STD	ADV	STD	ADV
0,	0.088,	0.084,	0.094,	0.090,
1,	0:080,	0:077,	0:085,	0:084,
4,	0:074,	0:071,	0:078,	0:075,
3,	0:069,	0:066,	0:072,	0:070,
7,	0.067,	0.064,	0.069,	0.065,
5,	0.060,	0.058,	0.063,	0.061,
6,	0.056,	0.055,	0.059,	0.059,
9,	0,053,	0.054,	0.055,	0.054,
8,	0.051,	0.079,	0.052,	0.051,
9,	' :' 78,	' :' 79,	' :' 5' ,	' :' 79,
¼ ,	' :' 7–,	' :' 75,	' :' 79,	' :' 7–,
11,	0:077,	0:073,	0:075,	0:077,
14,	0:074,	0:071,	0:073,	0:074,

TABLE 10-5(2)

2 x 4 Single Wood Stud:

R-13 Batt

NOI E:
Nominal,Batt,R.value;, R.13,at,3:63,inch,thickness, ,
Installed,Batt,R.value;, R.14:9,in,3:5,inch,cavity,

Siding Material/Framing Type				
	Lapped Wood		I 1111	
R-value of Foam Board	SI D	ADV	STD	ADV
0,	0:084,	0:098,	0:088,	0:083,
1,	0:095,	0:094,	0:080,	0:096,
4,	0:069,	0:066,	0:093,	0:090,
3,	0:065,	0:064,	0:068,	0:065,
4,	0:060,	0:058,	0:063,	0:061
5,	0.059,	0.055,	0.059,	0.059,
6,	0:053,	0:054,	0:056,	0:054,
7,	0:051,	0:049,	0:054,	0:051,
8,	0:078,	0:077,	0:050,	0:078,
9,	0.076,	0.075,	0.079,	0.076,
10,	0.077,	0.073,	0.075,	0.077,
11,	0.044,	0.041,	0.043,	0.044,
14,	0.040,	0.039,	0.041,	0.040,

TABLE 10-5(3)

2 x 4 Single Wood Stud:

R-15 Batt

NOTE:

Nominal,Batt,R.value;, R.14,at,3:5,inch,thickness, ,

Installed,Batt,R.value;, R.13,in,3.5,inch,cavity,

Siding Material/Framing Type						
	Lapped Wood			T1-11		
R-value of Foam Board	STD	INT	ADV	STD	INT	ADV
0,	0.064,	0.058,	0.055,	0.065,	0.061,	0.058,
1,	0.058,	0.055,	0.054,	0.060,	0.059,	0.055,
2,	0.057,	0.052,	0.050,	0.056,	0.057,	0.051,
3,	0.051,	0.049,	0.049,	0.053,	0.051,	0.049,
7,	0.078,	0.076,	0.075,	0.050,	0.078,	0.076,
5,	0.076,	0.077,	0.073,	0.078,	0.076,	0.077,
6	0.044	0.044	0.041	0.045	0.044	0.044
9	0:044	0:040	0:039	0:043	0:044	0:040
8	0:040	0:039	0:038	0:041	0:040	0:039
9,	0.038,	0.039,	0.035,	0.039,	0.038,	0.039,
10,	0.039,	0.036,	0.035,	0.038,	0.039,	0.036,
11,	0.036,	0.035,	0.034,	0.036,	0.035,	0.035,
14,	0:034,	0:033,	0:033,	0:035,	0:034,	0:033,

I AMLP 10'5(5)

2 x 6 Single ood SOld: R121 MaGe

NOI E:
Nominal,Batt,R.value;, R.¼6,at,3:5,inch,thickness, ,
Installed,Batt,R.value;, R.15,in,3:5,inch,cavity,

Siding Material/Framing Type						
	Lapped Wood			T1-11		
R-value of Foam Board	SI D	IYI	ADV	SI D	INI	ADV
0,	0.059,	0.057,	0.051,	0.060,	0.056,	0.053,
1,	0:057,	0:051,	0:078,	0:056,	0:053,	0.050,
4,	0:050,	0:078,	0:075,	0:054,	0:050,	0:079,
3,	0:078,	0:075,	0:073,	0:079,	0:079,	0:075,
7,	0:075,	0:073,	0:071,	0:079,	0:075,	0:073,
5,	0:073,	0:071,	0:070,	0:077,	0:074,	0:071,
6,	0:041,	0:039,	0:038,	0:044,	0:041,	0:039,
9,	0.039,	0.038,	0.036,	0.040,	0.039,	0.039,
8,	0:038,	0:036,	0:035,	0.039,	0:037,	0:036,
9,	0:036,	0:035,	0:034,	0:037,	0:036,	0:035,
10,	0:035,	0:037,	0:033,	0:036,	0:035,	0:033,
11,	0.033,	0.033,	0.034,	0.037,	0.033,	0.034,
14,	0.034,	0.031,	0.031,	0.033,	0.034,	0.031,

TABLE 10-5(6)

2 x 6 Single Wood Stud: R-22 Batt

NOTE:
Nominal,Batt,R.value:, R.22 at 6.75 inch thickness ,
Installed,Batt,R.value:, R.40 in 5.5 inch cavity

Siding Material/Framing Type						
	Lapped Wood			T1-11		
R-value of Foam Board	STD	INT	ADV	STD	INT	ADV
0,	0.059,	0.055,	0.052,	0.062,	0.058,	0.054,
1	0.055	0.052	0.079	0.057	0.057	0.051
4,	0.054,	0.049,	0.049,	0.054,	0.051,	0.048,
3,	0.049,	0.046,	0.044,	0.050,	0.048,	0.046,
4	0.046	0.044	0.044	0.048	0.046	0.044
5	0.044	0.044	0.041	0.045	0.043	0.044
6	0.042	0.040	0.039	0.043	0.042	0.040
7	0.040	0.039	0.037	0.041	0.040	0.038
8	0.038	0.037	0.036	0.039	0.038	0.037
9,	0.037,	0.036,	0.035,	0.038,	0.037,	0.035,
¼ ,	' :' 35,	' :' 37,	' :' 33,	' :' 3–,	' :' 35,	' :' 37,
¼4	' :' 37,	' :' 33,	' :' 34,	' :' 35,	' :' 37,	' :' 33,
14,	0:033,	0:034,	0:031,	0:037,	0:033,	0:034,

'ABLE 10-5(7)

: x 6 Single Wood Stud: Two R-11 Batts

IOI E:
Iominal,Batt,R.value;, :.44,at,9,inch,thickness, ,
nstalled,Batt,R.value;, :.18.9,in,5.5,inch,cavity,

Siding Material/Framing Type						
	Lapped Wood			T1-11		
R-value of Foam Board	SI D	INI	ADV	STD	INT	ADV
0,	0:060,	0:059,	0:057,	0:063,	0:059,	0:056,
1,	0:056,	0:053,	0:051,	0:059,	0:056,	0:053,
4,	0:053,	0:050,	0:078,	0:055,	0:054,	0:050,
3,	0:050,	0:048,	0:046,	0:054,	0:049,	0:049,
4,	0.049,	0.045,	0.044,	0.049,	0.049,	0.045,
5,	0:045,	0:043,	0:044,	0:046,	0:045,	0:043,
6,	0:043,	0:041,	0:040,	0:044,	0:043,	0:041,
7,	0:071,	0:070,	0:038,	0:072,	0:071,	0:039,
8,	0.039,	0.038,	0.039,	0.070,	0.039,	0.038,
9,	0.038,	0.039,	0.036,	0.039,	0.038,	0.036,
10,	0.036,	0.035,	0.034,	0.039,	0.036,	0.035,
11,	0.035,	0.034,	0.033,	0.036,	0.035,	0.034,
12,	0.037,	0.033,	0.032,	0.037,	0.037,	0.033,

TABLE 10-5(9)

2 x 64 StEaC all

	Siding MateBal/FEame I yCe			
	LaCCed BBd		I 1-11	
	SI D	ADV	STD	ADV
R.19, ,R.11,Batts,	0:036,	0:035,	0:038,	0:036,
R.19, ,R.8,Batts,	0:071,	0:039,	0:074,	0:070,

'ABLE 10-5(8)

x 8 Single Stud: R-25 Batt

IOTE:
Iominal,Batt,R.value:, ..45 at 8 inch thickness
nstalled Batt R-value: ..43.6 in 7.45 inch cavity

Siding Material/Framing Type						
	Lapped Wood			T1-11		
R-value of Foam Board	STD	INT	ADV	STD	INT	ADV
0,	0.051,	0.049,	0.045,	0.053,	0.049,	0.046,
1	0.048	0.045	0.043	0.049	0.046	0.044
4	0.045	0.043	0.041	0.047	0.044	0.044
3	0.043	0.041	0.039	0.044	0.042	0.040
4	0.041	0.039	0.037	0.044	0.040	0.038
5	0.039	0.037	0.036	0.040	0.038	0.037
–,	' :' 39,	' :' 3–,	' :' 35,	' :' 38,	' :' 39,	' :' 3–,
9,	' :' 3–,	' :' 35,	' :' 33,	' :' 39,	' :' 35,	' :' 37,
8,	0:035,	0:033,	0:034,	0:035,	0:037,	0:033,
9,	0:033,	0:034,	0:031,	0:037,	0:033,	0:034,
10,	0:034,	0:031,	0:030,	0:033,	0:034,	0:031,
11,	0:031,	0:030,	0:049,	0:034,	0:031,	0:030,
14,	0:030,	0:049,	0:048,	0:031,	0:030,	0:049,

TABLE 10-5(10)

2 x 6 + 2 x 4: Double Wood Stud

Batt NonfiguEation			Siding Material/Frame Type			
			Lapped Wood		T1-11	
Exterior	Middle	Interior	STD	ADV	STD	ADV
R.19,	..,	R.11,	0.070,	0.039,	0.071,	0.038,
R.19,	..,	R.19,	0.037,	0.031,	0.035,	0.034,
R.19	R.8	R.11	0.049	0.048	0.031	0.049
R.19	R.11	R.11	0:049	0:046	0:048	0:049
R.19	R.11	R.19	0:044	0:043	0:045	0:043
R.19,	R.19,	R.19,	0.041,	0.040,	0.041,	0.040,

TABLE 10-5(11)

2 x 4 + 2 x 4: Double Wood Stud

Batt Configuration			Siding Material/Frame Type			
			Lapped Wood		T1-11	
Exterior	Middle	Interior	STD	ADV	STD	ADV
R.¼4	..,	R.¼4	' :' 5',	' :' 7–,	' :' 54,	' :' 78,
R.¼9	..,	R.¼4	' :' 39,	' :' 39,	' :' 73,	' :' 39,
R.11,	R.8,	R.11,	0:039,	0:035,	0:036,	0:036,
R.11,	R.11,	R.11,	0:034,	0:031,	0:033,	0:034,
R.13,	R.13,	R.13,	0:049,	0:048,	0:049,	0:048,
R.11,	R.19,	R.11,	0:04–,	0:04–,	0:047,	0:04–,

TABLE 10-5(12)
Log Walls

AUeEage LBg DiameteD IncheF	U-factoE
6,	0:178,
8,	0.111,
10,	0:089,
14,	0:097,
17,	0:063,
16,	0:056,

NOI E:,
R.value,of,wood:, R.1.45,per,inch,thickness,

Average,wall,thickness, 90%,average,log,diameter,

TABLE 10-5(13)
Stress Skin Panel

Panel Thickness, Inches	U-factor
3,6 ,	0.091,
5,6 ,	0.048,
9,¼,	0.039,
9,¼,	0.030,
11,¼,	0.045,

NOTE:,
R,value,of,expanded, polystyrene;,R.3.85,per,inch,

Framing;,6%, Spline:,8%, No,thermal,bridging,between,interior,and,exterior,splines,

Meial Siud Walls:,,The,nominal,R.values,in,Table,10.5A,may,be,used,for,purposes,of, calculating,metal,stud,wall,section,U.factors,in,lieu,of,the,ASHRAE,zone,calculation,method,as, provided,in,Chapter,45,of,Standard,RS.1.,

TABLE 10-5A

DEFAULT U-FACTORS FOR OVERALL ASSEMBLY METAL STUD WALLS, EFFECTIVE R-VALUES FOR METAL FRAMING AND CAVITY ONLY, AND DEFAULT METAL BUILDING U-FACTORS

TABLE 10-5A(1)

OVERALL ASSEMBLY U-FACTORS FOR METAL STUD WALLS

Metal Framing	R-Value of Continuous Foam Board Insulation	Cavity Insulation					
		R-0	R-11	R-13	R-15	R-19	R-21
16" o.c.	R-0 (none)	U-0.358	U-0.138	U-0.184	U-0.118	U-0.109	U-0.106
	R-1	U-0.860	U-0.117	U-0.111	U-0.106	U-0.099	U-0.096
	R-8	U-0.807	U-0.105	U-0.100	U-0.096	U-0.090	U-0.087
	R23	U25.777	U25.595	U25.597	U25.587	U25.582	U25.585
	R24	U25.746	U25.587	U25.583	U25.585	U25.576	U25.574
	R25	U25.728	U25.585	U25.577	U25.574	U25.577	U25.569
	i -6	U-5373	U-5374	U-5377	U-5369	U-5366	U-5365
	i -7	U-5758	U-5369	U-5366	U-5365	U-5368	U-5367
	i -8	U-5398	U-5364	U-5368	U-5367	U-5358	U-5357
	i 29	b20.084	b20.060	b20.059	b20.057	b20.055	b20.054
	i -10	U-0.078	U-0.057	U-0.055	U-0.054	U-0.052	U-0.051
24" o3:3	R20 (none0	U20338	U20316	U20308	U20302	U20394	U20390
	R21	U20253	U20304	U20398	U20392	U20386	U20383
	i -2	U-0.202	U-0.094	U-0.089	U-0.084	U-0.079	U-0.077
	i 29	U20.768	U20.086	U20.082	U20.078	U20.079	U20.077
	i 24	U20.744	U20.079	U20.075	U20.072	U20.068	U20.066
	i 25	U20.726	U20.079	U20.070	U20.067	U20.064	U20.062
	i -6	U-5.118	U-5.568	U-5.566	U-5.563	U-5.565	U-5.559
	i -7	U-5.155	U-5.564	U-5.568	U-5.559	U-5.557	U-5.555
	i -8	U-5.591	U-5.565	U-5.558	U-5.556	U-5.554	U-5.558
	i -9	U-0.084	U-0.057	U-0.055	U-0.053	U-0.051	U-0.050
	R-10	U-0.077	U-0.054	U-0.052	U-0.050	U-0.048	U-0.048

TABLE 10-5A(2)

EFFECTIVE R-VALUES FOR METAL FRAMING AND CAVITY ONLY

	Cavity		Insulation		
	Nominal Depth, Inches	Actual Depth, Inches	Nominal R-Value	Effective R-Value 16" O.C.	Effective R-Value 24" O.C.
Air Cavity	Any,	Any,	R.' :9¼(air),	' :99,	' :9¼
Wall	7,	3.¼4,	R.¼4	5:5,	–:–,
	7,	3.104,	R.13,	6:0,	9:4,
	7,	3.104,	R.15,	6:7,	9:8,
	6,	5.104,	R.19,	9:1,	8:6,
	–,	5.104,	R.41,	7:7,	9:0,
	8,	9.107,	R.45,	9:8,	9:6,
RBBt		Insulation,is, uncompress ed,	R.11,	5:5,	6:1,
			R.19,	9:',	9:1,
			R.[',	9:[,	11:7,

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Default Xetal Building all U-FactoEs

Insulation System	Nominal R-Value of Insulation	Total Nominal R-Value of Insulation	Overall U-Factor for Entire Base Wall Assembly	Overall U-Factor for Assembly of Base Wall Plus Continuous Insulation (uninterrupted by framing) Nominal R-Value of Continuous Insulation					
				R-5.6	R-11.2	R-16.8	R-22.4	R-28.0	R-33.6
Single Layer of Mineral Fiber									
None	0		1.180	0 161	0.086	0 059	0.045	0.036	0 030
R-6	6		0.184	0 091	0.060	0.045	0 036	0.030	0.026
R-10	10		0.134	0.077	0 057	0 051	0.033	0 028	0.024
R-11	11		0.123	0.073	0 052	0.040	0 033	0.048	0 044
R-13	13		0.113	0.069	0 050	0.039	0.034	0 049	0.041
Double Layer of Mineral Fiber (Second layer inside of girts) (Multiple layers are listed in order from inside to outside)									
R 6 R 13	19		0.070	N0A	N/A	N/A	N0A	N0A	N/A
R.10 R 13	43		0.061	N0A	N/A	N/A	N0A	N0A	N0A
R.13 R 13	46		0.057	N0A	N0A	N/A	N0A	N0A	N0A
R.19 R.13	34		0.048	N0A	N0A	N/A	N/A	N0A	N0A

	((R-10	R-11	R-13	R-19	R-24	R-30
Faced fiber glass blanket insulation rolled over and perpendicular to structural frame. Metal covering sheets fastened to the frame, holding insulation in place.	0.133	0.127	0.114	0.091	na	Na
Faced fiber glass batt insulation suspended between structural frame. Metal covering sheets fastened directly to frame.	0.131	0.123	0.107	0.079	0.065	0.057
Faced fiber glass blanket insulation rolled over and perpendicular to structural frame. Rigid insulation blocks placed over insulation to align with structural frame.	0:104,	0:096,	0:087,	0:065,	na,	Na
Faced fiber glass batt insulation suspended between structural frame. Rigid insulation blocks placed over insulation to align with structural frame.	0.099	0.093	0.080	0.059	0.078	0071)),

Concreie,Maionry,Waalr,,The,nominal,R.values,in,Table,10.5B,may,be,used,for,purposes,of, calculating,concrete,masonry,wall,section,U.factors,in,lieu,of,the,ASHRAE,isothermal,planes, calculation,method,as,provided,in,Chapter,45,of,Standard,RS.1:,

I AMLP 10-5M(1)

GROUP R OCCUPANCY: DEFAULT U-FACTORS FOR CONCRETE AND MASONRY WALLS

TABLE 10-5B(1a): Group R Occupancy

8" Concrete Masonry

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with Ungrouted Cores			Solid Grout
	Empty	Loose-fill Insulated		
		Perlite	Vermiculite	
Exposed,Block-,Both,Sides,	0.70,	0.43,	0.47,	0.73
R.5 Interior Insulation- Wood Furring	0.14	0.11	0.14	0.15
R.6 Interior Insulation, Wood Furring	0:14	0:11	0:11	0:14
R.10:5 Interior Insulation, Wood Furring	0:11	0:09	0:09	0:11
R.8,Interior,Insulation-,Metal,Clips,	0.11,	0.09,	0.09,	0.11
R.6,Exterior,Insulation,	0,14,	0.10,	0.10,	0.14
R-10,Exterior,Insulation,	0.08,	0.09,	0.09,	0.08
R.9:5,Rigid,Polystyrene,Integral, Insulation-,Two,Webbed,Block,	0:11,	0:09,	0:09,	0:14

TABLE 10-5B(1b): Group R Occupancy

12" Concrete Masonry

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with Ungrouted Cores			Solid Grout
	Empty	Loose-fill Insulated		
		Perlite	Vermiculite	
Exposed,Block-,Both,Sides,	0:35,	0:19,	0:18,	0:33,
R.5,Interior,Insulation-,Wood,Furring,	0:17,	0:10,	0:10,	0:13,
R.6,Interior,Insulation-,Wood,Furring,	0:13,	0:09,	0:10,	0:13,
R.10:5,Interior,Insulation-,Wood, Furring,	0:11,	0:08,	0:08,	0:10,
R.8,Interior,Insulation-,Metal,Clips,	0:10,	0:08,	0:08,	0:09,
R.6,Exterior,Insulation,	0:11,	0:09,	0:09,	0:11,
R.1' ,Exterior,Insulation,	' :' 8,	' :' 6,	' :' 6,	' :' 8,
R.9:5,Rigid,Polystyrene,Integral, Insulation-,Two,Webbed,Block,	:11,	' :' 8,	' :' 9,	' :14,

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8" Clay BEck

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with Ungrouted Cores			Solid Grout
	Empty	Loose-fill Insulated		
		Perlite	Vermiculite	
Exposed,Block,,Both,Sides,	0:50,	0:31,	0:34,	0:56,
R.5,Interior,Insulation-,Wood,Furring,	0.15,	0.13,	0.13,	0.16,
R.6,Interior,Insulation-,Wood,Furring,	0:15,	0:14,	0:14,	0:15,
R.10:5,Interior,Insulation-,Wood, Furring,	0:14,	0:10,	0:10,	0:14,
R.8,Interior,Insulation-,Metal,Clips,	0:11,	0:10,	0:10,	0:11,
R.6,Exterior,Insulation,	0.14,	0.11,	0.11,	0.13,
R.10,Exterior,Insulation,	0.08,	0.08,	0.08,	0.09,

TABLE 10-5B(1d): Group R Occupancy

6" Concrete Poured or Precast

WALL DESCRIPTION	CORE TREATMENT			
	Partial Grout with Ungrouted Cores			Solid Grout
	Empty	Loose-fill Insulated		
		Perlite	Vermiculite	
Exposed,Concrete-,Both,Sides,	NA,	NA,	NA,	0.61,
R-5,Interior,Insulation-,Wood,Furring,	NA,	NA,	NA,	0.16
R.6,Interior,Insulation-,Wood,Furring,	NA,	NA,	NA,	0:15
R.10:5,Interior,Insulation-,Wood,Furring,	NA,	NA,	NA,	0:14,
R.8,Interior,Insulation-,Metal,Clips,	NA,	NA,	NA,	0.12,
R.6 Exterior Insulation	NA	NA	NA	0.13
R.¼ ,Exterior,Insulation,	NA,	NA,	NA,	' :' 9,

I AMLP 105M(1e): REoHC R OccHCancy and OOeEOan REoHC R OccHCancy

Peripheral Edges of Intermediate Concrete Floors

Slab Edge Treatment	Average Thickness of Wall Above and Below			
	6 inches	8 incheF	10 incheF	12 incheF
Exposed,Concrete,	0:81–,	0:941,	0:–98,	0:–45,
R.5,Exterior,Insulation,	0:1–1,	0:159,	0:154,	0:154,
R.6,Exterior,Insulation,	0:138,	0:136,	0:137,	0:134,
R.9,Exterior,Insulation,	0.144,	0.140,	0.118,	0.116,
R.8,Exterior,Insulation,	0:108,	0:109,	0:106,	0:107,
R.9,Exterior,Insulation,	0:098,	0:099,	0:095,	0:097,
R.10,Exterior,Insulation,,	0:089,	0:088,	0:089,	0:086,
R.11,Exterior,Insulation,	0:084,	0:081,	0.080,	0:079,
R.12,Exterior,Insulation,	0.096,	0.095,	0.094,	0.094,
R.13,Exterior,Insulation,	0.090,	0.090,	0.069	0:068
R.17,Exterior,Insulation,	0.066,	0.065,	0:065,	0:064,
R.15 Exterior Insulation ,	0.064,	0.061	0.061	0.060

Notes for Defaut Tabæ 10-5B(1)

1. Grouted cores at 40" x 48" on center vertically and horizontally in partial grouted walls.
4. Interior insulation values include 10¼" gypsum board on the inner surface.
3. Furring and stud spacing is 16" on center. Insulation is assumed to fill furring space and is not compressed.
4. Intermediate values may be interpolated using this table. Values not contained in this table may be computed using the procedures listed in Standard RS.1.

