RULE-MAKING ORDER
(RCW 34.05.360)

CR-103 (10/1/89)

Agency: Washington State Building Code Council

XXX Permanent Rule
☐ Emergency Rule

(1) Date of adoption: November 9, 1990

(2) Purpose: To adopt a new Chapter 51-13 WAC

(3) Citation of existing rules affected by this order:

Repealed: none
Amended: none
Suspended: none

(4) Authority for adoption:

Statute: RCW 19.27.190
Other Authority: None

(5.1) **PERMANENT RULE ONLY**

Pursuant to notice filed as WSR 90-17-149 on August 22, 1990 (date)

Describe any changes other than editing from proposed to adopted version.

See attached.

(5.2) **EMERGENCY RULE ONLY**

Pursuant to RCW 34.05.350 the agency for good cause finds:

☐ (a) That immediate adoption, amendment, or repeal of a rule is necessary for the preservation of the public health, safety, or general welfare, and that observing the time requirements of notice and opportunity to comment upon adoption of a permanent rule would be contrary to the public interest.

☐ (b) That state or federal law or federal rule or a federal deadline for state receipt of federal funds requires immediate adoption of a rule.

Reasons for this finding:

(5.3) Any other findings required by other provisions of law as precondition to adoption or effectiveness of rule?

☐ Yes XX No If yes, explain:

(6) Effective date of rule:

Permanent Rules	Emergency Rules
☐ 31 days after filing	☐ Immediately
XX Other (specify) July 1, 1991	☐ Later (specify)

*(If less than 31 days after filing, specific finding in 5.3 under RCW 34.05.380(3) is required)

NAME (TYPE OR PRINT)
Marc Sullivan

SIGNATURE

TITLE
Chair

DATE
11/9/90

CODE REVISER USE ONLY

CODE REVISER'S OFFICE
STATE OF WASHINGTON
FILED

DEC 18 1990

TIME: 2:32

WSR 91-01-102

Attachment to CR-103

Changes to the Ventilation and Indoor Air Quality Code

1. **Added a New Section 502 to the Ventilation and Indoor Air Quality Code:**

Change: Statewide radon testing requirements for new residential buildings added to code requirements by recommendation of the Energy Committee.

Reasons: The Washington State Department of Health, United States Environmental Protection Agency, Washington State Energy Office, and private radon mitigating companies testified that the only way to determine if radon is present, is to test every newly constructed house and all first floor multi-family units. They also emphasized that in lieu of a statewide radon construction standard for new residential units, a statewide monitoring requirement is the only prudent option. Testifiers stressed that monitoring is only the first but a vital step in reducing radon levels in homes.

The Bonneville Power Administration (BPA) testified that if the radon testing provisions were not included in the code the provisions of the BPA Record of Decision on Indoor Air Quality would not be satisfied. Failure to satisfy those provisions prohibits the Bonneville Power Administration from making incentive and other payments under the Energy Efficient Residential Construction Program.

2. **A New Phrase was Added to Section 302.6.2:**

Change: Outdoor air inlets required to be tested by a nationally recognized standard or approved agency.

Reasons: Testimony was given regarding a concern that devices may be installed that were never intended to be used as outdoor air inlets and may cause structural or cosmetic damage to the house. All devices manufactured as outdoor air inlets have a cubic foot per minute flow rating and are accompanied by installation instructions.

3. **Section 303.1.2b Amended:**

Change: Outdoor air inlet ducts were changed from 4 to 6 inches in diameter, and the outdoor air inlet ducts shall have a damper to regulate the air-flow between 0.35 and 0.5 air changes per hour under normal operating conditions.

Reasons: Testimony was given that a 4-inch diameter inlet duct may not provide a sufficient amount of air to satisfy the 0.35 air change per hour requirement in all new construction. The damper is installed to maintain an air change rate between 0.35 and 0.5. This is necessary to prevent over ventilation of the home which would cause drafts and waste energy.

4. **Table 3-4 Amended:**

Change: Table 3-4 has been changed to reflect ASHRAE Standard 62-1989.

Reasons: Testimony was given that the ASHRAE Standard 63-1973 is out of print and does not reflect current practices in indoor air quality. This is the first step in meeting the legislative mandate of Chapter 315, Session Laws of 1989.