TABLE 10-5B(2)

OTHER THAN GROUP R OCCUPANCY:

DEFAULT U-FACTORS FOR CONCRETE AND MASONRY WALLS

Framing Type and Depth	Rated R-Value of Insulation Alone	Assembly U-Factors for Solid Concrete Walls	Assembly U-Factors for Concrete Block Walls: Solid Grouted	Assembly U-Factors for Concrete Block Walls: Partially Grouted (Cores uninsulated except where specified)
No Framing	R 0,	U- 0.940,	U- 0.580	U 0.480
	Ungrouted Cores Filled with Loose Fill Insulation	n.A.	N.A	U- 0.350
Continuous Wood Framing				
0.75 in.	R- 3.0	U- 0.247	U 0.226	U- 0.210
1.5 in.	R- 6.0	U- 0.160	U- 0.151	U- 0.143
2.0 in.	R- 10.0	U- 0.116	U- 0.111	U- 0.107
3.5 in.	R- 11.0	U- 0.094	U- 0.091	U- 0.088
3.5 in.	R- 13.0	U- 0.085	U- 0.083	U- 0.080
3.5 in.	R- 15.0	U- 0.079	U- 0.077	U- 0.075
5.5 in.	R- 19.0	U- 0.060	U- 0.059	U- 0.058
5.5 in.	R- 21.0	U- 0.057	U- 0.055	U- 0.054
Continuous Metal Framing at 24 in. on center horizontally				
0.75 in.	R- 3.0	U- 0.364	U- 0.321	U- 0.288
1.5 in.	R- 6.0	U- 0.274	U- 0.249	U- 0.229
2.0 in.	R- 10.0	U- 0.225	U- 0.207	U- 0.193
3.5-4.0 in.	R- 11.0	U- 0.168	U- 0.158	U- 0.149
3.5-4.0 in.	R- 13.0	U- 0.161	U- 0.152	U- 0.144
3.5-4.0 in.	R- 15.0	U- 0.155	U- 0.147	U- 0.140
5.5-6.0 in.	R- 19.0	U- 0.118	U- 0.113	U- 0.109
5.5-6.0 in.	R- 21.0	U- 0.113	U- 0.109	U- 0.105
1 in. Metal Clips at 24 in. on center horizontally and 16 in. vertically				
1.0 in.	R- 3.8	U- 0.210	U- 0.195	U- 0.182
1.0 in.	R- 5.0	U- 0.184	U- 0.172	U- 0.162
1.0 in.	R- 5.6	U- 0.174	U- 0.163	U- 0.154
1.5 in.	R- 5.7	U- 0.160	U- 0.151	U- 0.143
1.5 in.	R- 7.5	U- 0.138	U- 0.131	U- 0.125
1.5 in.	R- 8.4	U- 0.129	U- 0.123	U- 0.118
2.0 in.	R- 7.6	U- 0.129	U- 0.123	U- 0.118
2.0 in.	R- 10.0	U- 0.110	U- 0.106	U- 0.102
2.0 in.	R- 11.2	U- 0.103	U- 0.099	U- 0.096
2.5 in.	R- 9.5	U- 0.109	U- 0.104	U- 0.101
2.5 in.	R- 12.5	U- 0.092	U- 0.089	U- 0.086
2.5 in.	R- 14.0	U- 0.086	U- 0.083	U- 0.080
3.0 in.	R- 11.4	U- 0.094	U- 0.090	U- 0.088
3.0 in.	R- 15.0	U- 0.078	U- 0.076	U- 0.074
3.0 in.	R- 16.8	U- 0.073	U- 0.071	U- 0.069
3.5 in.	R- 13.3	U- 0.082	U- 0.080	U- 0.077
3.5 in.	R- 17.5	U- 0.069	U- 0.067	U- 0.065
3.5 in.	R- 19.6	U- 0.064	U- 0.062	U- 0.061
4.0 in.	R- 15.2	U- 0.073	U- 0.071	U- 0.070
4.0 in.	R- 20.0	U- 0.061	U- 0.060	U- 0.058
4.0 in.	R- 22.4	U- 0.057	U- 0.056	U- 0.054
5.0 in.	R- 28.0	U- 0.046	U- 0.046	U- 0.045
Continuous Insulation Uninterrupted by Framing				
No Framing	R- 3.0	U- 0.230	U- 0.212	U- 0.197
	R- 4.0	U- 0.187	U- 0.175	U- 0.164
	R- 5.0	U- 0.157	U- 0.149	U- 0.141
No Framing	R- 6.0	U- 0.136	U- 0.129	U- 0.124
	R- 7.0	U- 0.120	U- 0.115	U- 0.110
	R- 8.0	U- 0.107	U- 0.103	U- 0.099
	R- 9.0	U- 0.097	U- 0.093	U- 0.090
	R- 10.0	U- 0.088	U- 0.085	U- 0.083
No Framing	R- 11.0	U- 0.081	U- 0.079	U- 0.076
	R- 12.0	U- 0.075	U- 0.073	U- 0.071
	R- 13.0	U- 0.070	U- 0.068	U- 0.066
	R- 14.0	U- 0.065	U- 0.064	U- 0.062
	R- 15.0	U- 0.061	U- 0.060	U- 0.059
No Framing	R- 16.0	U- 0.058	U- 0.056	U- 0.055
	R- 17.0	U- 0.054	U- 0.053	U- 0.052
	R- 18.0	U- 0.052	U- 0.051	U- 0.050
	R- 19.0	U- 0.049	U- 0.048	U- 0.047
	R- 40.0	U- 0.047	U- 0.046	U- 0.035

Notes for Default Table 10-5B(2)

1. It is acceptable to use the U-factors in Table 10-5B(2) for all concrete and masonry walls- provided that the grouting is equal to or less than that specified.
   – For ungrouted walls, use the partially grouted column,
   – For metal studs and z.furring, use the continuous.metal.framing category.
   – For discontinuous metal clips 1 inch square or smaller, use the metal.clip category.
   – For insulation that is attached without any framing members (e.g. glued), use the continuous.insulation. uninterrupted.by.framing.category.,,Continuous,insulation,may.be,installed,on,the,interior,or,exterior,of, masonry,walls-,or,between,stand.alone,walls,in,multi.layer,masonry,walls-,or,on,the,interior,or,exterior,of,the, concrete.
2. For Table 10.5B(2), the U.factor includes R.0.17 for exterior air film and R.0.68 for interior air film . vertical surfaces. For insulated walls, the U.factor also includes R.0 45 for 0.5 in. gypsum board. U.factors are provided for the following configurations:
   (a) Concrete wall: 8-in. normal weight concrete wall with a density of 145 lb/ft³.
   (b) Solid grouted concrete block wall: 8-in. medium weight ASTM C90 concrete block with a density of 115 lb/ft³ and solid grouted cores
   (c), Partially,grouted,concrete,block,wall:,,8.in.,medium,weight,ASTM,C90,concrete,block,with,a,density,of, 115 lb/ft³ having reinforcing steel every 32 in. vertically and every 48 in. horizontally, with cores grouted in those areas only. Other cores are filled with insulating material only if there is no other insulation.
3. For walls with insulation contained in a framing layer, the U-factors in Table 10-5B(2) assume contact (and thermal bridging) between the mass wall and other framing. For wall assemblies with multiple layers where the wood or metal framing layer does not contact the concrete or masonry layer (i.e. walls with an airspace between the stud wall layer and the mass wall layer), it is acceptable to use the appropriate wood or metal frame wall default U-factors in Tables 10-5 or 10-5A. Note, it is acceptable to use this approach where the insulation extends,beyond,the,framing,and,is,in,contact,with,the,mass,wall,layer,(e.g.,a,nominal,four.inch,metal,stud, containing,insulation,that,is,nominally,six,inches,thick,and,therefore,extends,two,inches,beyond,the,back,of,the, metal stud).
7. Except for wall assemblies qualifying for note 3, if not taken from Table 10.5B(2), mass wall U.factors shall be determined in accordance with ASHRAE/IESNA Standard 90.1.2004, Appendix A, Section A3.1 and Tables A3.1A to A3.1D, or Section A9.4. If not taken from Table 10.9, heat capacity for mass walls shall be taken from ASHRAE/IESNA Standard 90.1.2004, Appendix A, Table A3.1B or A3.1C.

***,

SECTION 1007 -- CEILINGS

3119.3,t enerVa,Table,10.9,lists,heat,loss,coefficients,for,the,opaque,portion,of,exterior, ceilings,below,vented,attics-,vaulted,ceilings,and,roof,decks,in,units,of,Btu/h•ft²•°F,of, ceiling:,

, They,are,derived,from,procedures,listed,in,Standard,RS.1-,listed,in,Chapter,9:,,Ceiling,U. factors,are,modified,for,the,buffering,effect,of,the,attic-,assuming,an,indoor,temperature,of, 65°F,and,an,outdoor,temperature,of,75°F:,

MeiVas rVb ed,CeSEngh,,The,nominal,R.values,in,Table,10.5A(4);,Effective,R.Values,for, Metal,Framing,and,Cavity,Only,may,be,used,for,purposes,of,calculating,metal,framed,ceiling, section,U.factors,in,lieu,of,the,ASHRAE,zone,calculation,method,as,provided,in,Chapter,45, of,Standard,RS.1:,

Metal,building,roofs,have,a,different,construction,and,are,addressed,in,Table,1' .9(F):

3117.4,Cob ponent,DehcrSpiSon:,The,((four)),types,of,ceilings,are,characterized,as,follows:, **CeSEngh,Beaol ,V,Venied,AiiS/,**Attic,insulation,is,assumed,to,be,blown.in-,loose.fill, fiberglass,with,a,K.value,of,4:–,h•ft⁴•°F/Btu,per,inch:,,Full,bag,count,for,specified,R.value,is, assumed,in,all,cases:,,Ceiling,dimensions,for,flat,ceiling,calculations,are,75,by,3' ,feet-,with,a, gabled,roof,having,a,7/12,pitch:,,The,attic,is,assumed,to,vent,naturally,at,the,rate,of,3,air, changes,per,hour,through,soffit,and,ridge,vents:,,A,void,fraction,of,' :' ' 4,is,assumed,for,all, attics,with,insulation,baffles:,,Standard.framed-,unbaffled,attics,assume,a,void,fraction,of, ' :' ' 8:,

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

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

RooDPIGh	U-factor for Standard Framing	
	R-30	R-38
7014,	0:036,	0:031,
5014,	0:035,	0:030,
6014,	' :' [7,	' :' 49,
9014,	' :' [7,	' :' 49,
8014,	' :' [7,	' :' 48,
9014,	0:034,	0:048,
10014,	0:033,	0:048,
11014,	0:033,	0:049,
14014,	0.033,	0.049,

, Vented,scissors,truss,attics,assume,a,ceiling,pitch,of,4012,with,a,roof,pitch,of,either,7012,or, 5012:,,Unbaffled,standard,framed,scissors,truss,attics,are,assumed,to,have,a,void,fraction,of, ' :' ¼-:,

VVj aled,CeSEngh/,Insulation,is,assumed,to,be,fiberglass,batts,installed,in,roof,joist,cavities:,,In the,vented,case-,at,least,¼5,inches,between,the,top,of,the,batts,and,the,underside,of,the,roof, sheathing,is,left,open,for,ventilation,in,each,cavity:,,A,ventilation,rate,of,3:' ,air,changes,per, hour,is,assumed:,,In,the,unvented,or,dense,pack,case-,the,ceiling,cavity,is,assumed,to,be,fully, packed,with,insulation-,leaving,no,space,for,ventilation:,,

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

MeiVa,I rj hh,s rVb Shg/,,Overall,system,tested,values,for,the,roof/ceiling,U_o,for,metal,framed, truss,assemblies,from,approved,laboratories,shall,be,used-,when,such,data,is,acceptable,to,the, building,official:,

, Alternatively-,the,U_o for,roof/ceiling,assemblies,using,metal,truss,framing,may,be,obtained, from,Tables,¼ .9A-,¼ .9B-,¼ .9C-,¼ .9D-,and,¼ .9E:,

HeeaI rj hhs rVb ed,CeSEngh-,I VWe,31.9A

HeeaI rj hhs rVb ed,CeSEngJ SRG.[,HReVRSngh-,I VWe,31.9B

HeeaI ruhhs rVb ed,CeSEngJ SRG.7,HReVRSngh-,I VWe,31.9C.

HeeaI ruhhs rVb ed,CeSEngJ SRG.31,HReVRSngh-,I VWe,31.9D.

HeeaI rj ss,s rab ed,CeSEngJ SRG.35,HReaiRSngh-,I aVWe,31.7E.

MeiVaBj SdSngGoof-,I VWe,31.9s /,,the,base,assembly,is,a,roof,where,the,insulation,is,draped over,the,steel,structure,(purlins),and,then,compressed,when,the,metal,roof,panels,are,attached, to,the,steel,structure,(purlins):,Additional,assemblies,include,continuous,insulation-, uncompressed,and,uninterrupted,by,framing:

, The,first,nominal,R.value,is,for,insulation,draped,over,purlins,and,then,compressed,when,the metal,roof,panels,are,attached-,or,for,insulation,hung,between,the,purlins:,,A,minimum,1,in:,R. 5,thermal,spacer,block,between,the,purlins,and,the,metal,roof,panels,is,required,when, specified,in,Table,10.9F:

, For,double.layer,installations-,the,second,nominal,R.value,is,for,insulation,installed,parallel, to,the,purlins:

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

Goofs l SRInsj aiSn EniSrea AWove Deck (j nShierrj pied Wj frab Shg)- I aVWe 31.9t ; the base,assembly,is,continuous,insulation,over,a,structural,deck:,,Added,insulation,is,continuous,

and,uninterrupted,by,framing:,,For,the,insulation-,the,first,column,lists,the,R.value,for,continuous,insulation,with,a,uniform,thickness,l,the,second,column,lists,the,comparable,area,weighted,average,R.value,for,continuous,insulation,provided,that,the,insulation,thickness,is,never,less,than,R.5,(except,at,roof,drains),and,that,the,slope,is,no,greater,than,¼,inch,per,foot:,

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DPQAULI U1QANI ORS QOR NPILIYRS

	SQndaEi QEame	Advanced Frame
Ceilings Below Vented Attics		
Flat	**Baffled**	
, R.19,	0:079,	0:077,
, R.30,	0:036,	0:034,
, R.38,	0:031,	0:046,
, R.79,	' :' 49,	' :' 4',
, R.6',	' :' 45,	' :' 19,
ScIFFBEF I EuFF		
, R.30,,(40l4,roof,pitch),	0:043,	0:031,
, R.38,,(40l4,roof,pitch),	0:040,	0:045,
, R.79,,(70l4,roof,pitch),	0:038,	0:040,
, R.30,,(50l4,roof,pitch),	0.039,	0.034,
, R.38,,(50l4,roof,pitch),	0:035,	0:046,
, R.79,,(50l4,roof,pitch),	0:034,	0:040,
Vaulted Ceilings	**16" O.C.**	**24" O.C.**
Vented		
, R.19,,4x10,joist,	0:079,	0:078,
, R.30,,4x14,joist,	0:034,	0:033,
, R.38,,4x14,joist,	0.049,	0.049,
Unvented		
, R.30,,4x10,joist,	0:034,	0:033,
, R.38,,2x12,joist,	0:029,	0:027,
, R.41, ,R.41,,4x14,joist,	0.046,	0.045,
Roof Deck	**4x Beams, 48" O.C.**	
, R.14.5,,4",,,Rigid,insulation,	0.064,	
, R.41.9,,3.5",Rigid,insulation,	0.040,	
, R.39.5,,6",,,Rigid,insulation,	0.025,	
, R.50,,,,8",,,Rigid,insulation,	0.019,	

TABLE 10-7A

Steel Truss[1] Framed Ceiling U_o

Cavity R-value	Truss Span (ft) 12	14	16	18	20	22	24	26	28	30	32	34
19	0 1075	0.0991	0 0928	0.0878	0.0839	0.0807	0.0780	0.0757	0.0737	0 0720	0.0706	0.0693
30	0.0907	0.0823	0.0760	0.0710	0.0671	0.0638	0.0612	0.0589	0.0569	0.0552	0.0538	0.0525
38	0.0844	0.0759	0 0696	0.0647	0.0607	0 0575	0.0548	0.0525	0.0506	0 0489	0.0474	0.0461
49	0.0789	0 0704	0.0641	0.0592	0.0552	0.0520	0.0493	0.0470	0.0451	0 0434	0.0419	0.0406

TABLE 10-7B

Steel Truss[1] Framed Ceiling U_o with R-3 Sheathing

NaUQ R1Value	Truss Span (ft) 72	74	76	78	20	22	24	26	28	30	32	34
19	0.0809	0.0763	0.0728	0.0701	0.0679	0.0661	0.0647	0.0634	0.0623	0.0614	0 0606	0.0599
30	0.0641	0.0595	0 0560	0.0533	0 0511	0.0493	0.0478	0 0466	0.0455	0.0446	0.0438	0.0431
38	0.0577	0.0531	0.0496	0 0469	0.0447	0.0430	0.0415	0.0402	0.0392	0.0382	0.0374	0.0367
49	0.0523	0.0476	0.0441	0.0414	0.0393	0.0375	0.0360	0.0348	0.0337	0.0328	0.0319	0.0312

TABLE 10-7C

Steel Truss[1] Framed Ceiling U_o with R-5 Sheathing

Cavity R-value	Truss Span (ft) 12	14	16	18	20	22	24	26	28	30	32	34
19	0.0732	0.0697	0.0670	0.0649	0.0633	0.0619	0.0608	0.0598	0.0590	0 0583	0.0577	0.0571
30	0.0564	0.0529	0.0502	0.0481	0.0465	0.0451	0.0440	0.0430	0.0422	0.0415	0.0409	0.0403
38	0.0501	0.0465	0.0438	0.0418	0.0401	0.0388	0.0376	0.0367	0.0359	0.0351	0.0345	0.0340
49	0.0448	0.0410	0.0384	0.0363	0.0346	0 0333	0.0322	0.0312	0.0304	0.0297	0.0291	0.0285

TABLE 10-7D

Steel Truss[1] Framed Ceiling U_o with R-10 Sheathing

Cavity R-value	Truss Span (ft) 12	14	16	18	20	22	24	26	28	30	32	34
19	0.0626	0.0606	0.0590	0.0578	0 0569	0.0561	0.0555	0.0549	0.0545	0.0541	0.0537	0.0534
30	0.0458	0.0437	0.0422	0.0410	0.0401	0.0393	0.0387	0.0381	0.0377	0.0373	0.0369	0 0366
38	0 0394	0.0374	0.0359	0.0347	0.0337	0.0330	0.0323	0 0318	0.0313	0.0309	0.0305	0.0302
49	0.0339	0.0319	0.0304	0.0292	0.0283	0.0275	0.0268	0.0263	0.0258	0.0254	0.0251	0.0247

TABLE 10-7E

Steel Truss[1] Framed Ceiling U_o with R-15 Sheathing

Cavity RtUalue	Truss Span (ft) 12	14	16	18	20	22	24	26	28	30	32	34
19	0.0561	0.0550	0.0541	0.0535	0.0530	0.0526	0.0522	0 0519	0.0517	0 0515	0.0513	0.0511
30	0.0393	0.0382	0.0373	0.0367	0.0362	0.0358	0.0354	0.0351	0 0349	0.0347	0.0345	0.0343
38	0.0329	0.0318	0.0310	0.0303	0.0298	0.0294	0.0291	0.0288	0.0285	0.0283	0.0281	0.0279
49	0.0274	0.0263	0.0255	0.0249	0.0244	0.0239	0.0236	0.0233	0.0230	0.0228	0.0226	0.0225

1:,,Assembly,values,based,on,27,inch,on,center,truss,spacing1,11,Truss,member,connections, penetrating,insulation,(7,at,the,eaves-,7,in,the,interior,space)1,6 ,inch,drywall,ceiling1,all, truss,members,are,2x7,"C",channels,with,a,solid,web:,

4:,,Ceiling,sheathing,installed,between,bottom,chord,and,drywall:,

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DeDaHGXeQl MHlding RooDU1QacQEF

Insulation System	Nominal R-Value of Insulation	Total Nominal R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (uninterrupted by framing) Nominal R-Value of Continuous Insulation					
				R-5.6	R-11.2	R-16.8	R-22.4	R-28.0	R-33.6
Standing Seam Roofs with Thermal Spacer Blocks									
Single Layer									
None	0	0	1.280	0.164	0.087	0.059	0.045	0 036	0.030
R-6	6	0.167	0 086	0.058	0 044	0.035	0.029	0.025	
R-10	10	0.097	0.063	0.076	0 039	0.031	0.046	0.023	
R-11	11	0.092	0.061	0 075	0.036	0.030	0.026	0.022	
R-13	13	0.083	0.057	0.043	0.035	0.049	0.025	0.022	
R-16	16	0.072	0 051	0.070	0 033	0.048	0.027	0.021	
R 19	19	0.065	0.048	0 038	0 031	0.046	0.043	0 040	
Double Layer									
R 10 R.10	20	0.063	0.049	0.037	0.031	0 046	0 043	0.040	
R.10 R.11	21	0.061	0.045	0.036	0 030	0.046	0.043	0.040	
R.11 R.11	22	0.060	0 075	0.036	0.030	0 046	0.044	0 020	
R 10 R.13	43	0.058	0 044	0.035	0.029	0.025	0.022	0.020	
R.11 R.13	47	0.057	0.043	0.035	0.029	0.025	0.022	0.020	
R.13 R.13	46	0.055	0.042	0.037	0 029	0.025	0.022	0 019	
R.10 R.19	49	0.052	0 040	0 033	0.028	0 024	0 021	0.019	
R-11 + R-19	30	0.051	0 040	0.032	0.027	0 024	0.021	0.019	
R-13 + R-19	32	0.049	0.038	0.032	0.027	0.023	0.021	0.019	
R-16 + R-19	35	0.047	0.037	0 031	0.026	0.023	0.020	0 018	
R-19 + R-19	38	0.046	0 037	0 030	0.026	0 023	0 020	0.018	
Thru-Fastened Roofs Without Thermal Spacer Blocks									
R-10	10	0.153	N/A	N/A	N/A	N/A	N/A	N/A	
R-11	11	0.139	N/A	N/A	N/A	N/A	N/A	N/A	
R-13	13	0.130	N/A	N/A	N/A	N/A	N/A	N/A	
R-16	16	0.109	N/A	N/A	N/A	N/A	N/A	N/A	
R-19	19	0.098	N/A	N/A	N/A	N/A	N/A	N/A	
Filled Cavity with Thermal Spacer Blocks									
R-19 + R-10	29	0.041	0 033	0.028	0 024	0 021	0.020	0.017	

TABLE 10-7G Assembly U-Factors for Roofs with Insulation Entirely Above Deck

(uninterrupted by framing)

Rated R-Value of Insulation Alone: Minimum Throughout, Unsloped	Rated R-Value of Insulation Alone: Average (R-5 minimum), Sloped (1/4 inch per foot maximum)	Overall U-Factor for Entire Assembly
R 0	Not allowed	U. 1.484
R.1	Not allowed	U.0 562
R.2	Not allowed	U.0.360
R.3	Not allowed	U.0 465
R.4,	Not.allowed	U.0.209
R.5	Not allowed	U 0.173
R 6	R.7	U 0.177
R 9	R.8	U-0.129
R-8	R-9	U-0.114
R-9	R-10	U-0.102
R-10	R-12	U-0 093
R.11	R.13	U.0 085
R.14	R-15	U-0 078
R-13	R-16	U.0.093
R.17	R.18	U-0 068
R-15	R-20	U-0 063
R-16	R-22	U.0.060
R.17	R.43	U-0 056
R-18	R-25	U-0.053
R.19	R.49	U.0.051
R-40	R-29	U-0.078
R.41	R 31	U.0.046
R.44	R 33	U.0.044
R.43	R.35	U.0 044
R.47	R.37	U.0.070
R.25	R.39	U-0 039

	R-71	U-0.037	
R-26	R.43	U.0.036	
R.47	R.76	U.0.035	
R.48	R.48	U.0.034	
R.49	R.50	U.0.034	
R.30	R.61	U.0.048	
R.35	R 73	U-0.025	
R.70	R.86	U.0 044	
R.45	R-99	U-0.020	
R-50	R 114	U.0.018	
R-55	R.146	U.0.016	
R.60			

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, Section,5:, The,following,sections,of,Chapter,11,of,the,400–,Washington,State,Energy, Code,are,amended,as,follows:,

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TABLE 11-1;

ECONOMIZER COMPLIANCE OPTIONS FOR MECHANICAL ALTERATIONS

Unit Type	Option A: Any alteration with new or replacement equipment	Option B (alternate to A): Replacement unit of the same type with the same or smaller output capacity	Option C (alternate to A): Replacement unit of the same type with a larger output capacity	Option D (alternate to A): New equipment added to existing system or replacement unit of a different type
1. Packaged Units	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: min.[1] Economizer: 1433[2,3]	Efficiency: min.[1] Economizer: 1433[2,3]	Efficiency: min.[1] Economizer: 1433[2,4]
2. Split Systems	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: + 10/5%[5] Economizer: shall not decrease existing economizer capability	Only for new units < 54,000 Btuh replacing unit installed prior to 1991 (one of two): Efficiency: + 10/5%[5] Economizer: 50%[6]; For units > 54,000 Btuh or any units installed after 1991: Option A	Efficiency: min.[1] Economizer: 1433[2,4]
2a. ASHRAE Std 127 equipment	Efficiency: none[1] Economizer: 1733[2]	Efficiency: none[1] Economizer: 1433[2]	Efficiency: none[1] Economizer: 1433[2]	Efficiency: none[1] Economizer: 1433[2]
3. Water Source Heat Pump	Efficiency: min.[1] Economizer: 1733[2]	(two of three): Efficiency: 10/5%[5] Flow control valve[7] Economizer: 50%[6]	(three of three): Efficiency: 10/5%[5] Flow control valve[7] Economizer: 50%[6] (except for certain pre. 1991 systems[8])	Efficiency: min.[1] Economizer: 1733[2,4] (except for certain pre. 1991 systems[8])
7. Hydronic Economizer using Air.Cooled Heat Rejection	Efficiency: min.[1] Economizer: 1733[2]	Efficiency: 10/5%[5] Economizer: shall not decrease existing economizer capacity	Option A	Efficiency: min.[1] Economizer: 1733[2,4]
Equipment (Dry Cooler)				
4a. Hydronic Economizer using ASHRAE Std 147 equipment	Efficiency: none[1] Economizer: 1433[2]	Efficiency: none[1] Economizer: 1433[2]	Efficiency: none[1] Economizer: 1433[2]	Efficiency: none[1] Economizer: 1433[2]
5. Air-Handling Unit (including fan coil units) where the system has an air-cooled chiller	Efficiency: min.[1] Economizer: 1433[2]	Economizer: 1433[2] if outside, otherwise shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems[8])	Option A (except for certain pre-1991 systems[8])
6. Air- Handling Unit (including fan coil units) and Water-cooled Process Equipment, where the system has a water-cooled chiller[10]	Efficiency: min.[1] Economizer: 1433[2]	Economizer: 1433[2] if outside, otherwise shall not decrease existing economizer capacity	Option A (except for certain pre. 1991 systems[8] and certain 1991.4007 systems[9])	Efficiency: min.[1] Economizer: 1733[2,4] (except for certain pre. 1991 systems[8] and certain 1991. 4007 systems[9])
7. Cooling Tower	Efficiency: min.[1] Economizer: 1733[2]	No requirements	Option A	Option A
8. Air.Cooled Chiller	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: 5%[11] Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) 10%[12] and (4) multistage Economizer: shall not decrease existing economizer capacity	Efficiency: min.[1] Economizer: 1433[2,4]
9. Water.Cooled Chiller	Efficiency: min.[1] Economizer: 1433[2]	Efficiency (one of two): (1) 10%[12] or (4) plate frame heat exchanger[13] Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) 15%[14] and (4) plate.frame heat exchanger[13] Economizer: shall not decrease existing economizer capacity	Efficiency: min.[1] Economizer: 1433[2,4]
10. Boiler	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: 8%[16] Economizer: shall not decrease existing economizer capacity	Efficiency: 8%[16] Economizer: shall not decrease existing economizer capacity	Efficiency: min.[1] Economizer: 1433[2,4]

1. Minimum equipment efficiency shall comply with Section 1411.1 and Tables 14-1A through M. "ASHRAE Std. 127 equipment" means equipment that both (a) is not subject to one of the rating standards in Tables 14-1A through M and (b) is within the scope of ASHRAE Std. 149.(00). Note that there is no minimum efficiency in Section 1411.1 for equipment not within the scope of the rating standards in Tables 14.1A through M. However, there may be a minimum efficiency associated with compliance with other criteria (e.g. Section 1433, Exception 9, Option d).
2. System and building shall comply with Section 1733 (including both the individual unit size limits and the total building capacity limits on units without economizer). It is acceptable to comply using one of the exceptions to Section 1733.
3. All equipment replaced in an existing building shall have air economizer complying with Sections 1713 and 1733 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section 1733.
7. All separate new equipment added to an existing building shall have air economizer complying with Sections 1713 and 1733 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section 1733.
5. Equipment shall have a capacity-weighted average cooling system efficiency:
   a. for units with a cooling capacity below 57,000 Btuh, a minimum of 10% greater than the requirements in Tables 17-1A and 17-1B (1.10 x values in Tables 17-1A and 17-1B).
   b. for units with a cooling capacity of 57,000 Btuh and greater, a minimum of 5% greater than the requirements in Tables 17-1A and 17-1B (1.05 x values in Tables 17-1A and 17-1B.
6. Minimum of 50% air economizer that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake. If this is an increase in the amount of outside air supplied to this unit, the outside air supply system shall be capable of providing this additional outside air and equipped with economizer control.
9. Have flow control valve to eliminate flow through the heat pumps that are not in operation with variable speed pumping control complying with Section 1732.2.2 for that heat pump.
   – When the total capacity of all units with flow control valves exceeds 15% of the total system capacity, a variable frequency drive shall be installed on the main loop pump.
   – As an alternate to this requirement, have a capacity-weighted average cooling system efficiency that is 5% greater than the requirements in note 5 (i.e. a minimum of 15%/10% greater than the requirements in Tables 17-1A and 17-1B (1.15/1.10 x values in Tables 17-1A and 17-1B))
8. Systems installed prior to 1991 without fully utilized capacity are allowed to comply with Option B, provided that the individual unit cooling capacity does not exceed 90,000 Btuh.
9. Economizer not required for systems installed with water economizer plate and frame heat exchanger complying with previous codes between 1991 and June 4004, provided that the total fan coil load does not exceed the existing or added capacity of the heat exchangers.
10. For water.cooled process equipment where the manufacturers specifications require colder temperatures than available with waterside economizer, that portion of the load is exempt from the economizer requirements.
11. The air.cooled chiller shall have an IPLV efficiency that is a minimum of 5% greater than the IPLV requirements in Table 14.1C (1.05 x IPLV values in Table 14.1C).
14. The air.cooled chiller shall:
   a. have an IPLV efficiency that is a minimum of 10% greater than the IPLV requirements in Table 14.1C (1.10 x IPLV values in Table 14.1C), and
   b. be multistage with a minimum of two compressors.
13. The water.cooled chiller shall have an IPLV or NPLV efficiency that is a minimum of 10% greater than the IPLV or NPLV requirements in Table 14.1C, Table 14-1K, Table 14-1L, or Table 14-1M (1.10 x IPLV or NPLV values in Table 17-1C, Table 17-1K, Table 17-1L, or Table 17-1M).
17. The water-cooled chiller shall have IPLV or NPLV efficiency that is a minimum of 15% greater than the IPLV or NPLV requirements in Table 14.1C, Table 14.1K, Table 14.1L, or Table 14.1M (1.15 x IPLV or NPLV values in Table 14.1C, Table 14.1K, Table 14.1L, or Table 14.1M).
15. Economizer cooling shall be provided by adding a plate.frame heat exchanger on the waterside with a capacity that is a minimum of 40% of the chiller capacity at standard ARI rating conditions.
16. The replacement boiler shall have an efficiency that is a minimum of 8% higher than the value in Table 14.1F (1.08 x value in Table 14.1F), except for electric boilers.

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33[4.[„LSgRiSng,Vnd,Moiork:,,Where,the,use,in,a,space,changes,from,one,use,in,Table,15.1,to, another,use,in,Table,15.1-,the,installed,lighting,wattage,shall,comply,with,Section,1541,or,15[1:

, , Other,tenant,improvements-,alterations,or,repairs,where,–' ,percent,or,more,of,the, fixtures,in,a,space,enclosed,by,walls,or,ceiling.height,partitions,are,new,shall,comply,with, Sections,⅛53¼and,⅛534:,(Where,this,threshold,is,triggered-,the,areas,of,the,affected,spaces,may, be,combined,for,lighting,code,compliance,calculations:),Where,less,than,–' ,percent,of,the, fixtures,in,s,apace,enclosed,by,walls,or,ceiling.height,partitions,are,new-,the,installed,lighting, wattage,shall,be,maintained,or,reduced:,Where,–' ,percent,or,more,of,the,lighting,fixtures,in,a, suspended,ceiling,are,new-,and,the,existing,insulation,is,on,the,suspended,ceiling-,the, roofCeiling,assembly,shall,be,insulated,according,to,the,provisions,of,Chapter,⅛-,Section, ⅛¼44:,

, , Where,new,wiring,is,being,installed,to,serve,added,fixtures,andOr,fixtures,are,being, relocated,to,a,new,circuit,(except,as,noted,in,the,following,paragraph)-,controls,shall,comply, with,Sections,⅛5⅛:¼through,⅛5⅛:5,and-,as,applicable-,⅛5⅛:9:,,For,compliance,with,Section, 1513:3:4,for,existing,luminaires,where,the,existing,ballasts,are,not,being,changed-,the,number,of, required,incremental,steps,of,automatic,daylighting,control,shall,be,equal,to,one,plus,the,number of,ballasts,in,the,luminaire:,,In,addition-,office,areas,less,than,300,ft4,enclosed,by,walls,or, ceiling.height,partitions-,and,all,meeting,and,conference,rooms-,and,all,school,classrooms-,shall, be,equipped,with,occupancy,sensors,that,comply,with,Section,1513:–,and,1513:7:,,Where,a,new, lighting,panel,(or,a,moved,lighting,panel),with,all,new,raceway,and,conductor,wiring,from,the, panel,to,the,fixtures,is,being,installed-,controls,shall,also,comply,with,the,other,requirements,in, Sections,1513:–,and,1513:7:,

, , Where,new,walls,or,ceiling.height,partitions,are,added,to,an,existing,space,and,create,a, new,enclosed,space-,but,the,lighting,fixtures,are,not,being,changed-,other,than,being,relocated-, the,new,enclosed,space,shall,have,controls,that,comply,with,Sections,⅛5⅛:¼through,⅛5⅛:4-, ⅛5⅛:7-,and,⅛5⅛:–,through,⅛5⅛:9:,

, , Those,motors,which,are,altered,or,replaced,shall,comply,with,Section,⅛5¼,

33[[„CRVnge,of,Occj pVncy,or,J he/,,Changes,of,occupancy,or,use,shall,comply,with,the, following,requirements:,

a:,,Any,unconditioned,space,that,is,altered,to,become,semi.heated-,cooled-,or,fully,heated-,or,any semi.heated,space,that,is,altered,to,become,cooled,or,fully,heated,space,shall,be,required,to,be, brought,into,full,compliance,with,this,Code:,,For,spaces,constructed,prior,to,this,Code-,the, installed,heating,output,capacity,shall,not,exceed,¼-,Btu(h,per,square,foot,unless,the,building, envelope,complies,with,Chapter,13:,,Existing,warehouses,and,repair,shops,are,considered, unconditioned,space,unless,they,are,indicated,as,conditioned,space,in,DPD,records,or,they,were, built,after,1980,and,they,comply,with,the,building,envelope,requirements,for,conditioned,space, in,effect,at,the,time,of,construction:,,(See,the,Seattle,Mechanical,Code,for,requirements,for, combustion,appliances:)

b:,,Any,Group,R,Occupancy,which,is,converted,to,other,than,a,Group,R,Occupancy,shall,be, required,to,comply,with,all,of,the,provisions,of,Sections,1130,through,1134,of,this,Code:,

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3366,,VSbaMSnh,Vnd,PenVaSch,((~~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:~~)),

3366.3 Vioœilions: It,is,a,violation,of,this,Code,for,anyone,to:

¼,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:

4:,,knowingly,aid-,abet-,counsel-,encourage-,hire-,commend-,induce,or,otherwise,procure, another,to,violate,or,fail,to,comply,with,this,Code:

3:,,use,any,material,or,to,install,any,device-,appliance,or,equipment,which,does,not,comply,with, the,applicable,standards,of,this,Code,or,which,has,not,been,approved,by,the,building,official:

7:,,violate,or,fail,to,comply,with,any,final,order,issued,by,the,building,official,pursuant,to,the, provisions,of,this,code,or,with,any,requirements,of,this,code:,

5:,remove-,mutilate-,destroy,or,conceal,any,notice,or,order,issued,or,posted,by,the,building, official,pursuant,to,the,provisions,of,this,code-,or,any,notice,or,order,,issued,or,posted,by,the, building,official,in,response,to,a,natural,disaster,or,other,emergency:

3366.4,NoiSe,of,VSbaMSon:,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,regular first,class,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,may,also,be,posted,even if,served,by,personal,service,or,first,class,mail:,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,¼ 4-,¼ 3,or,¼ 7,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:

3366.4.3,,GevSel ,W,iRe,WiSdSng,offS:Sa,for,noiSe,of,vSbaMSon

3366.2.3.3,,Any,person,affected,by,a,notice,of,violation,issued,pursuant,to,Section,1177:4,may, obtain,a,review,of,the,notice,by,making,a,request,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,runs,until,5;00,p:m:,of,the,next,business,day:,,The,review,shall,occur,not,less,than,ten, nor,more,than,twenty,days,after,the,request,is,received,by,the,building,official,unless,otherwise, agreed,by,the,person,requesting,the,review:,,Any,person,aggrieved,by,or,interested,in,the,notice, of,violation,may,submit,additional,information,to,the,building,official:

3366.4.3.4,,The,review,shall,be,made,by,a,representative,of,the,building,official,who,will,review any,additional,information,that,is,submitted,and,the,basis,for,issuance,of,the,notice,of,violation: The,reviewer,may,request,clarification,of,the,information,received,and,a,site,visit:,,After,the review-,the,building,official,shall:

1:, Sustain,the,notice,or

4:, Withdraw,the,notice1or

3:, Continue,the,review,to,a,date,certain1or

7:, Amend,the,notice:

3366.4.3.3.,,The,building,official,shall,issue,an,order,containing,the,decision,within,15,days,of the,date,that,the,review,is,completed,and,shall,cause,the,order,to,be,mailed,by,regular,first,class mail,to,the,persons,requesting,the,review,and,the,persons,named,on,the,notice,of,violation addressed,to,their,last,known,address:,,

3366.4.3.6.,,Because,civil,actions,to,enforce,Title,44,SMC,are,brought,in,Seattle, Municipal,Court,pursuant,to,Section,1177:3:4-,orders,of,the,building,official,issued,under, this,chapter,are,not,subject,to,judicial,review,pursuant,to,chapter,36:90C,RCW:,

3344.3,CS'SaPenaaSlr,,

3366.[.3,,Any,person,violating,or,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, notice,of,violation:

3366.[.4,,Civil,actions,to,enforce,this,chapter,shall,be,brought,exclusively,in,Seattle,Municipal, Court-,except,as,otherwise,required,by,law,or,court,rule:,,In,any,civil,action,for,a,penalty-,the, City,has,the,burden,of,proving,by,a,preponderance,of,the,evidence,that,a,violation,exists,or, existed,the,issuance,of,the,notice,of,violation,or,of,an,order,following,a,review,by,the,building, official,is,not,itself,evidence,that,a,violation,exists:

3366.6 AdernaiSve CrSnSnaaPenaaiy:,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,by,the,building,official,shall-,upon,conviction,thereof-,be, punished,by,a,fine,of,not,more,than,$5000,or,by,imprisonment,for,not,more,than,365,days,,or,by both,such,fine,and,imprisonment:,,Each,day3,violation,or,failure,to,comply,shall,constitute,a, separate,offense:

3366.7,AddSSnVaGeSf:,The,building,official,may,seek,legal,or,equitable,relief,to,enjoin,any, acts,or,practices,and,abate,any,condition,when,necessary,to,achieve,compliance:,,

3366.6,GecordSng,of,Orders,and,NoiSes:,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:

3351,,Conf&Sih,l SR,OiRer,Codek,,In,case,of,conflicts,among,Codes,enumerated,in,RCW, 19:49:' [1,subsections,(1)-,(4)-,([ ),and,(7),and,this,Code-,the,first,named,Code,shall,govern:,,The duct,insulation,requirements,in,this,Code,or,a,local,jurisdiction3,energy,code-,whichever,is,more stringent-,supersede,the,requirements,in,the,Mechanical,Code:,

, 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:,

3361,,HekerVWSSy,Vnd,LSWSSy,,,

3384,,LSWSSy:,,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:,,This, code,shall,not,be,construed,to,lessen,or,relieve,the,responsibility,of,any,person,owning-, operating,or,controlling,any,building,or,structure,for,any,damages,to,persons,or,property,caused, by,defects-,nor,shall,the,Department,of,Planning,and,Development,or,the,City,of,Seattle,be,held, to,have,assumed,any,such,liability,by,reason,of,the,inspections,authorized,by,this,code,or,any, permits,or,certificates,issued,under,this,code:,

, Section,6:, The,following,sections,of,Chapter,13,of,the,4006,Washington,State, Energy,Code,are,amended,as,follows:,

Cu API EG,3[,,

BUvLDvNt ,ENVELOPE,

3[13,Hope:,,Conditioned,buildings,or,portions,thereof,shall,be,constructed,to,provide,the, required,thermal,performance,of,the,various,components,according,to,the,requirements,of,this, chapter:,,Unless,otherwise,approved,by,the,building,official-,all,spaces,shall,be,assumed,to,be,at, least,semi.heated:,

, , **EXCEPI vONH,**

, , 1:, Greenhouses,isolated,from,any,conditioned,space,and,not,intended,for,occupancy:,,

, , 4:, As,approved,by,the,building,official-,spaces,not,assumed,to,be,at,least,semi.heated:,,

, , 3:, Unconditioned,Group,U,occupancy,accessory,to,Group,R,occupancy:,,

, , 7:, Unstaffed,equipment,shelters,or,cabinets,used,solely,for,personal,wireless,service, facilities:,

, , , 5:, Parking,lot,attendant,booths,no,larger,than,¼ ' ,square,feet-,provided,that,the,roof, insulation,is,R.4¼minimum,and,the,wall,insulation,is,R.⅛,minimum-,unless, otherwise,allowed,by,Section,1310:

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3[31.4,Heb Su eVed,HpVcek,,,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^4),or,greater,but,not,greater,than,8,Btu(h,•,ft^4),and,in,Climate,Zone,4-,shall,be,5,Btu(h,•,ft^4),or greater,but,not,greater,than,14,Btu(h,•,ft^4):,

, For,semi.heated,spaces-,the,building,envelope,shall,comply,with,the,same,requirements,as, that,for,conditioned,spaces,in,Section,1310:1:,,However-,semi.heated,spaces,shall,be,calculated, separately,from,other,conditioned,spaces,for,compliance,purposes:

EXCEPTION: For,semi.heated,spaced,heated,by,other,fuels,only-,wall,insulation,is,not,required, for,those,walls,that,separate,semi.heated,spaces,(see,definition,in,Section,401:1),from,the exterior,provided,that,the,space,is,heated,solely,by,a,heating,system,controlled,by,a, thermostat,with,a,maximum,setpoint,capacity,of,75°F-,mounted,no,lower,than,the,heating unit:,

***

3[33.8,,GVdSni,s morh,*on,or,Veal ,grVde ,,Slab,on,grade,insulation,shall,extend,downward, from,the,top,of,the,slab,a,minimum,distance,of,3–,inches,or,downward,to,the,top,of,the,footing, and,horizontal,for,an,aggregate,of,not,less,that,3–,inches:,

, ((~~If,required,by,the,building,official,where,soil,conditions,warrant,such,insulation ,the~~)),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:,

***

3[32.2,,Hoar,u eai,t aSi,CoeffS:Sni,and,~~*HRadSng,CoeffS:Sni~~))VSSbæ,I ranlb Siance:,, Solar,Heat,Gain,Coefficient,(SHGC),and,Visible,Transmittance,(VT)-,shall,be,determined-, certified,and,labeled,in,accordance,with,the,National,Fenestration,Rating,Council,(NFRC), Standard,by,a,certified-,independent,agency-,licensed,by,the,NFRC:,

, , **EXCEPI vONH,**,1:,,Shading,coefficients,(SC),or,solar,heat,gain,coefficient,for,the, center,of,glass,shall,be,an,acceptable,alternate,for,compliance,with,solar,heat,gain, coefficient,requirements:,,Shading,coefficients,or,solar,heat,gain,coefficient,for,the,center of,glass,for,glazing,shall,be,taken,from,Chapter,31,of,Standard,RS.1,or,from,the, manufacturer3,((~~test,~~))data,using,a,spectral,data,file,determined,in,accordance,with, NFRC,300:,

4:, For,the,purposes,of,1343-,Exception,1-,visible,transmittance,for,the,center,of,the, glazing,assembly,shall,be,taken,from,Chapter,31,of,Standard,RS.1,or,from,the, manufacturer3,data,using,a,spectral,data,file,determined,in,accordance,with,NFRC,300:

, Note,that,using,the,exception,for,the,SHGC,for,the,center, of,glass,does,not,give,the,full,credit,for,the,overall,product, (including,the,frame),that,the,NFRC,certified,SHGC,does:,, Though,the,SHGC,for,the,frame,is,not,zero,(the,ASHRAE, Handbook,of,Fundamentals,indicates,that,the,SHGC,can,range, from,0:11.0:17,for,metal,frames,and,from,0:04.0:07,for, wood0vinyl(fiberglass,frames)-,the,SHGC,for,the,frame,is, invariably,lower,than,that,for,the,glass:,,Consequently-,an,NFRC. certified,SHGC,will,generally,be,lower:

, Conversely-,the,VT,for,the,center. of. glass,overstates,the, VT,for,the,overall,product,(including,the,frame):,,The,VT,for,the, frame,is,zero:,,Consequently-,an,NFRC.certified,VT,will,always, be,lower:,,For,this,reason-,Exception,4,to,Section,1314:4,is,only, applicable,to,Exception,1,in,Section,1343:,,It,is,not,applicable,to, other,sections.