Chapter 51-13 WAC

VENTILATION AND INDOOR AIR QUALITY

NEW SECTION

WAC 51-13-100 CHAPTER 1 ADMINISTRATION AND ENFORCEMENT

NEW SECTION

WAC 51-13-101 SCOPE AND GENERAL REQUIREMENTS 101.1 Title: This Code shall be known as the Washington State Ventilation and Indoor Air Quality Code. It is herein referred to as "this Code".

101.2 Intent: The purpose of this Code is to provide minimum standards for the design and installation of mechanical ventilation systems, the selection of structural materials used within the conditioned space, and the construction of radon mitigation systems for new construction.

It is intended that these provisions provide flexibility to permit the use of innovative approaches and techniques. These provisions are structured to permit compliance with the intent of this Code by demonstration of performance through on site testing or through engineered design. This Code is not intended to abridge any safety or health requirements required under any other applicable codes or ordinances.

101.3 Scope: This Code sets forth minimum requirements for ventilation in all occupancies, including the design of new construction.

101.3.1 Application to Existing Buildings

101.3.1.1 Additions to Existing Buildings: Additions to existing buildings or structures may be made without making the entire building comply, provided that the new addition shall conform to the provisions of this Code.

Exceptions

1. Additions that do not include kitchens, bathrooms, water closets, indoor swimming pools, spas, and other areas where excess water vapors are produced and are less than five hundred square feet are exempt from Chapter 3.

2. Additions or alterations to existing buildings which do not require the construction of foundations, crawlspaces, slabs, or basements shall not be required to meet the requirements for radon protection.

101.3.1.2 Alterations and Repairs: All alterations and repairs may be made to existing or moved buildings built or permitted prior to the enforcement of this Code without making the entire building comply with the provisions of this Code, provided the alterations or repairs comply with this Code.

101.3.1.3 Historic Buildings: Historic buildings are exempt from this Code only to the extent necessary to preserve those features essential to their historical appearance or function.

NEW SECTION

WAC 51-13-102 ALTERNATE SYSTEMS AND MATERIALS METHOD OF DESIGN, CONSTRUCTION AND INSTALLATION

102.1 Alternate Materials and Methods of Construction: The provisions of this Code are not intended to prevent the use of any material, method of construction, design or ventilation system not specifically prescribed herein, provided that such construction, design, or ventilation system has been approved by the building official.

The building official may approve any such alternate, provided that the proposed design is satisfactory and complies with the provisions of this Code and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in this Code in suitability, effectiveness, safety, and indoor air quality.

The building official may require plans and specifications to be submitted in support of an application for a building permit. Plans and specifications may be required by the building official to be stamped and authenticated by an engineer or architect licensed by the state to practice as such.

NEW SECTION

WAC 51-13-103 PLANS AND SPECIFICATIONS

103.1 General: With each application for a building permit, and when required by the building official, plans and specifications demonstrating compliance with this Code shall be submitted. The building official may require that plans and specifications be stamped and authenticated by an engineer, architect, or other qualified professional licensed to practice in the state.

103.2 Details: The plans and specifications shall show in sufficient detail pertinent data and features of the materials, equipment and systems as herein governed, including, but not limited to: design criteria, structural panel materials, size and type of apparatus and equipment, systems and equipment controls, provisions for combustion air to fuel burning appliances, and other pertinent data to indicate conformance with the requirements of this Code.

NEW SECTION

WAC 51-13-104 ENFORCEMENT AND INSPECTIONS

104.1 General: Pertinent data and features of the building and the materials, equipment and/or systems as herein governed shall be subject to inspection by the building official.

104.2 Approvals Required: No materials, equipment, systems, or portions thereof, shall be concealed without first obtaining approval from the building official.

104.3 Tests: Whenever there is insufficient evidence of compliance with any of the provisions in this Code or evidence that any material or construction does not conform to the requirements of this

Code, the building official may require tests as proof of compliance to be made at no expense to the local jurisdiction.

Test methods shall be as specified by this Code or by other recognized test standards. If there are no recognized or accepted test methods for the proposed alternate, the building official shall determine test procedures.

104.4 Final Inspection: All materials, equipment, and systems herein governed shall be inspected and approved before the building shall be deemed ready for occupancy.

NEW SECTION

WAC 51-13-105 VALIDITY

105.1 Validity: If a section, subsection, sentence, clause, or phrase of this Code is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portion of this Code.