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3[36 AS Leakage

3[36.3 *~~Building,Envelope; The,requirements,of,this,section,shall,apply,to,building,elements, separating,conditioned,from,unconditioned,spaces:,Exterior,joints,around,windows,and,door, frames,,openings,between,walls,and,foundation,,between,walls,and,roof,and,wall,panels1, openings,at,penetrations,of,utility,services,through,walls ,floors,and,roofs1,and,all,other,openings in,the,building,envelope,shall,be,sealed ,caulked',gasketed,or,weatherstripped,to,limit,air, leakage:~~))BuSdSng,Enveaope,HeVSng,,The,following,areas,of,the,building,envelope,shall,be, sealed-,caulked-,gasketed-,or,weather. stripped,to,minimize,air,leakage:

a: joints,around,fenestration,and,door,frames-

b: junctions,between,walls,and,foundations-,between,walls,at,building,corners-,between,walls, and,structural,floors,or,roofs-,and,between,walls,and,roof,or,wall,panels-

c: openings,at,penetrations,of,utility,services,through,roofs-,walls-,and,floors-,

d: site.built,fenestration,and,doors-,

e: building,assemblies,used,as,ducts,or,plenums-,

f: joints-,seams-,and,penetrations,of,vapor,retarders-,

g: all,other,openings,in,the,building,envelope;

3336.4 t aazing and Doors: Air,leakage,for,fenestration,and,doors,shall,be,determined,in, accordance,with,NFRC,700,or,AAMA0WDMA0CSA101I.S.40A770.,,Air,leakage,shall,be, determined,by,a,laboratory,accredited,by,a,nationally,recognized,accreditation,organization-,such as,the,National,Fenestration,Rating,Council-,and,shall,be,labeled,and,certified,by,the, manufacturer:,,Air,leakage,shall,not,exceed,1:0,cfm(ft^4,for,glazed,swinging,entrance,doors,and, for,revolving,doors,and,0:3,cfm(ft^2,for,all,other,products: ((~~Doors,and,operable,glazing, separating,conditioned,from,unconditioned,space,shall,be,weatherstripped.,Fixed,windows,shall, be,tight,fitting,with,glass,retained,by,stops,with,sealant,or,caulking,all,around:~~)),

EXCEPTIONS: 1.Openings that are required to be fire resistant.

2. Field.fabricated fenestration and doors that are weather.stripped or sealed in accordance with 1314.1

3. For garage doors, air leakage determined by test at standard test conditions in accordance with ANSI/DASMA 105 shall be an acceptable alternate for compliance with air leakage requirements.

4. Units without air leakage ratings produced by small business that are weather stripped or sealed in accordance with 1314.1.

3[36.7 LoVdSng,DocU,' eVRerIeVih,Cargo,doors,and,loading,dock,doors,shall,be,equipped, with,weatherseals,to,restrict,infiltration,when,vehicles,are,parked,in,the,doorway:

3[36.6,VesiSVæs.,Building,entrances,that,separate,conditioned,space,from,the,exterior,shall,be, protected,with,an,enclosed,vestibule-,with,all,doors,opening,into,and,out,of,the,vestibule, equipped,with,self.closing,devices:,Vestibules,shall,be,designed,so,that,in,passing,through,the, vestibule,it,is,not,necessary,for,the,interior,and,exterior,doors,to,open,at,the,same,time:,Interior, and,exterior,doors,shall,have,a,minimum,distance,between,them,of,not,less,than,9,ft,when,in,the, closed,position:,,The,exterior,envelope,of,conditioned,vestibules,shall,comply,with,the, requirements,for,a,conditioned,space:,Either,the,interior,or,exterior,envelope,of,unconditioned, vestibules,shall,comply,with,the,requirements,for,a,conditioned,space:

EXCEPTIONS: 1. Building entrances with revolving doors.

4. Doors not intended to be used as a building entrance.

3. Building entrances in buildings that are less than four stories above grade and less than 10,000 ft^2 in area.

4. Doors that open directly from a space that is less than 3000 ft^2 in area and is separate from the building entrance.

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3[22 Opaqj e Enveæpe:,,Roof0eilings-,opaque,exterior,walls-,opaque,doors-,floors,over, unconditioned,space-,below.grade,walls-,slab.on.grade,floors,and,radiant,floors,enclosing, conditioned,spaces,shall,be,insulated,according,to,Section,1311,and,Tables,13.1,or,13.4:,, Compliance,with,nominal,R.values,shall,be,demonstrated,for,the,thermal,resistance,of,the,added, insulation,in,framing,cavities,and0r,insulated,sheathing,only:,Nominal,R.values,shall,not, include,the,thermal,transmittance,of,other,building,materials,or,air,films:,,

, For,metal,frame,assemblies,used,in,spaces,with,electric,resistance,space,heat-,compliance shall,be,demonstrated,with,the,component,U.factor,for,the,overall,assembly,based,on,the, assemblies,in,Chapter,¼ :,

, Area.weighted,averaging,of,the,R.value,is,not,allowed:,,When,showing,compliance,with, R.values-,the,minimum,insulation,R.value,for,all,areas,of,the,component,shall.comply,with, Table,13.1:,,When,calculating,compliance,using,U.factors-,area.weighted,averaging,is,allowed:,, Where,insulation,is,tapered,(e:g:,roofs)-,separate,assembly,U.factors,shall,be,calculated,for,each, four.foot,section,of,tapered,insulation:

, **EXCEPTIONS:** 1. Opaque smoke vents are not required to meet insulation requirements.

2. For prescriptive compliance only:

((~~a. For glazing areas that are 30% and less of the gross wall area, the~~)) The insulation of the perimeter edge of an above grade floor slab which penetrates the exterior wall may be reduced to R.5 provided the glazing U.factor is reduced to U.0.05 below that required in Tables 13.1 and 13 4.

((~~b. For glazing areas that exceed 30% of the gross wall area, the perimeter edge of an above grade floor slab which penetrates the exterior wall may be left uninsulated provided the glazing U.factor is reduced by U.0.10 below that required in Tables 13.1 and 13-1.~~))

3. For roofs with continuous rigid insulation on the top of the roof, the insulation R.value may be averaged for compliance with minimum prescriptive R values only, provided that both:

a. the minimum insulation is no less than R.5 (but not including area within 6 inches of each roof drain), and

b. the area.weighted average insulation is R 50 (in lieu of R 30).

1323 t aazSng:,,Glazing,shall,comply,with,Section,1312,and,Tables,13.1,or,13.2:,,All,glazing, shall,be-,at,a,minimum-,double,glazing:,,In,addition-,all,glazing,assemblies,shall,have,at,least,one low.emissivity,coating,unless,the,glazing,assembly,has,an,overall,U.factor,that,complies,with, the,values,in,Table,13.1.

EXCEPI vONH

, ¼, Vertical,glazing,located,on,the,display,side,of,the,street,level,story,of,a,retail, occupancy,or,where,there,is,a,street,level,transparency,requirement,in,the,Seattle, Land,Use,Code,provided,the,glazing,

, a:, (i), is,double.glazed,with,a,minimum,10¼,inch,airspace,and,with,a,low.e,coating, having,a,maximum,emittance,of,e.0:70,in,any,type,of,frame,or,,

, , (ii),has,an,area.weighted,U.factor,of,0:–0,or,less:,,, (U.factor,calculations,shall,use,overall,assembly.U.factors:,,When,this,exception, is,used,there,are,no,SHGC,requirements),and, , ,

, b:, has, a, visible, transmittance, of, (i), 0:60, or, greater, for, the, center, of, the, glazing, assembly, in, any, type, of, frame, or, (ii), has, an, area. weighted, visible, transmittance, for, the, overall, assembly, including, the, frame, of,' :54, or, greater, for, fixed, glazing, and, ' :77, or, greater, for, operable, glazing:, , Visible, transmittance, shall, be, determined,in,accordance,with,Section,1[14:4-,and-

, ((~~b.~~)),c:, does,not,exceed,95%,of,the,gross,exterior,wall,area,of,the,display,side,of, the,street,level,story:,,However-,if,the,display,side,of,the,street,level,story,exceeds, 40,feet,in,height-,then,this,exemption,may,only,be,used,for,the,first,40,feet,of,that, story:,,,

, When,this,exception,is,utilized-,separate,calculations,shall,be,performed,for,these, sections,of,the,building,envelope,and,these,values,shall,not,be,averaged,with,any, others,for,compliance,purposes:,,The,95%,area,may,be,exceeded,on,the,street,level-,if the,additional,glass,area,is,provided,from,allowances,from,other,areas,of,the,building:

, , 4:, 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,⅓.¼or,⅓.4:,,The,maximum,area,allowed,for,the,total,of,all,single,glazing,is, ¼%,of,the,gross,exterior,wall,area:,

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3[4[[,,HbaVr,u eVi,t Vsn,CoeffS:Sni/,,The,area.weighted,average,solar,heat,gain,coefficient,of, all,glazing,shall,not,be,greater,than,that,specified,in,Tables,⅓.¼or,⅓.4,for,the,appropriate,area, and,U.factor:,,

, , , **EXCEPI vONH**,,,

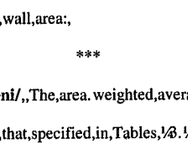
, , , 1:, Glazing,separating,conditioned,space,from,semi heated,space,or,unconditioned,space.

2. Vertical glazing which is oriented within 45 degrees of north shall be allowed to have a maximum solar heat gain coefficient SHGC.0.10 above that required in Table 13.1.

3. For demonstrating compliance for vertical glazing only, the SHGC in the proposed building shall be allowed to be reduced by using the multipliers in the table below for each glazing product shaded by permanent projections that will last as long as the building itself.

Projection Factor	SHGC Multiplier (All Orientations except North.oriented)	SHGC Multiplier (North.Oriented)
0 . 0.10	1.00,	1.00
"0.10,.0.40,	0 91	0.95
<0.20 . 0.30	0.82	0.91
<0.30 - 0.40	0.74,	0 87
<0.40 - 0.50	0.67	0.84
<0.50 - 0 60	0.61	0.81
<0.60, .0.90,	0.56	0.78
<0.90 . 0 80	0.51	0.76
<0.80 . 0.90	0.47	0.75
<0.90 - 1.00	0.44	0.73

Projection factor (PF) is the ratio of the horizontal depth of the external shading projection (A) divided by the sum of the height of the fenestration and the distance from the top of the fenestration to the bottom of the farthest point of the external shading projection (B), in consistent units. (See Exhibit 1323.3.)



Exhibit,1343:3

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3[[3 t eneraa Buildings,or,structures,whose,design,heat,loss,rate,(UA_p),and,solar,heat,gain, coefficient,rate,(SHGC,*,A_p),are,less,than,or,equal,to,the,target,heat,loss,rate,(UA_t),and,solar, heat,gain,coefficient,rate,(SHGC,*,A_t),shall,be,considered,in,compliance,with,this,section:,,The,

stated,U.factor-,F.factor,or,allowable,area,of,any,component,assembly-,listed,in,Tables,13.1,or,13.4-,such,as,roof/ceiling-,opaque,wall-,opaque,door-,glazing-,floor,over,conditioned,space-,slab,on,grade,floor-,radiant,floor,or,opaque,floor,may,be,increased,and,the,U.factor,or,F.factor,for,other,components,decreased-,provided,that,the,total,heat,gain,or,loss,for,the,entire,building,envelope,does,not,exceed,the,total,resulting,from,compliance,to,the,U.factors-,F.factors,or,allowable,areas,specified,in,this,section:,

EXCEPI IONS:

1.. Compliance,is,also,allowed,to,be,shown,using,RS.I4,

4.. The,prescriptive,approach,in,Section,1I4I,may,be,used,for,that,portion,of,the,building,envelope,that, complies with Exception 1 to Section 1323,

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3[[[,,J A,CVacuaMSonk,,The,target,UA_t,and,the,proposed,UA_p,shall,be,calculated,using, Equations,13.1,and,13.4,and,the,corresponding,areas,and,U.factors,from,Table,13.1,or,13.4:,, For,the,target,UA_t,calculation-,the,overhead,glazing,shall,be,located,in,roof/ceiling,area,and,the, remainder,of,the,glazing,allowed,per,Table,13.1,or,13.4,shall,be,located,in,the,wall,area:,,Where, insulation,is,tapered-,separate,assembly,U.factors,shall,be,calculated,in,accordance,with,Section, 1344:

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I ABLE,3[.3,

BUvLDvNt ,ENVELOPE,GEF UvGEMENI Hs OG,CLvMAI E,ZONE,3,

Minimum,Insulation,R.Values,or,Maximum,Component,U.Factors,for,Zone,1,

Building Components

Space Heat Type	Components: Roofs Over Attic[3]	All Other Roofs[3]	Opaque Walls[1,2]	Opaque Doors	Floor Over Uncond Space	Slab-On-Grade[2]
1. Electric resistance heat** and wood frame portions of all others	U=0.031 or R.38	U=0.034 or R.30	U=0.062 or R.19	U=0.60 for metal door; U=0.50 for wood, fiberglass, other door	U=0.029 or R.30	F=0.54 or R.10
4. All others including heat pumps and VAV	U=0 031or (a) Metal framing: R.38 cavity insul, R-15 continuous insulation ((R-30 or U=0.036))	U=0.034 or (a) Insulation entirely above deck: R.30 continuous insulation (b) Metal buildings: R.19 cavity insul, R.15 continuous insulation ((R.41 or U=0.076))	U=0.062 or (a) Metal framing: R.13 cavity insul, R.7.5 continuous, insulation, and R.15 continuous insulation for peripheral edges of intermediate concrete floors (((a) Metal framing: R.19 or U=0.109 (b) Wood framing & framing other than metal: R-19 or =0.062))	U=0.60 for metal door; U=0.50 for wood, fiberglass, other door	U=0.049 or (a) Concrete floor: R-30 continuous insulation (b) Metal joist: R.19 cavity insul, R.15 continuous insulation ((R-19 or U=0.056))	F=0.54 or R-10

**** Compliance with nominal prescriptive R-values requires wood framing**

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 30%			>30% to 45%		
	Maximum U-Factor		Max SHGC[4,8,2]	Maximum U-Factor		Max SHGC[4,8,2]
	VG	OG		VG	OG	
1. Electric resistance heat[2]	0.70	0.78 ((0.60))	0.35 without PF, or 0.40 with PF > 0.3 for south and west	PRESCRIPTIVE PATH NOT ALLOWED		
4. All others including heat pumps and VAV[5,6,2]	0.40 ((0.55))	0.78 ((0.90))	0 35 without PF, or 0.40 with PF > 0 3 for south and west ((0.75))	0.70 ((0.45))	0. 48 ((0.60))	0 35 without PF, or 0.70 with PF > 0 3 for south and west

Footnotes

1. Below-Grade Walls:
When complying by the prescriptive approach, Section 1344:
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) walls shall be insulated for the first 10 feet below grade. (There shall be no credit for those portions of below grade walls and footings that are more than 10 feet below grade, and those portions below 10 feet shall not be included in the gross exterior wall area.)

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=0.090 for U_{bgwt},
c) the calculations shall include the first 10 feet of walls below grade. (Those portions of below grade walls and footings that are more than 10 feet below grade shall not be included in the gross exterior wall area and shall not be included when determining A_{bgwt} and A_{bgw}.

2. Concrete and Masonry Walls: If the area weighted heat capacity of the total opaque above grade wall is a minimum of 9.0 Btu/ft^4 • °F, then:
a) The area weighted average U.factor for interior insulation may be increased to ((U.0.15)) U-0.091 maximum, or
i) minimum R-19 insulation between wood studs; or
ii) minimum R-13 cavity insulation between metal studs R-6 continuous insulation; or
iii) minimum R 15.4 insulation held in place solely by 1 inch metal clips at 44 inches on center vertically and 16 inches on center horizontally((a minimum additional R.5.7 continuous insulation uninterrupted by framing; or)).
b) The area weighted average U.factor for integral and exterior insulation for insulation position as defined in Chapter 2 may be increased to U.0.093 maximum or a minimum additional R.12 continuous insulation uninterrupted by framing.
((The wall may be ASTM C90 concrete block walls, ungrouted or partially grouted at 32 in, or less on center vertically and 78 in. or less on center horizontally, with ungrouted cores filled with material having a maximum thermal conductivity of 0.44 Btu.in/h•ft^2•°F.))
.. 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 glazing requirements listed above.

3. Roof Types: A roof over attic is where the roof structure has at least 30 inches clear distance from the top of the bottom chord of a truss or ceiling joist to the underside of the sheathing at the roof ridge, and the ceiling is attached to the ceiling joist or the bottom of the truss or ceiling joist. Anything else is considered all other roofs.

4. SHGC (Solar Heat Gain Coefficient per Section 1312.2): May substitute Maximum Shading Coefficient (SC) for SHGC (See Chapter 4 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 (not applicable to Target UA or annual energy analysis): For the prescriptive building envelope option only, for other than electric resistance heat only, glazing may comply with the following:

Maximum Glazing Area as % of Wall:	Maximum U-Factor VG	OG	Max. SHGC[4]
>45% to 50%	0 35	0 44	0 30

7. Prescriptive Alternate (not applicable to Target UA or annual energy analysis): 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 and the overhead glazing U.factor or U.0.48:
a. Double glazing with a minimum 10/8 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 10.6A), fiberglass, wood, aluminum clad wood, vinyl, aluminum clad vinyl, or reinforced vinyl.

8. Daylighting with Plastic Skylights. For plastic skylights, the SHGC is allowed to be SHGC.0.65 maximum provided that:,
a. the visible transmittance (VT) is greater than the SHGC and
b. the skylight area is no greater than 6% of the overhead daylight zone.

9. Projection Factor (PF). See definition of projection factor in 1323.3 Exception 3 and Exhibit 1323.3. South-oriented glazing is vertical glazing oriented within 45 degrees of due south. West oriented glazing is vertical glazing oriented within 45 degrees of due west. If area-weighted average projection factor for south-oriented and west oriented vertical glazing is greater,than,0·3,,then,the,area-weighted,average,SHGC,for,all,vertical,glazing,shall,not,exceed,0·70:

, Section,9., The,following,sections,of,Chapter,17,of,the,4006,Washington,State,Energy, Code,are,amended,as,follows;,

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3614,,MecRanSaa,VeniSaiSon;,,The,minimum,requirements,for,ventilation,shall,comply,with, the,((Washington,State,Ventilation,and,Indoor,Air,Quality,Code,(WAC51-13))),Seattle, Mechanical,Code.,

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3633,3,t enerW,,Equipment,shall,have,a,minimum,performance,at,the,specified,rating, conditions,not,less,than,the,values,shown,in,Tables,1/7.1/A,through,1/7.1/G:,,If,a,nationally, recognized,certification,program,exists,for,a,product,covered,in,Tables,1/7.1/A,through,1/7.1/G-, and,it,includes,provisions,for,verification,and,challenge,of,equipment,efficiency,ratings-,then,the, product,shall,be,listed,in,the,certification,program:,

If,equipment,is,subject,to,an,ARI,Standard-,it,shall,be,listed,in,the,ARI,certification,program,

EXCEPTION:,,Water-cooled,centrifugal,water-chilling,packages,that,are,not,designed,for,operation,at,ARI, Standard 550/590 test conditions of 44°F leaving chilled water temperature and 85°F entering condenser water temperature with 3 gpm/ton condenser water flow shall have a minimum NPLV rating as shown in Tables 14.1K, L, and M The table values are only specified for the following full load design ranges:

Leaving Chiller Water Temp.: 40 to 48°F
Entering Condenser Water Temp.: 75 to 85°F
Condensing Water Temp. Rise: 5 to 15°F
Glycol percent 0%

Chillers designed to operate outside of these ranges shall have a code compliant selection at the nearest table operating point based on an all-water system. Non-standard Part Load Value (NPLV) is defined as single number part-load efficiency figure of merit for chillers references to conditions other than IPLV conditions. Design condenser water flow rate shall not be less than 2 5 gpm/ton.

, Equipment,not,listed,in,Tables,17.1A,to,17.1G,is,allowed,to,be,used:

, Gas-fired,and,oil-fired,forced-air,furnaces,with,input,ratings,≥,445-000,Btu/h,(65,kW),and,all unit,heaters,shall,also,have,an,intermittent,ignition,or,interrupted,device,(IID)-,and,have,either, mechanical,draft,(including,power,venting),or,a,flue,damper.,A,vent,damper,is,an,acceptable, alternative,to,a,flue,damper,for,furnaces,where,combustion,air,is,drawn,from,the,conditioned, space:,All,furnaces,with,input,ratings,≥,445-' ' ',Btu/h,(-5,kW)-,including,electric,furnaces-,that, are,not,located,within,the,conditioned,space,shall,have,jacket,losses,not,exceeding,' :95%,of,the, input,rating:,

, Electric,furnaces,over,/5kW,shall,have,a,minimum,of,two,stages,of,control,for,heating:

, Cooling,towers,serving,chilled,water,systems,with,airside,economizer,complying,with, Section,1733,without,using,the,exceptions,shall,be,selected,to,be,able,to,maintain,a,return, condenser,water,temperature,to,the,tower,of,86°F,or,less,at,peak,design,conditions:

, Hydronic,heat,pump,and,other,cooling,and,refrigeration,equipment,(e:g:,icemakers-,walk-in, coolers),shall,not,use,domestic,water,only,one,time,before,dumping,it,to,waste,(no,single,pass, water,cooling,systems,are,allowed):,,The,only,exceptions,are:,medical,and,dental,equipment1, equipment,using,less,than,1,gpm,replacement,of,existing,icemakers,or,use,of,single,pass, cooling,during,power,outages,and,other,emergencies:

3633.4,,GWSng,CondSSonk,,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;

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3633.6,,PVcUVged,Vnd,Hpa8,Hysieb ,EaccirSt,u eWSng,Vnd,CooSng,EquSpb eni:,,Packaged,and split,system,electric,equipment,providing,both,heating,and,cooling,with,a,total,cooling,capacity, greater,than,40-000,Btu/h,shall,be,a,heat,pump.,

, , **EXCEPI vON/,,**Unstaffed,equipment,shelters,or,cabinets,used,solely,for,personal, wireless,service,facilities:,

3633 7,,u eWSng,Hybieb hSh,J nencabed,Hb Veh ,,Where,heating,is,provided,to,unenclosed, spaces-,only,radiant,heating,systems,shall,be,used,unless,otherwise,approved,by,the,building, official:,,The,heating,system,shall,be,controlled,by,an,occupancy,sensor:,,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:

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3634.6,,HeiWcU,Vnd,HRui.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;,

a:, Have,a,minimum,seven.day,clock,and,be,capable,of,being,set,for,seven,different,day,types, per,week-,

b:, Be,capable,of,retaining,programming,and,time,settings,during,loss,of,power,for,a,period,of,at least,ten,hours-,and,

c:, Include,an,accessible,manual,override-,or,equivalent,function,(e:g:-,telephone,interface)-,that, allows,temporary,operation,of,the,system,for,up,to,two,hours:,

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

3634,6,3,DVb perlr,,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,(fails,to,open,upon,loss,of,power),dampers:,These,dampers,shall,remain, closed,until,activated,by,the,fire,alarm,system,or,other,approved,smoke,detection,system:,

EXCEPTIONS: 1. Systems serving areas which require continuous operation.
4. Combustion air intakes.
3 Gravity (nonmotorized) dampers are acceptable in systems with a design outdoor air intake or exhaust capacity of 300 cfm or less,((buildings less than three stories in height.))
4. ((Gravity (nonmotorized) dampers are acceptable in exhaust and relief outlets in the first story and levels below the first story of buildings three or more stories in height.)) Reserved.
5 Type 1 Grease hoods exhaust.

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

a: Motorized,Dampers:,,10,cfm/ft^2,of,damper,area,at,1:0,inch,w:g:,

b: Nonmotorized,Dampers:,40,cfm/ft^2,of,damper,area,at,1:0,inch,w:g:-,except,that,for, nonmotorized,dampers,smaller,than,47,inches,in,either,dimension:,,70,cfm/ft^2,of,damper,area,at, 1:0,inch,w:g:,

Dampers,used,as,a,component,of,packaged,HVAC,equipment,shall,comply,with,the,damper, leakage,requirements-,unless,it,is,the,lowest,leakage,available,as,a,factory,option:,,Drawings, shall,indicate,compliance,with,this,section:,

3634,6,4,OpiSb j b ,HVri,Conirodr,,Heating,and,cooling,systems,with,design,supply,air, capacities,exceeding,1/4 -' ' ',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:,

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3634,8,,Cob WjHSon,u eWSng,Eqj Spb eni,Conirodr,,Combustion,heating,equipment,with,a, capacity,over,445-' ' ',Btu/h,shall,have,((modulating))modulated,or,staged,combustion,control:,, Boilers,shall,have,proportionately-modulated,or,staged,combustion,control,to,control,both,the, fuel,and,the,air:

, , **EXCEPI vONS:,,**

, , 1:, Boilers,under,1-000-000,Btu/h,input,capacity:,,

, , 4:, Radiant,Heaters:,,

, , 3:, Systems,with,multiple,boilers,which,are,sequentially-staged:

Boilers,shall,comply,with,the,reset,requirements,in,Section,1734:4:

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3634.9,Encabed,PVrUSng,t VrVge,VeniSMSon.,,See,the,Seattle,Mechanical,Code-,Section,7' 7, for,requirements,for,controls,for,parking,garage,ventilation:

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363[.3,OperWSon:,,Air,economizers,shall,be,capable,of,automatically,modulating,outside,and, return,air,dampers,to,provide,1' ' %,of,the,design,supply,air,as,outside,air,to,reduce,or,eliminate, the,need,for,mechanical,cooling:,Air,economizers,shall,be,used,for,RS.49,analysis,base,case,for, all,systems,without,exceptions,in,Sections,1/7/8-,1/7/43-,or,1/7/33:,Water,economizers-,when, allowed,by,Section,1/4/84:4,exception,1/4or,Section,1/7/33,exception,9- ,shall,be,capable,of, providing,the,total,concurrent,cooling,load,served,by,the,connected,terminal,equipment,lacking, airside,economizer-,at,outside,air,temperatures,of,75· F,dry.bulb/70· F,wet.bulb,and,below:,For, this,calculation-,all,factors,including,solar,and,internal,load,shall,be,the,same,as,those,used,for, peak,load,calculations-,except,for,the,outside,temperatures:ll

((EXCEPTION; Water economizers using air-cooled heat rejection equipment may use a 35°F dry-bulb outside air temperature for this calculation. This exception is limited to a maximum of 20 tons per building.))

Note that this requirement will result in a larger cooling tower.

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363[.7 Econob Sver u eaiSng Sysieb Ib pac1:,,Any,HVAC,system,that,increases,the,building, heating,energy,use,during,economizer,operation,is,not,allowed,(e:g:,single,fan/dual,duct,systems and,multizone,systems):,

EXCEPI IONH,,

, , 1:, Where,the,heating,is,allowed,by,Section,1735:

, , 4:, Water,source,heat,pump,systems,that,comply,with,Section,1733-,Exception,4:

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

, This,requirement,will,not,affect,three-deck,multizone,since,they,cannot, work,with,an,air,economizer,in,any,case,(it,would,make,the,neutral,deck,a,cold deck).
An exception to the heating impact is provided for economizers on VAV systems that cause zone level heating to increase due to a reduction in supply air temperature. Reducing supply air temperatures on a cooling VAV system will reduce fan energy (particularly if the system has a variable speed drive), offsetting the energy lost due to increased reheat energy.
See the discussion and diagrams of Section 6.5.1.4 of ASHRAE/IESNA Standard 90.1 in the Users Manual.

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3636.3,HeVng:,Duct,work,which,is,designed,to,operate,at,pressures,above,10/1,inch,water, column,static,pressure,shall,be,sealed,((in,accordance,with,Standard,RS.18:,Extent,of,sealing, required,is,))as,follows;,

, 1:, ((Static,pressure;,6,inch,to,4,inches,seal,transverse,joints:))(Reserved.)

, 4:, Static,pressure;,((4))6 ,inches,to,3,inches,seal,all,transverse,joints,and,longitudinal, seams:,,Spiral,lock,seams,in,round,and,flat,oval,ductwork,do,not,require,sealing-, however-,other,seams,shall,be,sealed:

, 3:, Static,pressure;,above,3,inches,seal,all,transverse,joints-,longitudinal,seams,and,duct, wall,penetrations:,

, , ((Duct,tape,and,other,pressure,sensitive,tape,shall,not,be,used,as,the,primary,sealant, where,ducts,are,designed,to,operate,at,static,pressures,of,1,inch,W.C.,or,greater.))

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

, , **EXCEPI vON:** Fibrous glass duct systems installed in accordance with standard UL 181A and flexible duct systems installed in accordance with standard UL 181B may use tapes listed for these systems.

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

3636.4,vnsuaMSn:,,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,4-800,cfm,of,total,supply,air,capacity,shall,be,insulated, to,a,minimum,of,R.9,and,are,not,considered,building,envelope:,,Other,outside,air,duct,runs,are, considered,building,envelope,until,they-

1:, connect,to,the,heating,or,cooling,equipment-,or,

4:, are,isolated,from,the,exterior,with,an,automatic,shut.off,damper,complying,with,Section, 1714:7:1:,,

, , Once,outside,air,ducts,meet,the,above,listed,requirements-,any,runs,within,conditioned, space,shall,comply,with,Table,¼7.5,requirements:,,

, , Other,ducts,and,plenums,shall,be,thermally,insulated,per,Table,¼7.5:,,

, , **EXCEPI vONH,,**¼, Within,the,HVAC,equipment:,,

, , 4:, Exhaust,air,ducts,not,subject,to,condensation:,,

, , 3:, Exposed,ductwork,within,a,zone,that,serves,that,zone,

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3643,HyHeb ,I ype/,,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,with,cooling,capacity,of, ¼35-' ' ,Btu(h,or,less:,

b:,,Air,cooled-,constant,volume,split,systems-,which,provide,heating-,cooling,or,both-,with, cooling,capacity,of,87-000,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,90%,of,the,total,air,circulation:,

, All,((~~other~~)),systems,shall,comply,with,Sections,1730,through,1739:,

~~**3644,Conlrods,,In,addition,to,the,control,requirements,in,Section,1714 ,where,separate, heating,and,cooling,equipment,serve,the,same,temperature,zone ,thermostats,shall,be,interlocked to,prevent,simultaneous,heating,and,cooling:,,Systems,which,provide,heating,and,cooling, simultaneously,to,a,zone,are,prohibited:~~

~~364[,Econob Sterh/,,Economizers,meeting,the,requirements,of,Section,1713,shall,be,installed, on;~~

~~a:,,cooling,units,installed,outdoors,or,in,a,mechanical,room,adjacent,to,outdoors,having,a,total, cooling,capacity,greater,than,40-000,Btu(h,including,those,serving,computer,server,rooms-, electronic,equipment ,radio,equipment ,and,telephone,switchgear1and,~~

~~b:,,other,cooling,units,with,a,total,cooling,capacity,greater,than,57-000,Btu(h ,including,those, serving,computer,server,rooms ,electronic,equipment ,radio,equipment ,and,telephone, switchgear:~~

~~EXCEPTION: For Group R Occupancy, economizers meeting the requirement of Section 1413 shall be installed on single package unitary fan.cooling units having a total cooling capacity greater than 54,000Btu(h.~~

~~, The,total,capacity,of,all,units,without,economizers,(i:e: ,those,units,with,a,total,cooling, capacity,less,than,a,and,b,above),shall,not,exceed,470-000,Btu(h,per,building ,or,10%,of,its, aggregate,cooling,(economizer),capacity ,whichever,is,greater:,That,portion,of,the,equipment, serving,Group,R,occupancy,is,not,included,in,determining,the,total,capacity,of,all,units,without, economizers,in,a,building:)),~~

***,

1431.2 System SSSig LSnSs: Heating,and,cooling,design,loads,for,the,purpose,of,sizing, systems,shall,be,determined,in,accordance,with,one,of,the,procedures,described,in,Chapter,29,of Standard,RS.1,listed,in,Chapter,9,or,an,equivalent,computation,procedure.,,For,interior, temperatures-,90°F,shall,be,used,for,heating,and,95°F,for,cooling-,except,where,different,values, are,specified,in,the,Washington,Administrative,Code,(WAC).,,For,exterior,temperatures-,44°F, shall,be,used,for,heating,and,84°F,dry,bulb,and,66°F,for,wet,bulb,for,cooling.

, , Building,mechanical,systems,for,all,buildings,which,provide,space,heating,and0r,space, cooling,shall,be,sized,no,greater,than,1¼5' %,of,the,design,load,as,calculated,above-,except,that, cooling,towers,shall,comply,with,the,sizing,requirements,in,Section,1711:1:,,No,additional, safety,factor,is,allowed:

, , For,buildings,with,a,total,equipment,cooling,capacity,of,300,tons,and,above-,the, equipment,shall,comply,with,one,of,the,following:,(1),no,one,unit,shall,have,a,cooling,capacity, of,more,than,4(8,of,the,total,installed,cooling,equipment,capacity1(4),the,equipment,shall,have,a, variable,speed,drive1or,(3),the,equipment,shall,have,multiple,compressors:,,

, , **EXCEPI vONH,,**The,following,limited,exemptions,from,the,sizing,limit,shall,be, allowed-,however-,in,all,cases,heating,and0r,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.,

, 4:, Stand.by,equipment,may,be,installed,if,controls,and,devices,are,provided,which, allow,redundant,equipment,to,operate,automatically,only,when,the,primary, equipment,is,not,operating:,

, 3:, Multiple,units,of,the,same,equipment,type-,such,as,multiple,chillers,and,boilers-,with, combined,capacities,exceeding,the,design,load-,or,a,single,unit,that,is,capable,of, modulating,to,a,part.load,capacity,of,50%,of,the,load,or,less,,may,be,specified,to, operate,concurrently,only,if,controls,are,provided,that,sequence,or,otherwise, optimally,control,the,operation,of,each,unit,based,on,load:

7:,,Installed,space,heating,equipment,output,that,does,not,exceed,17,Btu(h,per,square,foot of,gross,conditioned,floor,area,and,installed,space,cooling,equipment,output,that,does,not, exceed,43,Btu(h,per,square,foot,of,gross,conditioned,floor,area:,,No,additional,safety,factor is,allowed:

***,

36[[,Econob Sterh,Air,economizers,meeting,the,requirements,of,Section,1713,shall,be, provided,on,all,new,systems,including,those,serving,computer,server,rooms-,electronic, equipment-,radio,equipment-,telephone,switchgear.,

EXCEPTIONS: 1. Qualifying small equipment: This exception shall not be used for unitary cooling equipment installed outdoors or in a mechanical room adjacent to the outdoors. This exception is allowed to be used for other cooling units and split systems with a total cooling capacity rated in accordance with 1411.4 of less than 33,000 Btu(h (hereafter referred to as qualifying small systems) provided that these are ((~~High~~))high efficiency cooling ((~~units~~)) equipment with SEER and EER values more than ((~~10%~~)) 15% higher than minimum efficiencies listed in Tables 14.1A, 14.1B and 14.1D, in the appropriate size category, using the same test procedures. The total capacity of all ((~~systems~~)) qualifying small equipment without economizers shall not exceed ((~~480,000~~)) 74,000 Btu/h per building, or ((~~20%~~)) 5% of its air economizer capacity, whichever is greater. That portion of the equipment serving Group R Occupancy is not included in determining the total capacity of all units without economizers in a building. Redundant units are not counted in the capacity limitations. This exception shall not be used for RS.49 analysis((~~for include,unitary,cooling,equipment,installed,outdoors,nor,in,a, mechanical room adjacent to outdoors~~)).

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

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

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

- Consequently, to use Exception 1 to Section 1433, a product must both: be within the scope of the specified ARI standard and be included in the ARI certification program. Certain equipment used in computer server rooms is not within the scope of the standards listed in Tables 14.1A, 14.1B, and 14.1D and is not eligible for certification. Therefore, such equipment does not qualify to use Exception 1 to Section 1433 (though it may qualify to use another exception).,,,

4. Chilled water terminal units connected to systems with chilled water generation equipment with ((~~COP and~~)) IPLV or NPLV values more than 10% higher than minimum efficiencies listed in Table 14.1C, 14.1K, 14.1L or 14.1M, in the appropriate size category, using the same test procedures. The total capacity of all systems without economizers shall not exceed ((~~480,000~~)) 74,000 Btu/h per building, or ((~~20%~~)) 5% of its air economizer capacity, whichever is greater. That portion of the equipment serving Group R Occupancy is not included in determining the total capacity of all units without economizers in a building. Redundant units are not counted in the capacity limitations. This exception shall not be used for RS.49 analysis.

3. ((~~Water.cooled,refrigeration,equipment,provided,with,a,water,economizer,meeting,the,requirements,of,Section,1713, Water economizer capacity per building shall not exceed 500 tons. This exception shall not be used for RS.29 analysis.~~)) Reserved.

4. Systems for which at least 75% of the annual energy used for mechanical cooling is provided from site.recovery or site.solar energy source.

5. Systems where special outside air filtration and treatment, for the reduction and treatment of unusual outdoor contaminants, makes an air economizer infeasible.

6. Systems with dehumidification that affect other systems (((~~such as dehumidification and supermarket refrigeration systems~~))) so as to increase the overall building energy consumption. New humidification equipment shall comply with Section 1413.4.

7. Systems complying with all of the following criteria:

a. Consist of multiple water source heat pumps with a total cooling capacity for each water-source heat pump of less than 57,000 Btu/h that are connected to a common water loop;

b. Have a minimum of 60% air economizer complying with Section 1713 that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake1

c. Have water source heat pumps with an EER at least 15% higher for cooling and, for units serving perimeter zones with heating loads (e.g. zones with exterior walls, roofs, or floors), a COP at least 15% higher for heating than that specified in Section 14111

d. Where provided with a dedicated boiler or furnace for that building, have a central boiler or furnace efficiency of:

i. 90% minimum for units up to 199,000 Btu/h1and

ii. 85% minimum for units above 199,000 Btu/h input1and

e. Provide heat recovery with a minimum 50% heat recovery effectiveness as defined in Section 1436 to preheat the outside air supply.

8. For Group R Occupancy, cooling units installed outdoors or in a mechanical room adjacent to outdoors with a total cooling capacity less than 40,000 Btu/h and other cooling units with a total cooling capacity less than 54,000 Btu/hr.

9. Equipment used to cool any dedicated server room, electronic equipment room or telecom switch room provided that they completely comply with option a or option b or option c or option d in the table below. This exception shall not be used for RS.49 analysis.

	Equipment Type	Higher Equipment Efficiency	Part-load Control	Economizer
Option 9a	Table 14.1A and Table 14.1B[a]	15%[b]	Required over 85,000 Btu/h[c]	None required
Option 9b	Table 14-1A and	+ 5%[d]	Required over	Waterside economizer[e]
	Equipment Type	Higher Equipment Efficiency	Part-load Control	Economizer
	Table 14.1B[a]		85,000 Btu/h[c]	
Option 9c	Table 14.1C, Table 14.1K, Table 14.1L, and Table 14.1M[f]	5%10%[g]	Required for all chillers[h]	Waterside economizer[e]
Option 9d	ASHRAE Standard 147[i]	0%[j]	Required over 85,000 Btu/h[c]	Waterside economizer[e]

Notes to Exception 9.

a. For a system where all of cooling equipment is subject to the ARI standards listed in Table 14-1A and Table 14-1B, the system shall comply with all of the following (note that if the system contains any cooling equipment that exceeds the capacity limits in Table14-1A or Table 14-1B, or if the system contains any cooling equipment that is not included in Table14-1A or Table 14-1B, then system is not allowed to use this option).

b. The cooling equipment shall have an EER value and an IPLV value that is a minimum of 15% greater than the value listed in Table 14-1A and Table 14-1B (1.15 x values in Tables 14-1A and 14-1B).

c. For units with a total cooling capacity over 85,000 Btuh, the system shall utilize part-load capacity control schemes that are able to modulate to a part.load capacity of 50% of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g. minimum of two.stages of compressor unloading such as cylinder unloading, two.stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).

d. The cooling equipment shall have an EER value and an IPLV value that is a minimum of 5% greater than the value listed in Table 14-1A and Table 14-1B (1.05 x values in Tables 14-1A and 14-1B).

e. The system shall include a water economizer in lieu of air economizer. Water economizers shall be capable of providing the total concurrent cooling load served by the connected terminal equipment lacking airside economizer, at outside air temperatures of 75°F dry.bulb/70°F wet.bulb and below. For this calculation, all factors including solar and internal load shall be the same as those used for peak load calculations, except for the outside temperatures. The equipment shall be served by a dedicated condenser water system unless a non.dedicated condenser water system exists that can provide appropriate water temperatures during hours when waterside economizer cooling is available.

f. For a system with chillers subject to the ARI standards listed in Table 14.1C, Table 14.1K, Table 14.1L, and Table 14.1M (e.g. a chilled water system with fan coil units).

g. For air-cooled chillers, the cooling equipment shall have an IPLV value that is a minimum of 5% greater than the IPLV value listed in Table 17-1C (1.05 x values in Table 17-1C). For water-cooled chillers, the cooling equipment shall have an IPLV or NPLV value that is a minimum of 10% greater than the IPLV or NPLV value listed in Table 17-1C, Table 14.1K, Table 14.1L, and Table 14.1M (1.10 x values in Table 14.1C, Table 14.1K, Table 14.1L, and Table 14.1M).

h. The chiller shall utilize part.load capacity control schemes that are able to modulate to a part.load capacity of 50% of the load or less that results in the compressor operating at the same or higher EER at part loads than at full load (e.g. minimum of two.stages of compressor unloading such as cylinder unloading, two.stage scrolls, dual tandem scrolls, but hot gas bypass is not credited as a compressor unloading system).

i. For a system where all of cooling equipment is subject to ASHRAE Standard 127.2001.

j. The cooling equipment subject to the ASHRAE Standard 149.4001 shall have an EER value and an IPLV value that is equal or greater than the value listed in Table 14.1A and Table 14.1B when determined in accordance with the rating conditions ASHRAE Standard 149.4001 (i.e. not the rating conditions in ARI Standard 4100140 or 340(360).

Note:,,Exception,9-,options,9a,and,9b,are,only,applicable,to,HVAC,equipment,that,complies,with,Section 1711.1,and,is,regulated,in,Tables,17.1A,and,17.1B.,,

, Section 1411.1 requires that "If a nationally recognized certification program exists for a product covered in Tables 14.1A through 14.1G, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program." As the ARI program does satisfy those criteria, products subject to the ARI standards must be listed in the ARI Certification Program.