NEW SECTION

WAC 51-13-106 CONFLICTS WITH OTHER CODES

106.1 Conflicts with Other Codes: In addition to the requirements of this Code, buildings must conform to the provisions of the State Building Code (Chapter 19.27 RCW and Chapter 51-16 WAC). In case of conflicts between the Uniform Building, Uniform Plumbing, Uniform Mechanical, and Uniform Fire Codes as adopted and amended in Chapter 51-16 Washington Administrative Code, the provisions of Chapter 51-13 shall govern. This Code is not intended to abridge any safety or health requirements under any other applicable codes or ordinances.

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.

Wherever in this Code reference is made to the appendix, the provisions of the appendix shall not apply unless specifically adopted.

106.2 Authority: Local legislative authorities are authorized and directed to enforce this Code. Local legislative authorities are authorized to promulgate, adopt, and issue those rules and regulations necessary for the effective and efficient administration of this Code.

NEW SECTION

WAC 51-13-107 VIOLATIONS

107.1 Violations: It shall be unlawful for any persons, 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 in violation of any of the provisions of this Code.

NEW SECTION

WAC 51-13-108 LIABILITY

108.1 Liability: Nothing contained in this Code is intended to be nor shall be construed to create nor form the basis for any liability on the part of any city or county 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.

NEW SECTION

WAC 51-13-200 DEFINITIONS

NEW SECTION

WAC 51-13-201 GENERAL

201.1 General: For the purposes of this Code, certain terms, phrases, words, and their derivatives shall be construed as specified in this section. Words used is the singular include the plural and the plural, the singular. Words used in the masculine gender include the feminine and feminine, the masculine.

Where terms are not defined in this section, the definitions shall be taken from Chapter 4 of the Uniform Building Code.

Where terms are not defined in either this section or Chapter 4 of the Uniform Building Code, they shall have their ordinary accepted meanings within the context with which they are used. Webster's Third International Dictionary of the English Language, Unabridged, copyrighted 1981, shall be considered as providing ordinarily accepted meanings.

NEW SECTION

WAC 51-13-202 DEFINITIONS

Addition: An extension or increase in floor area or height of a building or structure.

AGGREGATE: Crushed stone, stone, or other inert material, or combinations thereof having hard, strong, durable pieces.

AIR BARRIER: A continuous material or system of materials utilized for the purpose of minimizing the movement of air across a defined boundary, and capable of withstanding the maximum pressure developed across it, without failing by becoming significantly more leaky.

AIR, EXHAUST: Air removed from a space and not reused therein.

AIR, OUTDOOR: Air taken from the external atmosphere and, therefore, not previously circulated through the HVAC system or the conditioned space.

AIR, SUPPLY: That air delivered to the conditioned space and used for ventilation, heating, cooling, humidification, or dehumidification.

AIR, TRANSFER: The movement of indoor air from one space to another.

AIR, VENTILATION: That portion of supply air that is outdoor air plus any recirculated air that has been treated for the purpose of maintaining acceptable indoor air quality.

AMCA: Air Movement and Control Association, Inc.

APPROVED: As to material and types of construction, refers to approved by the building official as the result of investigation and tests conducted by him, or by reason of accepted principles or tests by recognized authorities, technical or scientific organizations.

ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc.

AUTOMATIC: Self-acting, operating by its own mechanism when actuated by some impersonal influence, as for example, a change in current strength, pressure, temperature, or mechanical configuration.

BACK-DRAFT DAMPER: A damper installed to restrict introduction of unconditioned air from an unconditioned space to a conditioned space.

BAROMETRIC DAMPER: Shall be any listed non-manual device that freely allows the flow of air in one direction, but does not allow conditioned air to escape. Any installed combustion air damper shall meet the installation requirements of the manufacturer.

BUILDING OFFICIAL: The officer or other designated authority charged with the administration and enforcement of this Code, or his duly authorized representative.

CERTIFIED LOCAL GOVERNMENT: The local government has been certified by the state historical preservation officer as having established its own historic preservation commission and a program meeting federal and state standards.

CFM: Cubic feet per minute.

CONDITIONED FLOOR AREA: The floor area within the conditioned space.

CONDITIONED SPACE: That part of a building that is heated or cooled or both for the comfort of occupants.

DEHUMIDISTAT: An automatic control device which measures changes in humidity and controls a device(s) for maintaining a maximum specified humidity range or level.