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

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

- Certain equipment used in computer server rooms is not within the scope of the standards listed in Tables 14-1A and 14-1B, but is within the scope of ASHRAE Standard 127, *Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners*.,,This,equipment,is,eligible,to,use,Exception,9,option,9d,to, Section,17[[.,,

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

***,

36[7,HBb uaVneouh,u eVSig,Vnd,Coo8ig:,Systems,which,provide,heating,and,cooling, simultaneously,to,a,zone,are,prohibited:,Zone,thermostatic,and,humidistatic,controls,shall,be, capable,of,operating,in,sequence,the,supply,of,heating,and,cooling,energy,to,the,zone:,Such, controls,shall,prevent;,

, a:, Reheating,for,temperature,control:,

, b:, Recooling,for,temperature,control:,

, c:, Mixing,or,simultaneous,supply,of,air,that,has,been,previously,mechanically,heated,and, air,that,has,been,previously,cooled-,either,by,economizer,systems,or,by,mechanical, refrigeration:,

, d:, Other,simultaneous,operation,of,heating,and,cooling,systems,to,the,same,zone:,

, e:, Reheating,for,humidity,control:,

, , **EXCEPI vONH,,**1:,,Zones,for,which,the,volume,of,air,that,is,reheated-,recooled-,or, mixed,is,no,greater,than,the,larger,of,the,following:,

, , , a:, The,volume,of,air,required,to,meet,the,minimum,required,to,meet,the,ventilation, requirements,of,the,((~~Washington,State,Ventilation,and,Indoor,Air,Quality,Code~~)),Seattle, Mechanical,Code,for,the,zone:,

, , , b:,, 0:7,cfm(ft^2,of,the,zone,conditioned,floor,area,(before,reheating)-,provided,that,the, temperature,of,the,primary,system,air,is-,by,design,or,through,reset,controls-,0.14°F,below,the, design,space,heating,temperature,when,outside,air,temperatures,are,below,-' °F,for,reheat, systems,and,cold,deck,of,mixing,systems,and,' .¼°F,above,design,space,temperature,when, outside,air,temperatures,are,above,-' °F,for,recooling,systems,and,hot,deck,of,mixing,systems:,, For,multiple,zone,systems-,each,zone,need,not,comply,with,this,exception,provided,the,average, of,all,zones,served,by,the,system,that,have,both,heating,and,cooling,ability,comply:,

, , , c:, 3' ' ,cfm:,,This,exception,is,for,zones,whose,peak,flow,rate,totals,no,more,than, ¼ %,of,the,total,fan,system,flow,rate:,

, , , d:, Any,higher,rate,that,can,be,demonstrated-,to,the,satisfaction,of,the,building, official-,to,reduce,overall,system,annual,energy,usage,by,offsetting,reheat0recool,energy,losses, through,a,reduction,in,outdoor,air,intake,in,accordance,with,the,multiple,space,requirements, defined,in,ASHRAE,Standard,-4:,

, , 4:, Zones,where,special,pressurization,relationships-,cross.contamination,requirements-, or,code,required,minimum,circulation,rates,are,such,that,variable,air,volume,systems, are,impractical:,

, , 3:, Zones,where,at,least,95%,of,the,energy,for,reheating,or,for,providing,warm,air,in, mixing,systems,is,provided,from,a,site.recovered,(including,condenser,heat),or,site. solar,energy,source:,

, 7:, Zones,where,specific,humidity,levels,are,required,to,satisfy,process,needs-,such,as, computer,rooms-,museums-,surgical,suites-,and,buildings,with,refrigerating,systems-, such,as,supermarkets-,refrigerated,warehouses-,and,ice,arenas:,

36[8,,u eVi,Gecokery,

36[8 3,s Vn,Hyhieb h',,Fan,systems,which,

a:, , have,both,(1),a,capacity,of,5-000,cfm,or,greater,or,serve,a,space,with,a,design,heating,or, cooling,load,exceeding,150,Btu(h.ft^4,and,((~~which,have~~)),(4),,a,minimum,outside,air,supply,of, 90%,or,greater,of,the,total,air,circulation-,or

b:, have,both,(1),a,capacity,of,1' -' ' ' ,cfm,or,greater,and,(4),,a,minimum,outside,air,supply,of, 5' %,or,greater,of,the,total,air,circulation-,or

c:, , have,both,(1),a,capacity,of,4' -' ' ' ,cfm,or,greater,and,(4),,a,minimum,outside,air,supply,of, 30%,or,greater,of,the,total,air,circulation-,,,

shall,have,a,heat,recovery,system,with,at,least,50%,recovery,effectiveness:,,Fifty,percent,heat, recovery,effectiveness,shall,mean,an,increase,in,the,outside,air,supply,temperature,at,design, heating,conditions,of,one.half,the,difference,between,the,outdoor,design,air,temperature,and, -5°F,(44:5°F,in,Seattle):,,Provisions,shall,be,made,to,bypass,or,control,the,heat,recovery,system, to,permit,air,economizer,operation,as,required,by,Section,1733.,,Heat,recovery,may,be,provided, from,any,site.recovered,or,site.solar,source.,

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

1. Laboratory systems equipped with both variable air volume supply and variable air volume or two.speed exhaust fume hoods provided that an instruction label is placed on the face of the hood that provides the information in Exhibit 14.1.

Exhibit 14.1

INSTRUCTIONS TO OPERATOR

To be in compliance with the 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.

4. 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.

36[6.4,,CondenhMe,Hyhieb h:,,On.site,steam,heating,systems,shall,have,condensate,water, recovery:,,On.site,includes,a,system,that,is,located,within,or,adjacent,to,one,or,more,buildings, within,the,boundary,of,a,contiguous,area,or,campus,under,one,ownership,and,which,serves,one, or,more,of,those,buildings:,,

, , Other,buildings,with,steam,heating,systems,which,do,not,have,condensate,water,recovery shall,have,condensate,heat,recovery:

36[8,[,u eVi,Gecokery,for,HerkSe,WVier,u eVSig:,Condenser,heat,recovery,systems,shall,be, installed,for,heating,or,preheating,of,service,hot,water,provided,all,of,the,following,are,true:

a: The facility operates 47 hours a day;

b: The total installed heat rejection capacity of the water cooled systems exceeds 1 000 000 Btu/h of heat rejection;

c: The capacity of service water heating equipment exceeds 1 000 000 Btu/h;

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

a: 60% of the peak heat rejection load at design conditions or,

b: preheat of the peak service hot water draw to 85°F or,

c: 50% of the service water heating load.

EXCEPTIONS:

1. Facilities that employ condenser heat recovery for space heating with a heat recovery design exceeding 30% of the peak water cooled condenser load at design conditions.

2. Facilities that provide 60% of their service water heating from site solar or site recovered energy or from other sources.

3437 Exercise Motor Efficiency: Design A & B squirrel cage T frame induction permanently wired polyphase motors of 1 hp or more having synchronous speeds of 3 600 1 800 and 1 400 rpm shall have a nominal full load motor efficiency no less than the corresponding values for energy efficient motors provided in Table 17.7:

EXCEPTIONS:

1. Motors used in systems designed to use more than one speed of a multi speed motor.
2. Motors used as a component of the equipment meeting the minimum equipment efficiency requirements of Section 1411 and Tables 14.1A through 14.1G provided that the motor input is included when determining the equipment efficiency.
3. Motors that are an integral part of specialized process equipment.
4. Where the motor is integral to a listed piece of equipment for which no complying motor has been approved.

Fan motors less than 1 hp in series terminal units shall

a: be electronically commutated motors or,

b: have a minimum motor efficiency of 65% when rated in accordance with NEMA Standard MG 1 at full load rating conditions;

36[8 ~~Variable Speed Hydronic Systems~~ Hydronic Variable Speed Pumping. For fans and pumps 9.5 hp and greater ((~~than 10 hp where the application involves variable flow and water source heat pump loops subject to the requirements of Section 1734:4:4~~)) there shall be:

a: Variable speed drives or,

b: Other controls and devices that will result in fan and pump motor demand of no more than [' %] of design wattage at [5' %] of design air volume for fans when static pressure set point equals [10] the total design static pressure and [5' %] of design water flow for pumps based on manufacturer's certified test data: Variable inlet vanes throttling valves (dampers) scroll dampers or bypass circuits shall not be allowed:

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

EXCEPTIONS: Variable speed devices are not required for motors 7.5 hp and greater that serve:

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

Static pressure sensors used to control variable air volume fans shall be placed in a position such that the controller set point is no greater than 10 the total design fan static pressure.

For systems with direct digital control of individual zone boxes reporting to the central control panel there shall be static pressure reset controls and the static pressure set point shall be reset based on the zone requiring the most pressure (i.e. the set point is reset lower until one zone damper is nearly wide open.

36[8.3 Cooling Towers: All cooling towers with a total fan motor horsepower 9.5 hp and greater ((~~than 10 hp~~)) shall be equipped with a variable speed drive or with a pony motor of a rated hp no greater than ¼ of the hp of the primary motor: For pony motors the cooling tower control shall provide two stage operation of fans and shall bring the pony motor to operate without the primary motor while meeting the condenser water setpoint:

***

3661 Clothes Washer Efficiency: Service water heating equipment shall comply with the applicable efficiencies in Tables ¼7.¼A through ¼7.¼M:

Effective January 1 2006 commercial clothes washers installed in Seattle shall have a minimum modified energy factor (MEF) of 1.46: The MEF definition and test procedure set forth at 10 C.F.R. Part 730 (Energy Conservation Program For Consumer Products) as amended is incorporated into this section by reference:

Commercial clothes washers are defined as all clothes washers

a: installed for use on fee basis e.g. coin or card operated and

b: not covered by federal residential clothes washer efficiency standards and

c: having a capacity of 4' lbs. or less:

***

3654 Pool Water Heaters: Pool water heaters using electric resistance heating as the primary source of heat are prohibited for pools over 4 000 gallons:

Heat pump pool heaters shall have a minimum COP of 4.0 determined in accordance with ASHRAE Standard 14— Method of Testing for Rating Pool Heaters:

Other pool heating equipment shall comply with the applicable efficiencies in Tables 14.1A through ((~~14.1G~~)) 17.1M:

3676 Pool Cover Vinyl Suspended Systems: Heated pools shall be equipped with a vapor retardant pool cover on or at the water surface:

Pools heated to more than 9' °F shall have a pool cover with a minimum insulation value of R ¼ and the sides and bottom of the pool shall also have a minimum insulation value of R 14:

***

TABLE 36.3C

ALTERNATIVE PACKAGED ELECTRICALLY OPERATED HEATING COOLING AND REFRIGERATION EQUIPMENT

Equipment Type	Size Category	((Sub-Category or Rating Condition)) Maximum kW/ton[d]	Minimum Efficiency[b]	Test Procedure[a]
Air Cooled, With Condenser, Electrically Operated	All Capacities	1.26 0.95	2.80 COP ((3.05)) 3.70 IPLV	ARI 550/590,
Air Cooled, Without Condenser, Electrically Operated	All Capacities	1.13 0.8[c]	3.10 COP ((3.45)) 4.15 IPLV,	
Water Cooled, Electrically Operated	≤ 40 tons,	0.84 0.63	4.20 COP 5.55 IPLV	ARI 550/590
	≥ 40 tons and ≤ 150 Tons	0.79 0.61	4.45 COP 5.80 IPLV	
	≥ 150 Tons and ≤ 300 Tons	0.58 0.50	6.10 COP 7.05 IPLV	
((Water Cooled, Electrically Operated, Positive Displacement (Reciprocating)))	((All Capacities))		((4.20 COP)) ((5.05 IPLV))	((ARI 550/590))
((Water Cooled, Electrically Operated, Positive Displacement (Rotary Screw and Scroll)))	((≤ 150 Tons))		((4.45 COP 5.05 IPLV))	((ARI 550/590))
	((≥ 150 Tons and ≤ 300 Tons))		((4.90 COP 5.60 IPLV))	
	((≥ 300 Tons))		((5.50 COP 6.15 IPLV))	
((Water Cooled, Electrically Operated, Positive Displacement (Centrifugal)))	((≤ 150 Tons))		((5.00 COP 5.25 IPLV))	((ARI 550/590))
	((≥ 150 Tons and ≤ 300 Tons))		((5.55 COP 5.90 IPLV))	
	((≥ 300 Tons))		((6.10 COP 6.40 IPLV))	
Air Cooled Absorption Single Effect	All Capacities		0.60 COP	ARI 560
Water Cooled Absorption Single Effect	All Capacities		0.70 COP	ARI 560
Absorption Double Effect, Indirect-Fired	All Capacities		1.00 COP 1.05 IPLV	ARI 560
Absorption Double Effect, Direct-Fired	All Capacities		1.00 COP 1.00 IPLV	ARI 560

[a] Reserved.
[b] ((The chiller equipment requirements do not apply for chillers used in low temperature applications where the design leaving fluid temperature is less than or equal to 40°F.)) Reserved.
[c] COP requirements do not apply to other than centrifugal equipment.
[d] This column is inserted for the convenience of users. The values are converted from the COP and IPLV values in the following column using the equation: kW/ton=[(COP x 3.413)/12000].

TABLE 14-1R

PERFORMANCE REQUIREMENTS FOR HEAT REJECTION EQUIPMENT

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Sub-Category or Rating Condition	Minimum Efficiency[b]	Test Procedure[a]
Propeller or Axial Fan Cooling Towers	All	95°F (35°C) Entering Water 85°F (29°C) Leaving Water 75°F (24°C) wb Outdoor Air	≥38.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal Fan Cooling Towers	All	95°F (35°C) Entering Water 85°F (29°C) Leaving Water 75°F (24°C) wb Outdoor Air	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Air Cooled Condensers	All	125°F (52°C) Condensing Temperature R22 Test Fluid 190°F (88°C) Entering Gas Temperature 15°F (8°C) Subcooling 95°F (35°C) Entering Drybulb	≥176,000 Btu/h·hp	ARI 460

[a] For purposes of this table, cooling tower performance is defined as the maximum flow rating of the tower divided by the fan nameplate rated motor power.
[b] For purposes of this table air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power. Note that the gpm/hp criteria in Table 14-1G does not apply to water- or evaporatively-cooled closed-circuit cooling towers.
[c] Reserved.

TABLE 36.3U Deleted

TABLE 36.3V Deleted

TABLE 36.3W Deleted

TABLE 36.3X

IPLV/NPLV OPTIONS FOR CENTRIFUGAL CHILLERS

Water Cooled Chillers < 150 Tons
IPLV/NPLV = 5.80

Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT[a] (°F)	Condenser Flow Rate: 2 gpm/ton[d]	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
			Required IPLV/NPLV					
46	75	29	6.42	6.71	6.93	7.27	7.52	7.70
45	75	30	6.33	6.60	6.81	7.14	7.35	7.51
44	75	31	6.24	6.50	6.69	6.97	7.18	7.34
43	75	32	6.15	6.40	6.59	6.85	7.03	7.17
42	75	33	6.06	6.31	6.49	6.73	6.90	7.03
41	75	34	5.97	6.23	6.39	6.62	6.78	6.89
46	80	34	5.97	6.23	6.39	6.62	6.78	6.89
40	75	35	5.89	6.14	6.30	6.52	6.67	6.77
45	80	35	5.89	6.14	6.30	6.52	6.67	6.77
44	80	36	5.79	6.05	6.22	6.42	6.56	6.67
43	80	37	5.68	5.96	6.13	6.34	6.46	6.56
42	80	38	5.57	5.86	6.04	6.24	6.37	6.46
41	80	39	5.45	5.76	5.95	6.16	6.28	6.36
46	85	39	5.45	5.76	5.95	6.16	6.28	6.36
40	80	40	5.31	5.65	5.85	6.07	6.19	6.27
45	85	40	5.31	5.65	5.85	6.07	6.19	6.27
44	85	41	5.16	5.54	5.80[e]	5.97	6.11	6.18
43	85	42	5.01	5.42	5.64	5.89	6.02	6.09
42	85	43	4.82	5.28	5.53	5.79	5.92	6.01
41	85	44	4.63	5.14	5.40	5.69	5.83	5.92
40	85	45	4.41	4.97	5.27	5.57	5.72	5.82
Condenser DT[b]			14.04	11.23	9.36	7.02	5.62	4.68

[a] LIFT = Entering Condenser Water Temperature – Leaving Chilled Water Temperature
[b] Condenser DT = Leaving Condenser Water Temperature (F) – Entering Condenser Water Temperature (F)
[c] All values shown are NPLV except at conditions of 3 gpm/ton and 41 F LIFT which is IPLV.
[d] Retrofit applications only.

TABLE 36.3L

IPLV/NPLV OPTIONS FOR CENTRIFUGAL CHILLERS

5,371 ONH 2,111 ONH

Water Cooled Chillers ≥ 150 Tons, < 300 Tons
IPLV/NPLV = 6.50

Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT[a] (°F)	Condenser Flow Rate: 2 gpm/ton[d]	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
			Required IPLV/NPLV					
46	75	29	7.24	7.56	7.82	8.21	8.48	8.69
45	75	30	7.14	7.44	7.68	8.03	8.28	8.47
44	75	31	7.04	7.33	7.55	7.87	8.10	8.27
43	75	32	6.94	7.22	7.43	7.72	7.93	8.09
42	75	33	6.84	7.12	7.32	7.59	7.78	7.92
41	75	34	6.74	7.02	7.21	7.47	7.65	7.77
46	80	34	6.74	7.02	7.21	7.47	7.65	7.77
40	75	35	6.63	6.92	7.11	7.35	7.51	7.63
45	80	35	6.63	6.92	7.11	7.35	7.51	7.63
44	80	36	6.52	6.82	7.01	7.24	7.39	7.50
43	80	37	6.40	6.72	6.91	7.14	7.28	7.39
42	80	38	6.28	6.61	6.81	7.04	7.18	7.28
41	80	39	6.14	6.50	6.71	6.94	7.08	7.17
46	85	39	6.14	6.50	6.71	6.94	7.08	7.17
40	80	40	5.98	6.38	6.60	6.84	6.99	7.07
45	85	40	5.98	6.38	6.60	6.84	6.99	7.07
44	85	41	5.82	6.25	6.50[e]	6.74	6.89	6.97
43	85	42	5.64	6.11	6.37	6.63	6.78	6.88
42	85	43	5.43	5.95	6.24	6.52	6.68	6.78
41	85	44	5.21	5.79	6.09	6.40	6.57	6.68
40	85	45	4.97	5.60	5.94	6.28	6.46	6.57
Condenser DT[b]			14.04	11.23	9.36	7.02	5.62	4.68

[a] LIFT = Entering Condenser Water Temperature – Leaving Chilled Water Temperature
[b] Condenser DT = Leaving Condenser Water Temperature (F) – Entering Condenser Water Temperature (F)
[c] All values shown are NPLV except at conditions of 3 gpm/ton and 41 F LIFT which is IPLV.
[d] Retrofit applications only.

TABLE 36.3M

IPLV/NPLV OPTIONS FOR CENTRIFUGAL CHILLERS

Water Cooled Chillers[c] > 300 Tons
IPLV/NPLV = 7.05

Leaving Chilled Water Temperature (°F)	Entering Condenser Water Temperature (°F)	LIFT[a] (°F)	Condenser Flow Rate: 2 gpm/ton[d]	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
			Required IPLV/NPLV					
46	75	29	7.87	8.22	8.49	8.91	9.21	9.44
45	75	30	7.76	8.09	8.34	8.72	9.00	9.20
44	75	31	7.65	7.95	8.20	8.55	8.80	8.98
43	75	32	7.54	7.84	8.06	8.39	8.61	8.78
42	75	33	7.43	7.73	7.94	8.24	8.45	8.60
41	75	34	7.32	7.62	7.83	8.11	8.31	8.44
46	80	34	7.32	7.62	7.83	8.11	8.31	8.44
40	75	35	7.21	7.51	7.71	7.99	8.16	8.29
45	80	35	7.21	7.51	7.71	7.99	8.16	8.29
44	80	36	7.08	7.40	7.61	7.87	8.03	8.15
43	80	37	6.95	7.29	7.50	7.76	7.91	8.03
42	80	38	6.82	7.18	7.39	7.65	7.80	7.91
41	80	39	6.67	7.06	7.28	7.54	7.69	7.79
46	85	39	6.67	7.06	7.28	7.54	7.69	7.79
40	80	40	6.50	6.93	7.17	7.44	7.58	7.68
45	85	40	6.50	6.93	7.17	7.44	7.58	7.68
44	85	41	6.33	6.79	7.05[e]	7.33	7.47	7.58
43	85	42	6.13	6.63	6.91	7.21	7.37	7.47
42	85	43	5.91	6.47	6.78	7.08	7.25	7.36
41	85	44	5.67	6.28	6.61	6.96	7.14	7.25
40	85	45	5.40	6.08	6.45	6.82	7.01	7.13
Condenser DT[b]			14.04	11.23	9.36	7.02	5.62	4.68

[a] LIFT = Entering Condenser Water Temperature – Leaving Chilled Water Temperature
[b] Condenser DT = Leaving Condenser Water Temperature (F) – Entering Condenser Water Temperature (F)
[c] All values shown are NPLV except at conditions of 3 gpm/ton and 41 F LIFT which is IPLV.
[d] Retrofit applications only.

***

Section 8. The following sections of Chapter 15 of the 2006 Washington State Energy Code are amended as follows:

***,

3734 Energy Budget/ The use of these exemptions is at the applicant's option:

3734.3 Energy Budget Where The following rooms spaces and areas are exempt from the ((lighting power,)) requirements in Sections 1540 through 1544 and 1530 through 1534 but shall comply with all other requirements of this chapter:

1: ((Areas in which medical or dental tasks are performed:)) Reserved:

4: High risk security areas or any area identified by building officials as requiring additional lighting:

3: Spaces designed for primary use by the visually impaired (-)) or hard of hearing (lip reading) ((~~or by senior citizens~~)):

7: ((~~Food preparation areas:~~)) Reserved:

5: Outdoor manufacturing greenhouses and processing areas:

-: Electrical/mechanical equipment rooms:

9: Outdoor athletic facilities:

8: ((~~Inspection and restoration areas in galleries and museums:~~)) Reserved:

9. The sanctuary portion of a house of worship defined as the space or room where the worship service takes place. Classrooms meeting rooms offices and multipurpose rooms that are part of the same facility are not exempt.

3734.4 Energy Budget Equipment: The following lighting equipment and tasks are exempt from the lighting requirements of Section 1540 through 1544 and need not be included when calculating the installed lighting power under Section 1530 through 1534 but shall comply with all other requirements of this chapter:

All other lighting in areas that are not exempted by Section ¼6¼4 where exempt tasks and equipment are used shall comply with all of the requirements of this chapter:

¼ Special lighting needs for research:

4: Emergency lighting that is automatically OFF during normal building operation:

3: Lighting that is part of machines equipment or furniture:

7: Lighting that is used solely for indoor plant growth during the hours of ¼ ;' ' p:m: to –;' ' a:m: However such lighting shall not be exempt unless it is in addition to general area lighting is located in a separate fixture and is controlled by an independent control device:

5: Lighting for theatrical productions television broadcasting (including sports facilities) ((~~audio visual presentations~~)) and special effects lighting for stage areas and dance floors in entertainment facilities: However such lighting shall not be exempt unless it is in addition to general area lighting is located in a separate fixture and is controlled by an independent control device:

6: Lighting in galleries museums and in main building entry lobbies for ((~~art~~)) exhibits ((~~non-retail displays portable plug in display fixtures and show case lighting~~)) inspection and restoration: However such lighting shall not be exempt unless it is in addition to general area lighting is located in a separate fixture and is controlled by an independent control device:

9: Lighting specifically designed for use only during medical or dental procedures and lighting integral to medical equipment: However such lighting shall not be exempt unless it is in addition to general area lighting designed specifically for medical lighting and is controlled by an independent control device:

8: Lighting integral to or specifically for food warming and food preparation equipment: However such lighting shall not be exempt unless it is in addition to general area lighting is located in a separate fixture and is controlled by an independent control device:

9: Audio visual and video conferencing lighting with multi level or dimming controls in rooms with permanently installed audio visual equipment or video conferencing equipment:

10: Permanently installed undershelf or undercabinet lighting that has an automatic shutoff control device integral to or is directly attached to the luminaires or is automatically controlled by a wall mounted control device that turns off the lighting whenever that particular space is unoccupied: Other permanently installed undershelf or undercabinet lighting that is not automatically controlled is not exempt and shall be included when determining compliance with the lighting requirements of Section 154' through 1544 and Section 15[' through 15[4:

***

373[.3 Local Control and Access Required: Each space enclosed by walls or ceiling height partitions shall be provided with lighting controls located within that space: The lighting controls whether one or more shall be capable of turning off all lights within the space: The controls shall be readily accessible at the point of entry/exit to personnel occupying or using the space:

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

1: Lighting controls for spaces which must be used as a whole:

4: Automatic controls when provided in addition to manual controls need not be accessible to the users and may be centralized in a remote location:

3: Controls requiring trained operators:

7: Controls for safety hazards and security:

***

373[.1 Daylight Zone Control: Lighting in ((~~All~~)) all daylighted zones as defined in Chapter 4 (see Exhibits 1513:3a and 1513:3b) both under overhead glazing and adjacent to vertical glazing shall be provided with controls that comply with Sections 1513:3:1 and 1513:3:4((~~individual controls or daylight or occupant sensing automatic controls which control the lights independent of general area lighting~~)):

353[.3 Separate Control: Daylight zones shall have controls which control the lights independent of general area lighting:

Contiguous daylight zones adjacent to vertical glazing are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e. north east south west): Daylight zones under overhead glazing more than 15 feet from the perimeter shall be controlled separately from daylight zones adjacent to vertical glazing: For daylight zones under overhead glazing that exceed 5 000 square feet there must be at least two independent photocontrol systems with each system having a dedicated photosensor:

EXCEPTION: Daylight spaces enclosed by walls or ceiling height partitions and containing 4 or fewer lighting fixtures are not required to have a separate switch for general area lighting.

1513.2 Automatic Controls. Daylight zones shall have controls which automatically reduce lighting power in response to available daylight by either:

a. a combination of dimming ballasts and daylight sensing automatic controls which are capable of dimming the lights continuously or,

b. a combination of stepped switching and daylight sensing automatic controls which are capable of incrementally reducing the light level in steps automatically and turning the lights off automatically.

i. Single lamp luminaire systems shall have three levels of automatic control: all lamps on approximately half of the luminaires turned off in a relatively uniform pattern and then all of the luminaires off. As an alternate where the daylight zone contains two rows of luminaires and they are parallel to a window three levels of automatic control may also be achieved by having both rows on the row closest to the window off and the other row on and both rows off. For rooms such as small offices which contain only a single one lamp luminaire it is acceptable for the daylighting control system to automatically switch off the entire luminaire.

ii. Two lamp luminaires shall have three levels of automatic control: both lamps on one lamp on and one lamp off and both lamps off. As an alternate where the daylight zone contains two rows of luminaires and they are parallel to a window three levels of automatic control may also be achieved by having both rows on the row closest to the window off and the other row on and both rows off. For rooms such as small offices which contain only a single two lamp luminaire it is acceptable for the daylighting control system to automatically switch off the entire luminaire rather than switching off one lamp then both lamps.

iii. Three lamp luminaires shall have four levels of automatic control: all three lamps on two lamps on and one lamp off one lamp on and two lamps off and all three lamps off.

iv. For other multi lamp luminaries with four or more lamps the number of required incremental steps shall be equal to one plus the number of lamps in the luminaire.

Any switching devices installed to override the automatic daylighting control shall comply with the criteria in Section 1513:4a.e.

EXCEPTIONS: 1. The following are exempt from the requirements for automatic daylighting controls in Section 1513:3:4.

a. retail spaces adjacent to vertical glazing (retail spaces under overhead glazing are not exempt).

b. lighting exempted by Section 1514 and

c. display exhibition and specialty lighting complying with Section 1513:4.

4. The following spaces are exempt from the requirements for automatic daylighting controls in Section 1513:3:4 provided that they have occupancy sensor controls that comply with Section 1513.6.1.

a. small spaces in the daylight zone that are normally unoccupied (such as a storage room with a window or restrooms).

b. rooms less than 300 square feet and

c. conference rooms 300 square feet and larger that have a lighting control system with at least four scene options:

3. HID lamps with automatic controls that are capable of reducing the power consumption by at least 50% in lieu of continuous dimming controls in 1513:3:4:

7. HID lamps 150 watts or less are exempt from the dimming requirements in 1513:3:4:

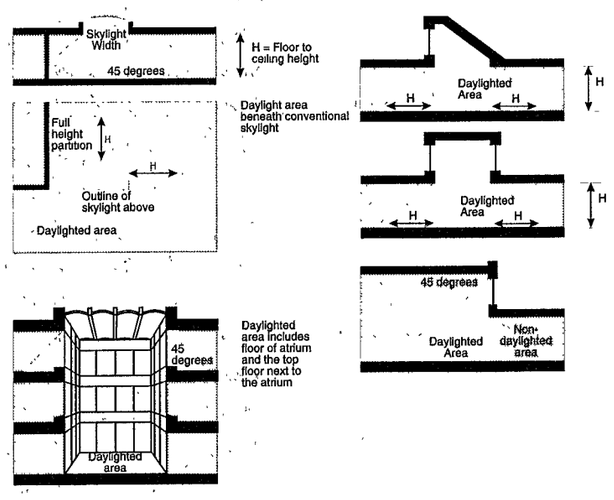

Exhibit 1513:3a

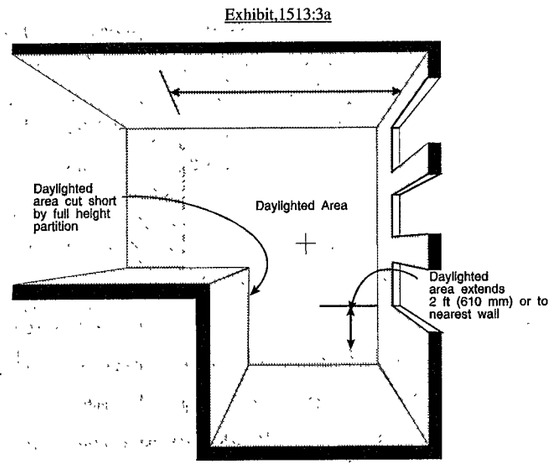

Exhibit 1513:3b

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3704.4 Interior Lighting Power. The exterior lighting power allowance shall be calculated separately for (1) covered parking and (4) outdoor parking outdoor areas and building exteriors. The lighting in these two areas shall not be traded.

The lighting allowance for covered parking shall be 0.40 W/ft² and the allowance for open parking and outdoor areas shall be 0.15 W/ft². For open parking and outdoor areas and roadways luminaires mounted above 15 feet shall meet IESNA requirements for Full Cutoff Luminaires. (Full Cutoff means a luminaire light distribution where zero candela intensity occurs at an angle of 90 degrees above nadir and all greater angles from nadir.)

The lighting allowance for building exteriors and externally illuminated signs (including billboards) shall be calculated either by multiplying the building facade area that is illuminated or sign area by 0.15 W/ft², or multiplying the building perimeter in feet by 9.5 watts per lineal foot. Any building exterior lighting that exceeds 9.5 watts per square foot of total building perimeter is not allowed to be traded with other lighting areas.

EXCEPTIONS: 1. Group U occupancy accessory to Group R-3 or R-7 occupancy.

2. The top level of a parking garage is allowed to be included with the covered parking garage category provided that the luminaires on the top level meet the IESNA requirements for Full Cutoff Luminaires.

3. For the gas station pump area under canopy only, 1.00 W/ft² may be used. For automobile sales area only, and for other exterior retail sales, including but not limited to gardening supplies, 0.50 W/ft² may be used.

EXTERIOR LIGHTING POWER ALLOWANCE		
TYPE OF USE	LIGHTING POWER ALLOWANCE	LIMITATIONS
PARKING AND OUTDOOR AREAS		
Covered Parking	0.20 Watts/square foot	Calculated separately. Trade offs not allowed with other categories.
Open parking and outdoor areas	0.15 Watts/square foot of area that is illuminated	Calculated separately, but see allowance below for use of façade lighting credit
FAÇADE LIGHTING		
Perimeter option	7.5 Watts/lineal foot of building perimeter	Calculated separately, but any wattage allowance not used for façade lighting may be used for open parking and outdoor areas that are illuminated
Surface area option	0.15 Watts/square foot of wall surface area that is illuminated	Calculated separately- but any wattage allowance up to 7.5 Watts/lineal foot of building perimeter that is not used for façade lighting may be used for open parking and outdoor areas that are illuminated

~~(All exterior building grounds luminaires that operate at greater than 1/4 ', watts shall contain lamps having a minimum efficacy of ' lm/W unless the luminaire is controlled by a motion sensor or qualifies for one of the following exceptions:~~

~~The total exterior lighting power allowance for all exterior building applications is the sum of the individual lighting power densities permitted in Table 15.4 for these applications. Trade offs are allowed only among exterior lighting applications listed in the Table 15.4 "Tradable Surfaces" section.~~

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

~~a. Specialized signal, directional, and marker lighting associated with transportation.~~

~~b. Lighting integral to signs.~~

~~c. Lighting, integral to equipment or instrumentation and installed by its manufacturer.~~

~~d. Lighting for theatrical purposes, including performance, stage, film production, and video production.~~

~~e. Lighting for athletic playing areas.~~

~~f. Temporary lighting.~~

~~g. Lighting for industrial production.~~

~~h. Theme elements in theme/amusement parks.~~

~~i. Lighting used to highlight features of public monuments.~~

~~j. Group U Occupancy accessory to Group R-3 or R-7 Occupancy.~~

~~TABLE 15.4~~

~~LIGHTING POWER DENSITIES FOR BUILDING EXTERIORS~~

~~Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be traded.)~~	~~Uncovered Parking Areas~~	
	~~Parking Lots and drives~~	~~0.15 W/ft²~~
	~~Building Grounds~~	
	~~Walkways less than 10 feet wide~~	~~1.0 W/linear foot~~
	~~Walkways 10 feet wide or greater Plaza areas Special Feature Areas~~	~~0.1W/ft²~~
	~~Stairways~~	~~1.0 W/ft²~~
	~~Building Entrances and Exits~~	
	~~Main entries~~	~~30 W/linear foot of door width~~
	~~Other doors~~	~~20 W/linear foot of door width~~
	~~Canopies and Overhangs~~	
	~~Canopies (free standing and attached and overhangs)~~	~~1.25 W/ft²~~
	~~Outdoor Sales~~	
	~~Open areas (including vehicle sales lots)~~	~~0.5 W/ft²~~
	~~Street frontage for vehicle sales lots in addition to "open area" allowance~~	~~40 W/linear foot~~
~~Non-Tradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and can not be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)~~	~~Building Facades~~	~~0.2 W/ft² for each illuminated wall or surface or 5 W/linear foot for each illuminated wall or surface length~~
	~~Automated teller machines and night depositories~~	~~270 W per location plus 90 W per additional ATM per location~~
	~~Entrances and gatehouse inspection stations at guarded facilities~~	~~1.25 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")~~
	~~Loading areas for law enforcement, fire, ambulance and other emergency service vehicles~~	~~0.5 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")~~
	~~Material handling and associated storage~~	~~0.5 W/ft²~~
	~~Drive up windows at fast food restaurants~~	~~700W per drive through~~
	~~Parking near 24 hour retail entrances~~	~~800 W per main entry~~))

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TABLE 15-1
UNIT LIGHTING POWER ALLOWANCE (LPA)

Use[1]	LPA[2] (W/ft²)
Automotive facility	0.9
Convention center	1.2
Courthouse	1.2
Cafeterias, fast food establishments[5], restaurants/bars[5]	1.3
Dormitory	1.0
Exercise center,	1.1
Gymnasia[9], assembly spaces[9],	1.1
Health care clinic,	1.0
Hospital, nursing homes, and other Group I.1 and I.4 Occupancies,	1.4
Hotel/motel,	1.0
Hotel, banquet/conference/exhibition hall[3,4],	1.0
Laboratory spaces (all spaces not classified "laboratory" shall meet office and other appropriate categories),	1.8
Laundries,	1.4
Libraries[5]	1.[illegible]
Manufacturing facility,	1.[illegible]
Museum,	1.1
Office buildings, office/administrative areas in facilities of other use types (including but not limited to schools, hospitals, institutions, museums, banks, churches)[5,7,11]	0.95 ((1.0))
Parking garages,	0.4
Penitentiary and other Group I.3 Occupancies,	1.0
Police and fire stations[8],	1.0
Post office,	1.1
Retail[10], retail banking, mall concourses, wholesale stores (pallet rack shelving),	1.5
School buildings (Group E Occupancy only), school classrooms, day care centers,	1.4
Theater, motion picture,	1.4
Theater, performing arts,	1.6
Transportation,	1.0
Warehouses[11], storage areas,	0.5
Workshop,	1.7
Plan Submitted for Common Area Only[7]	
Main floor building lobbies[3] (except mall concourses),	1.4
All building common areas, corridors, toilet facilities and washrooms, elevator lobbies, including Group R.1 and R.4 Occupancies,	0.8

Footnotes For Table 15-1

1. In cases in which a general use and a specific use are listed the specific use shall apply. In cases in which a use is not mentioned specifically the *use category* for a similar use shall be determined by the building official. This determination shall be based upon the most comparable use specified in the table. See Section 1505.4 for exempt areas.
2. The watts per square foot may be increased by 4% per foot of ceiling height above 4' feet unless specifically directed otherwise by subsequent footnotes.
3. The watts per square foot of room may be increased by 4% per foot of ceiling height above 14 feet.
4. For all other spaces such as seating and common areas use the *use category* for assembly.
5. The watts per square foot of room may be increased by 4% per foot of ceiling height above 9 feet.
6. Reserved.
7. For conference rooms and offices less than 150 ft² with full height partitions a Unit Lighting Power Allowance of 1.41 W/ft² may be used.
8. Reserved.
9. For indoor sport tournament courts with adjacent spectator seating over 5000 ft² the *use category* for the court area is 4.0 W/ft².
10. Display window illumination installed within 4 feet of the window provided that the display window is separated from the retail space by walls or at least three quarter height partitions (transparent or opaque) and lighting for free standing display where the lighting moves with the display are exempt.

An additional 0.5 W/ft² of merchandise display luminaires are exempt for individual tenant spaces less than 3000 gross square feet and 0.44 W/ft² for larger tenant spaces provided that they comply with all three of the following:

a. located on ceiling mounted track or directly on or recessed into the ceiling itself (not on the wall),

b. adjustable in both the horizontal and vertical axes (vertical axis only is acceptable for fluorescent and other fixtures with two points of track attachment),

c. fitted with LED tungsten halogen fluorescent ceramic metal halide or other high intensity discharge lamps.

This additional lighting power is allowed only if the lighting is actually installed.

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 *use* 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 4 applies only to the floor area not covered by racks.

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Section 9. The following sections of Reference Standard 49 of the 2006 Washington State Energy Code are amended as follows:

[ ] Envelope.

[ ] 3. Thermal and Solar Characteristics. Glazing area and U factor of the standard building envelope shall be determined by using the Target UA requirements of Equation 13.1 and U factor values in Table 13.1 or 13.4: The glazing solar heat gain coefficient (SHGC) (()) of the standard building shall be the lesser of ' 5 and the SHGC required by Table 13.1 or 13.4 for the vertical or overhead glazing area for the appropriate wall type:

The opaque area U factors of the standard building shall be determined by using the Target UA requirements from Equation 13.1 ((~~including the appropriate mass for walls~~)) except that the walls in the standard design shall be metal stud walls:

The insulation characteristics and glazing area are prescribed assumptions for the standard building for calculating the standard energy consumption:

In the calculation of the proposed energy consumption of the proposed design the envelope characteristics of the proposed design shall be used:

The standard design shall use the lesser of the glazing area of the proposed design or the maximum glazing areas listed in Tables 13.1 or 13.4 for the appropriate use:

The distribution of vertical glazing in the gross wall area of the standard design shall be equal to the distribution of vertical glazing in the proposed design or shall constitute an equal percentage of gross wall area on all sides of the standard building:

The distribution of overhead glazing in the gross roof/ceiling area of the standard design shall be equal to the distribution of overhead glazing in the proposed design:

The distribution of doors in the gross opaque wall area of the standard design shall be identical to the distribution of doors in the proposed design:

[ ] 4. Infiltration. For standard and proposed buildings infiltration assumptions shall be equal:

[ ] [ ] Envelope Mandatory Absorptivity. For the standard building absorptivity assumptions shall be default assumptions for computing the standard energy consumption and default assumptions for computing the proposed energy consumption: The solar absorptivity of opaque elements of the building envelope shall be assumed to be 90% The solar absorptivity of ground surfaces shall be assumed to be 80% (40% reflectivity):

[ ] 6. Shading Devices. No draperies or blinds shall be modeled for the standard or proposed building:

[ ] 7. HVAC Sizing. For standard building and the proposed design shading by permanent structures and terrain shall be taken into account for computing energy consumption whether or not these features are located on the building site: A permanent fixture is one that is likely to remain for the life of the proposed design: Credit may be taken for external shading devices that are part of the proposed design:

[ ] 8. HVAC Mandatory Equipment Efficiency. For the standard building the HVAC system used shall be the system type used in the proposed design: If the proposed HVAC system type does not comply with Sections 1734 through 1739 the standard design system shall comply in all respects with those sections:

EXCEPTION: ((~~When approved by the building official a~~)) A prototype HVAC system may be used ((~~if the proposed design system cannot be modified to comply with Sections 1744 and 1734 through 1739~~)) as a standard design: Use of prototype HVAC systems shall only be permitted for the building types listed below: For mixed use buildings the

floor,space,of,each,building,type,is,allocated,within,the,floor,space,of,the,standard, building:,,The,specifications,and,requirements,for,the,HVAC,systems,of,prototype, buildings,shall,be,those,in,Table,3.3:,

¼,,assembly, –:,,restaurant,

4:,,health0institutional,, 9:,,retail,(mercantile),

3:,,hotel0motel, , 8:,,school,(educational),

7:,,light,manufacturing, 9:,,warehouse,(storage),

5:,,office,(business),

[6 3,,u VAC,Zonel/,,HVAC,zones,for,calculating,the,standard,energy,consumption,and, proposed,energy,consumption,shall,consist,of,at,least,four,perimeter,and,one,interior, zone,per,floor-,with,at,least,one,perimeter,zone,facing,each,orientation:,,The,perimeter, zones,shall,be,½5,feet,in,width,or,one.third,the,narrow,dimension,of,the,building,when, this,dimension,is,between,3' ,and,75,feet,inclusive-,or,half,the,narrow,dimension,of,the, building,when,this,dimension,is,less,than,3' ,feet:,

EXCEPTIONS: 1. Building types such as assembly or warehouse may be modeled as a single zone if there is only one space.

4. Thermally similar zones, such as those facing one orientation on different floors, may be grouped together for the purposes of either the standard or proposed building simulation.

[6 4,,Procelh,Eq j Spb enl,HtSng:,,Process,sensible,and,latent,loads,shall,be,equal,in,calculating both,the,standard,energy,consumption,and,the,proposed,energy,consumption:,,The,designer,shall document,the,installation,of,process,equipment,and,the,size,of,process,loads:

[6 [,,u VAC,Eqj Spb enl,HtSng/,,The,equipment,shall,be,sized,to,include,the,capacity, to,meet,the,process,loads:,,For,calculating,the,proposed,energy,consumption-,actual,air, flow,rates,and,installed,equipment,size,shall,be,used,in,the,simulation:,,Equipment,sizing, in,the,simulation,of,the,proposed,design,shall,correspond,to,the,equipment,intended,to,be, selected,for,the,design,and,the,designer,shall,not,use,equipment,sized,automatically,by, the,simulation,tool:,

, Equipment,sizing,for,the,standard,design,shall,be,based,on,the,same,as,the,proposed, design,or,lesser,sizing,ratio,of,installed,system,capacity,to,the,design,load,for,heating,and, for,cooling:,

,,,Chilled,water,systems,for,the,standard,building,shall,be,modeled,using,a,reciprocating,chiller, for,systems,with,total,cooling,capacities,less,than,¼95,tons-,and,centrifugal,chillers,for,systems, with,cooling,capacities,of,¼05,tons,or,greater:,For,systems,with,cooling,capacities,of,–' ' ,tons,or, more-,the,standard,energy,consumption,shall,be,calculated,using,two,centrifugal,chillers-, lead0lag,controlled:,,Chilled,water,shall,be,assumed,to,be,controlled,at,a,constant,77°F, temperature,rise-,from,77°F,to,5–°F-,operating,at,–5,%,combined,impeller,and,motor,efficiency:,, Condenser,water,pumps,shall,be,sized,using,a,¼ °F,temperature,rise-,operating,at,–' %,combined impeller,and,motor,efficiency:,,The,cooling,tower,shall,be,an,open,circuit-,centrifugal,blower, type,sized,for,the,larger,of,85°F,leaving,water,temperature,or,¼ °F,approach,to,design,wetbulb, temperature:,The,tower,shall,be,controlled,to,provide,a,–5°F,leaving,water,temperature, whenever,weather,conditions,permit-,floating,up,to,design,leaving,water,temperature,at,design, conditions:,

[6 6,s Vnl/,,((~~The,power,of,the,combined,fan,system,per,air,volume,at,design,conditions, (w0fm),of,the,proposed,design,shall,be,equal,to,that,of,the~~))The,standard,design,shall,comply, with,the,following:,

[.6.6.3,s Vn,Hyhieb ,Pol er,LSb SVtSbn:,,Each,HVAC,system,at,fan,system,design,conditions, shall,not,exceed,the,allowable,fan,system,motor,nameplate,hp,°Option,1],or,fan,system,bhp, °Option,4],as,shown,in,the,Fan,Power,Limitation,table:,,This,includes,supply,fans-,return0relief, fans-,exhaust,fans-,and,fan.powered,terminal,units,associated,with,systems,providing,heating,or, cooling,capability:

s Vn,Pol er,LSb SVtSbn

	Limit	Constant Volume	Variable Volume
Option 1: Fan System Motor Nameplate hp	Allowable Nameplate Motor hp	hp≤ CFMS*0.0011	hp≤ CFMS*0.0015
Option 2: Fan System bhp	Allowable Fan System bhp	bhp≤ CFMS * 0.00094 + A	bhp≤ CFMS * 0.0013 + A

where:

fan,brake,horsepower,=,the,horsepower,delivered,to,the,fan's,shaft.,Brake,horsepower,does,not, include,the,mechanical,drive,losses,(belts-,gears-,etc.).

fan,system,design,conditions,=,operating,conditions,that,can,be,expected,to,occur,during,normal, system operation that result in the highest supply airflow rate to conditioned spaces served by the system:

fan,system,bhp,½the,sum,of,the,fan,brake,horsepower,of,all,fans,that,are,required,to,operate,at, fan,system,design,conditions,to,supply,air,from,the,heating,or,cooling,source,to,the,conditioned, space(s),and,return,it,to,the,source,or,exhaust,it,to,the,outdoors:

fan,system,motor,nameplate,hp,= the,sum,of,the,motor,nameplate,horsepower,of,all,fans,that,are, required,to,operate,at,design,conditions,to,supply,air,from,the,heating,or,cooling,source,to,the, conditioned,space(s),and,return,it,to,the,source,or,exhaust,it,to,the,outdoors:

nameplate,horsepower,= the,nominal,motor,horsepower,rating,stamped,on,the,motor,nameplate:

CFMS,=,the,maximum,design,supply,airflow,rate,to,conditioned,spaces,served,by,the,system,in, cubic,feet,per,minute

hp,=,the,maximum,combined,motor,nameplate,horsepower

bhp,=,the,maximum,combined,fan,brake,horsepower

A,=,Sum,of,°PD,x,CFMD,041311

where;

PD,=,Each,applicable,pressure,drop,adjustment,from,Table,17.8,in,in:,w:c:

CFMD,=,the,design,air,flow,through,each,applicable,device,from,Table,17.8,in,cubic,feet, per,minute

Exceptions:

(a),,Hospital,and,laboratory,systems,that,utilize,flow,control,devices,on,exhaust,and0or,return,to,maintain, space pressure relationships necessary for occupant health and safety or environmental control may use variable volume fan power Limitation.