EXFILTRATION: The uncontrolled outward air leakage through cracks and concealed spaces in any building element and around sole plates, wall outlets, duct systems, windows, and doors of a building, causes by the pressure effect of wind and/or the effect of differences in the indoor and outdoor air density.

GRAVEL: A type of aggregate.

HABITABLE SPACE (ROOM): Space in a structure for living, sleeping, eating, or cooking. Bathrooms, toilet compartments, closets, halls, storage, or utility space and similar areas, are not considered habitable space. For the purpose of this Code, a single habitable space may consist of adjoining rooms when one half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room or twenty five square feet, whichever is greater.

HEAT RECOVERY VENTILATION SYSTEM: A device or combination of devices applied to provide the outdoor air for ventilation in which energy is transferred between the intake and exhaust airstream.

HISTORIC BUILDINGS: Any structure, collection of structures, and their associated sites, deemed of importance to the history, architecture, or culture of an area by an appropriate local, state, or federal government jurisdiction. Including shall be structures on official national, state, or local listings such as the National Register of Historic Places, the State Register of Historic Places, state points of historical interest, and registers or listings of historical or architecturally significant sites, places, historic districts, or landmarks as adopted by a certified local government.

HUMIDISTAT: An automatic control device which measures changes in humidity and controls a device(s) for maintaining a minimum specified humidity range or level.

HVAC: Heating, ventilating, and air conditioning.

HVI: Home Ventilating Institute of America, Inc.

INFILTRATION: The uncontrolled inward air leakage through cracks and concealed spaces in any building element and around sole plates, wall outlets, duct systems, windows, and doors of a building, caused by the pressure effect of wind and/or the effect of differences in the indoor and outdoor air density.

"J" DEFINITIONS: (Reserved)

"K" DEFINITIONS: (Reserved)

"L" DEFINITIONS: (Reserved)

MANUAL: Capable of being operated by human intervention.

MITIGATE: To design, select, apply, and install systems, materials, and processes that reduce radon concentrations in the indoor air of a building, and/or prevent entry of radon into the indoor air of a building, so that the average indoor radon concentration is reduced to an acceptable level.

NEW CONSTRUCTION: Any building, addition or change in occupancy permitted on or after the effective date of this Code.

"O" DEFINITIONS: (Reserved)

PICOCURIE, pCi: A measure of radioactive activity equal to one trillion of a curie. A curie is the amount of any radionuclide that undergoes thirty seven billion nuclear disintegrations per second, hence a picocurie is .037 nuclear disintegrations per second.

PICOCURIE PER LITER, pCi/L: A common unit of measurement of the concentration of radioactivity in a gas. One pCi/L corresponds to 2.22 radioactive disintegrations per minute per liter of air.

"Q" DEFINITIONS: (Reserved)

R VALUE: (See THERMAL RESISTANCE (R))

READILY ACCESSIBLE: Readily accessible means capable of being reached safely and quickly for operation, repair, or inspections, without requiring those to whom ready access is requisite to climb over or remove obstacles, or to resort to the use of portable access equipment.

SOIL DEPRESSURIZATION SYSTEM (SDS): A radon control technique that depressurizes the space below a concrete slab or other soil gas retarder relative to the space above it. The purpose of SDS is to maintain a slightly lower pressure in the soil gas under the slab or other soil gas retarder, compared to the indoor pressure above it, to ensure that flows are from the indoors to the soil, thus preventing mass transport of radon contaminated soil gas to the indoor air.

SOIL GAS RETARDER MEMBRANE: A flexible sheet material placed between the soil and the indoor air for the purpose of reducing the flow of soil gas into the building.

SOLID FUEL BURNING APPLIANCE: Any factory-built or site built appliance designed to provide heat for a structure by burning solid fuels.

SOURCE SPECIFIC VENTILATION SYSTEM: A mechanical ventilation system including all fans, controls, and ducting, which is dedicated to exhausting contaminant-laden air to the exterior of the building from the room or space in which the contaminant is generated.

SYSTEM: A combination of equipment and/or controls, accessories, interconnecting means, and terminal elements by which air is transferred.

TERMINAL ELEMENT: The means by which the transferred air from a system is finally delivered; i.e., registers, diffusers, through-the-wall vents, roof caps, etc.