(b). Individual exhaust fans with motor nameplate horsepower of 1 hp or less.

(c),Fans,exhausting,air,from,fume,hoods.,(Note:,If,this,exception,is,taken-,no,related,exhaust,side,credits, shall,be,taken,from,line,table,below,and,the,Fume,Exhaust,Exception,Deduction,shall,be,taken,from,the, table below).

Fan,Power,Limitation,Pressure,Drop,Adjustment

Device	Adjustment
Credits	
Fully ducted return and/or exhaust air systems	0.5 in w.c.
Return and/or exhaust air flow control devices	0.5 in w.c.
Exhaust filters, scrubbers, or other exhaust treatment.	Pressure,drop,of,device,at,fan,system,design,condition
Particulate,filtration,credit:,MERV,9 thru,14	0.5 in w.c.
Particulate filtration credit: MERV 13 thru 15	0.9 in w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure,drop,calculated,at,2x,clean,filter,pressure,drop, at fan system design condition
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition
Heat recovery device	Pressure drop of device at fan system design condition
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design condition
Sound attenuation section	0.15 in w.c.
Deductions	
Fume hood exhaust exception (required,if,1438:4:1,exception,(c),is taken)	.1.0 in w.c.

3.4.4.2 Motor Nameplate Horsepower: For,each,fan-,the,selected,fan,motor,shall,be,no,larger, than,the,first,available,motor,size,greater,than,the,brake,horsepower.,The,fan,brake,horsepower, must be indicated on the design documents to allow for compliance verification by the code official.

Exceptionh

(a),For,fans,less,than,6,bhp-,where,the,first,available,motor,larger,than,the,brake,horsepower,has,a, nameplate,rating,within,50%,of,the,brake,horsepower-,the,next,larger,nameplate,motor,size,may,be, selected.

(b) For fans 6 bhp and larger, where the first available motor larger than the brake horsepower has a nameplate rating within 30% of the brake horsepower, the next larger nameplate motor size may be selected.

[.6.6.[,VVtSWe,Hpeed:,Variable,air,volume,fan,systems,in,the,standard,building,shall,be, variable,speed:

[.8,Conlroh,

[.8.3:,,All,occupied,conditioned,spaces,in,standard,and,proposed,design,buildings,in,all,climates, shall,be,simulated,as,being,both,heated,and,cooled:

, , **EXCEPI vONH,,**1:,,If,a,building,or,portion,of,a,building,is,to,be,provided,with,only, heating,or,cooling-,both,the,standard,building,and,the,proposed,design,shall,be,simulated, using,the,same,assumptions:,

, , 4:,,If,warehouses,are,not,intended,to,be,mechanically,cooled-,both,the,standard,and, proposed,energy,consumption,shall,be,modeled,assuming,no,mechanical,cooling:,

[.8.4:,,Space,temperature,controls,for,the,standard,building,shall,be,set,at,9' °F,for,space,heating. and,95°F,for,space,cooling-,with,a,deadband,in,accordance,with,Section,1714:4:,,The,system, shall,be,OFF,during,off.hours,according,to,the,appropriate,schedule,in,Table,[.4-,except,that,the, heating,system,shall,cycle,ON,if,any,space,should,drop,below,the,night,setback,setting,55°F:,, There,shall,be,no,similar,setpoint,during,the,cooling,season:,,Lesser,deadband,ranges,may,be, used,in,calculating,the,proposed,energy,consumption:,

, , **EXCEPI vONH,,**¼,,Setback,shall,not,be,modeled,in,determining,either,the,standard,or, proposed,energy4:,,If,deadband,controls,are,not,to,be,installed-,the,proposed,energy, consumption,shall,be,calculated,with,both,heating,and,cooling,thermostat,setpoints,set,to, the,same,value,between,9' °F,and,95°F,inclusive-,assumed,to,be,constant,for,the,year:,

[8 [/,,When,providing,for,outdoor,air,ventilation,when,calculating,the,standard,energy, consumption-,controls,shall,be,assumed,to,close,the,outside,air,intake,to,reduce,the,flow,of, outside,air,to,' :' ,cfm,during,5setback",and,5unoccupied",periods:,,Ventilation,using,inside,air, may,still,be,required,to,maintain,scheduled,setback,temperature:,,Outside,air,ventilation-,during, occupied,periods-,shall,be,as,required,by,the,Washington,State,Ventilation,and,Indoor,Air, Quality,Code-,Chapter,5¼13,WAC:,

[8 6/,,If,humidification,is,to,be,used,in,the,proposed,design-,the,same,level,of,humidification, and,system,type,shall,be,used,in,the,standard,building:,

[8 7/,,There,shall,be,no,credit,in,the,proposed,design,for,control,of,parking,garage,ventilation:

I ABLE,[.[,

u VAC,Hyhieb ,hof,Proioiype,Bj SdSngh[3]

Use	System #	Remarks
1. Assembly		
a. Churches (any size)	1	
b. ≤ 50,000 ft² or ≤ 3 floors	1 or 3	Note 4
c. > 50,000 ft² or > 3 floors	3	
4. Health		
a. Nursing Home (any size)	4	
b. ≤ 15,000 ft²	1	
c. > 15,000 ft² and ≤ 50,000 ft²	4	Note 3
d. > 50,000 ft²	5	Note 3,4
3. Hotel0Motel		
a. ≤ ((3)) 6 Stories	2	Note 6
b. > ((3)) 6 Stories	6	Note 7
4. Light Manufacturing	1 or 3	
5. Office		
a. ≤ 40,000 ft²	1	
b. > 40,000 ft² and ((either)) ≤ ((3)) 9 floors ((or ≤ 95,000 ft²))	7	
c. > ((95,000 ft² or >,3)) 9 floors	5	
6. Restaurant	1 or 3	Note 2
7. Retail		
a. ≤ 50,000 ft²	1 or 3	Note 4
b. > 50,000 ft²	4 or 5	Note 4
8. Schools		
a. ≤ 95,000 ft² or ≤ 3 floors	1	
b. > 95,000 ft² or > 3 floors	3	
9. Warehouse		Note 5

Footnote to Table 3-3: The systems and energy types presented in this table are not intended as requirements or recommendations for the proposed design. Floor areas in the table are the total conditioned floor areas for the listed use in the building. The number of floors indicated in the table is the total number of occupied floors for the listed use.

TABLE 3-3 (Continued)
HVAC System Descriptions for Prototype Buildings[1]

HVAC Component	System #1	System #2
System Description	Packaged rooftop single zone, one utit per zone	Packaged terminal air conditioner with space heater or heat pump, heating or cooling unit per zone
Fan system Design Supply Circulation Rate	Note 10	Note 11
Supply Fan Control	Constant volume	Fan cycles with call for heating or cooling
Return Fan Control	NA	NA
Cooling System	Direct expansion air cooled	Direct expansion air cooled
Heating System	Furnace, heat pump ((or electric resistance))	Heat pump with electric resistance auxiliary or air conditioner with space heater
Remarks	Drybulb economizer per Section 1433, heat recovery if required by Section 1436	No economizer, if not required by Section 1433

TABLE 3-3 (Continued)

HVAC System Descriptions for Prototype Buildings[1]

HVAC Component	System #3	System #4
System Description	Air handler per zone with central plant	Packaged rooftop VAV with perimeter reheat and fan. powered terminal units
Fan system Design Supply Circulation Rate	Note 10	Note 10
Supply Fan Control	Constant volume	((~~VAV~~))Variable Air Volume systems with controls per Section 1438 ((~~forward curved centrifugal fan and variable inlet fans~~))
Return Fan Control	Constant volume	((~~VAV~~))Variable Air Volume systems with controls per Section 1738 ((~~forward curved centrifugal fan and variable inlet fans~~))
Cooling System,	Water-cooled Chilled water (Note 12)	Direct expansion air cooled
Heating System	Hot water (Note 13)	Hot water (Note 13) or electric resistance
Remarks	Drybulb economizer per Section 1433, heat recovery if required by Section 1436	Drybulb economizer per Section 1433. Minimum VAV setting per Section 1435 Exception 1, Supply air reset by zone of greatest cooling demand, heat recovery if required by Section 1436

I ABLE 3.3 *ConiShued)

u VAC Hyhieb Dehcr$piSnnh for Proiolype BuSdSngh[1]

HVAC Component	System #5	System #6
System Description	Built.up central VAV with perimeter reheat and fan. powered terminal units	Four.pipe fan coil per zone with central plant
Fan system Design Supply Circulation Rate	Note 10	Note 10
Supply Fan Control	VAV with air-foil centrifugal fan and AC frequency variable speed drive	Fan cycles with call for heating or cooling
Return Fan Control	VAV with air-foil centrifugal fan and AC frequency variable speed drive	NA
Cooling System	Water-cooled Chilled water (Note 12)	Water-cooled Chilled water (Note 12)
Heating System	Hot water (Note 13) or electric resistance	Hot water (Note 13) or electric resistance
Remarks	Drybulb economizer per Section 1433. Minimum VAV setting per Section 1435 Exception 1, Supply air reset by zone of greatest cooling demand, heat recovery if required by Section 1436	No economizer, if not required by Section 1433

Nj b Wered,s oolnoieh,for,I Wie,[.[,

u VAC,Hyhieb ,DehcrSpiSnnh,for,Proioiype,Bj SdSngh,

1. The,systems,and,energy,types,presented,in,this,Table,are,not,intended,as,requirements,or,recommendations,for, the,proposed,design.,
4. For,occupancies,such,as,restaurants-,assembly,and,retail,that,are,part,of,a,mixed,use,building,which-,according, to,Table,[.[-,includes,a,central,chilled,water,plant,(systems,[-,5-,or,6)-,chilled,water,system,type,[,or,5,shall,be, used,as,indicated,in,the,table.,
[. Constant,volume,may,be,used,in,zones,where,pressurization,relationships,must,be,maintained,by,code.,Where, constant,volume,is,used-,the,system,shall,have,heat,recovery,if,required,by,Section,17[6.,VAV,shall,be,used,in, all,other,areas-,in,accordance,with,Sections,17[4,through,17[9.,
7. Provide,run.around,heat,recovery,systems,for,all,fan,systems,with,a,minimum,outside,air,intake,greater,than, 90%.,Recovery,effectiveness,shall,be,0.50.,
5. If,a,warehouse,is,not,intended,to,be,mechanically,cooled-,both,the,standard,and,proposed,designs,shall,be, calculated,assuming,no,mechanical,cooling.,
6. The,system,listed,is,for,guest,rooms,only.,Areas,such,as,public,areas,and,back.of.house,areas,shall,be,served,by, system,7.,Other,areas,such,as,offices,and,retail,shall,be,served,by,systems,listed,in,Table,[.[,for,these, occupancy,types.,
9. The,system,listed,is,for,guest,rooms,only.,Areas,such,as,public,areas,and,back.of.,house,areas,shall,be,served, by,system,5.,Other,areas,such,as,offices,and,retail,shall,be,served,by,systems,listed,in,Table,[.[,for,these, occupancy,types.,
8. Reserved.,
9. Reserved.,
10. Design,supply,air,circulation,rate,shall,be,based,on,a,supply.air,to,room.air,temperature,difference,of,40°F.,A, higher,supply.air,temperature,may,be,used,if,required,to,maintain,a,minimum,circulation,rate,of,7.5,air,changes per,hour,or,15,cfm,per,person,to,each,zone,served,by,the,system-,at,design,conditions.,If,return,fans,are, specified-,they,shall,be,sized,for,the,supply,fan,capacity,less,the,required,minimum,ventilation,with,outside,air-, or,95%,of,the,supply,fan,capacity-,whichever,is,larger.,Except,where,noted-,supply,and,return,fans,shall,be, operated,continuously,during,occupied,hours.,
11. Fan,energy,when,included,in,the,efficiency,rating,of,the,unit,as,defined,in,Section,1711-,need,not,be,modeled, explicitly,for,this,system.,The,fan,shall,cycle,with,calls,for,heating,or,cooling.,
14. Chilled,water,systems,shall,be,modeled,using,a,reciprocating,chiller,for,systems,with,total,cooling,capacities, less,than,195,tons-,and,centrifugal,chillers,for,systems,with,cooling,capacities,of,195,tons,or,greater.,For, systems,with,cooling,capacities,of,600,tons,or,more-,the,standard,design,energy,consumption,shall,be, calculated,using,two,centrifugal,chillers-,lead0lag,controlled.,Chilled,water,shall,be,assumed,to,be,controlled,at, a,constant,77°F.,Chiller,water,pumps,shall,be,sized,using,a,14°F,temperature,rise-,from,77°F,to,56°F-,operating, at,65%,combined,impeller,and,motor,efficiency.,,Condenser,water,pumps,shall,be,sized,using,a,10°F, temperature,rise-,operating,at,60%,combined,impeller,and,motor,efficiency.,The,cooling,tower,shall,be,an,open, circuit-,centrifugal,blower,type,sized,for,the,larger,of,85°F,leaving,water,temperature,or,10°F,approach,to, design,wetbulb,temperature.,The,tower,shall,be,controlled,to,provide,a,65°F,leaving,water,temperature, whenever,weather,conditions,permit-,floating,up,to,design,leaving,water,temperatures,at,design,conditions.,
Chilled,water,supply,temperature,shall,be,reset,in,accordance,with,Section,17[4.4.4.,
1[. Hot,water,system,shall,include,a,natural,draft,fossil,fuel,or,electric,boiler.,The,hot,water,pump,shall,be,sized, based,on,a,[0°F,temperature,drop-,from,180°F,to,150°F-,operating,at,a,combined,impeller,and,motor,efficiency, of,60%.,Hot,water,supply,temperature,shall,be,reset,in,accordance,with,Section,17[4.4.4.,

***,

, Section,¼ :, Sections,4–9–,of,Ordinance,¼41384¼are,repealed:,

, Section,¼4, The,provisions,of,this,ordinance,are,declared,to,be,separate,and,severable:,, The,invalidity,of,any,clause-,sentence-,paragraph-,subdivision-,section,or,portion,of,this, ordinance-,or,the,invalidity,of,the,application,thereof,to,any,person-,owner-,or,circumstance,shall, not,affect,the,validity,of,the,remainder,of,this,ordinance-,or,the,validity,of,its,application,to,other persons-,owners-,or,circumstances:

, Section,¼:,,For,a,period,of,–' ,days,following,the,effective,date,of,this,ordinance-,the, Director,may,also,accept,and,thereafter,approve,applications,that,are,designed,to,comply,with, either,the,requirements,of,this,Ordinance,or,the,requirements,of,Ordinance,¼41384¼,,

, Section,⅛:,,This,ordinance,shall,take,effect,and,be,in,force,thirty,(3'),days,from,and,after,its approval,by,the,Mayor-,but,if,not,approved,and,returned,by,the,Mayor,within,ten,(¼),days,after, presentation-,it,shall,take,effect,as,provided,by,Municipal,Code,Section,¼' 7:' 4' :,

, Passed,by,the,City,Council,the,/ 1st/ ,day,of,/ /Octobet/ / -,4' ' 9-,and,signed,by,me,in, open,session,in,authentication,of,its,passage,this,/ 1st/ ,day,of,/ /Octobet/ / /-,4' ' 9:,

, , , , , , /MICHAEL A/////////////////////////, , , , , , , President,/ / / / / / / / / / of,the,City,Council,

, Approved,by,me,this,/ 11th ,day,of,/ /October/ / /-,4' ' 9:,

, , , , , , , ////////////////////////////////, , , , , , , Gregory,J:,Nickels-,Mayor,

, Filed,by,me,this,/ 11th ,day,of,/ /October/ / -,4' ' 9:,

, , , , , , /JUDITH E PIPPIN//////////////////////, , , , , , City,Clerk,

Date of first publication in the Seattle Daily Journal of Commerce, October 19, 2007.

10/19 (216521)

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DAILY BAR EXAM

Question: Lamont owned a 40-acre farm bordering the city limits of Gridley when the local authorities annexed his land to the city and rezoned it from agricultural to residential use. Nathan, the moving force behind the annexation and rezoning, purchased the 40 acres from Lamont and obtained approval of, filed, and recorded a subdivision map dividing the former farm into 120 quarter-acre lots with two five-acre "city parks." He then announced the opening of "Parkland" and proceeded to sell the quarter-acre lots with houses built by his construction subsidiary.

Parkland included a set of covenants, conditions, and restrictions that had been approved by the local land use planning agencies and filed as part of the subdivision map. Among these was a covenant that all purchasers of the lots promised not to engage in any commercial activity (the zoning applicable to Parkland permitted certain types of businesses).

Nathan's real estate operations sold 100 of the quarter-acre lots over the next two years to individual purchasers; each deed referred to the covenants, conditions, and restrictions filed with the subdivision map. When the last 20 lots -- located adjacent to one of the areas originally designated as a city park -- did not move, Nathan sold the lots and the park in a single 10-acre package to a large national real estate corporation. The deed from Nathan to the corporation omitted any reference to the covenants, conditions, and restrictions. The corporation sold the quarter-acre lots to individual purchasers via deeds also not mentioning the covenants, etc., and then sold the five-acre "park" to a fundamentalist church.

After the sale of the five-acre park, but before the church began construction of its Born Again Worship Center and Christian Education Complex, the city of Gridley passes a resolution designating the two "park" areas in Parkland as the Richard Gridley and Gertrude Gridley Memorial Parks, respectively, and soliciting bids from local landscaping firms to prepare the parks for use by the public. When the church learns of the city's plans, it brings an action to quiet title to the five-acre parcel it purchased from the national corporation. How should the trial court rule?

(A) For the city, since the church had constructive notice that the parcel was to be used for park purposes.

(B) For the church, since the deed by which it purchased the parcel did not contain any reference to the subdivision map that designated the area a "park."

(C) For the city, since Nathan dedicated it and the city accepted the two parcels designated as a "park."

(D) For the church, since the city has committed laches inwaiting so long to develop the park.

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These questions are from the Multistate Bar Examination.
(Answer on preceding page)

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MLS 27113132

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ACROSS
1 Kickoff stand
4 Crow's sound
7 Hat part
11 Thickening agent
13 Whopper
14 Vibes
15 Get clean
16 Oz. or tsp.
17 Whodunit suspect
18 Sees fit
20 Given to back talk
21 Wassail alternative
22 Rapper Lil' —
23 Jargon
26 Fiasco
30 Flightless bird
31 Atom fragment
32 Rowboat need
33 Shouting
36 Mountain chain
38 Genre
39 Place to winter
40 Laud
43 Heifer
46 Explorer Ponce de —
47 Veer
48 Where Anna taught
50 Mrs. Shakespeare
51 Bullfight cheer
52 Beige
53 Makeshift coathanger
54 The "Velvet Fog" Torme
55 JFK lander

DOWN
1 Playing marble
2 Major Hoople's word
3 Relieve
4 Trolley sound
5 Targets
6 Rainy
7 Caribbean islands
8 Wishes undone
9 Pupil's place
10 Queen of Scots
12 Thick-skinned mammal
19 Came down with
20 Family mem.
22 Cowboy — Maynard
23 Alcott girl
24 Caviar
25 Milk qty.
26 Lab or boxer
27 Opposing
28 Not keep up
29 Before
31 Squid's weapon
34 A Barrymore
35 — -advised
36 Race the engine
37 Pastis flavor
39 Wooden rod
40 Gusto
41 Warrior Princess
42 Braxton or Tennille
43 Cotton unit
44 Shaving mishap
45 "Fatha" Hines
47 — Kippur
49 Corsage flower

Answer to Previous Puzzle

	L	O	B		U	N	D		F	A	C	E
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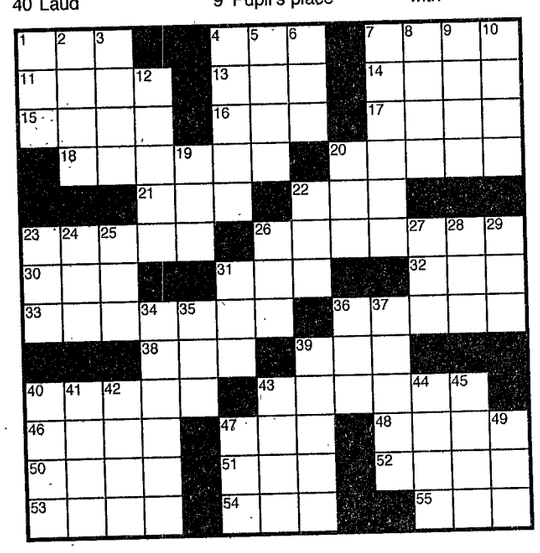

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