THERMAL RESISTANCE (R): The resistance of a material to heat flow, measured as the inverse of heat flow per unit area, per unit time, per unit temperature difference across the thickness of material considered. In this Code, R has units of sq.ft./hr./°F/Btu.

THERMOSTAT: An instrument which measures changes in temperature and control device(s) for maintaining a desired temperature.

UNCONDITIONED SPACE: (See CONDITIONED SPACE)

VENTILATION: The process of supplying and removing air by natural or mechanical means to and from any space. Such air may or may not be conditioned.

VENTILATION, MECHANICAL: The introduction and distribution of outdoor air and the removal of indoor air by mechanical means.

VENTILATION, NATURAL: Ventilation other than by mechanical means.

WHOLE HOUSE VENTILATION SYSTEM: A mechanical ventilation system, including fans, controls, and ducts, which replaces, by direct or indirect means, air from the habitable rooms with outdoor air.

WOOD STOVE: (See SOLID FUEL BURNING APPLIANCE)

"X" DEFINITIONS: (Reserved)

"Y" DEFINITIONS: (Reserved)

ZONE: A space or group of spaces within a building with heating and/or cooling requirements sufficiently similar so that comfort conditions can be maintained throughout by a single controlling device.

NEW SECTION

WAC 51-13-300 CHAPTER 3 DESIGN CONDITIONS

NEW SECTION

WAC 51-13-301 DESIGN CRITERIA

301.1 General: The criteria of this chapter establish the design conditions upon which the minimum ventilation systems are to be based for all occupancies.

NEW SECTION

WAC 51-13-302 MINIMUM VENTILATION CRITERIA FOR ALL GROUP R OCCUPANCIES

302.1 General: This section shall apply to all Group R occupancies as defined by the Washington State Building Code. Compliance with this section shall be demonstrated through engineering calculations or performance testing. Documentation of calculations shall be submitted to the building official where required. Performance testing shall be conducted in accordance with recognized test methods.

302.2 Minimum Ventilation Performance: Each dwelling unit or guest room shall be equipped with source specific and whole house ventilation systems designed and installed to satisfy the ventilation requirements of this chapter.

Exception: All public corridors shall meet the ventilation requirements in section 1205 (c) of the Uniform Building Code.

302.2.1 Source Specific Ventilation: Source specific exhaust ventilation shall be required in each kitchen, bathroom, water closet, laundry facility, indoor swimming pool, spa, and other rooms where excess water vapor or cooking odor is produced.

The minimum source specific ventilation effective exhaust capacity shall be not less than levels specified in Table 3-1.

302.2.2 Whole House Ventilation Systems: Each dwelling unit shall be equipped with a whole house ventilation system which shall be capable of providing at least 0.35 air changes per hour, but not less than fifteen cubic feet per minute per bedroom plus an additional fifteen cubic feet per minute. Whole house ventilation systems shall be designed to limit ventilation to a level no greater than 0.5 air changes per hour under normal operation conditions. Whole house ventilation systems shall supply outdoor air to all habitable rooms through individual outdoor air inlets, forced-air heating system, ducting or equivalent means. Doors and operable lites in windows are deemed not to meet the outdoor air supply intake requirements.

302.3 Controls: All ventilation system controls shall be readily accessible. Controls for whole house ventilation systems shall be capable of operating the ventilation system without energizing other energy-consuming appliances.

Exception: Continuously operated whole house ventilation systems switch shall not be readily accessible by the occupant.

302.3.1 Source Specific Ventilation Systems: Source specific ventilation systems shall be controlled by manual switches, dehumidistats, timers, or other approved means.

302.3.2 Intermittently Operated Whole House Ventilation Systems: The intermittently operated whole house ventilation systems shall be constructed to have the capability for continuous operation, and shall have a manual control and an automatic control, such as a clock timer.

302.4 Noise: Whole house fans located four feet or less from the interior grille shall have a sone rating of 1.5 or less measured at 0.1 inches water gauge. Remotely mounted fans shall be acoustically isolated from the structural elements of the building and from attached duct work using insulated flexible duct or other approved material.

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

302.5 Ventilation Ducts: All ducts shall terminate outside the building. Exhaust ducts in systems which are designed to operate intermittently shall be equipped with back-draft dampers. All exhaust ducts in unconditioned spaces shall be insulated to a minimum of R-4. All supply ducts in the conditioned space shall be insulated to a minimum of R-4.

302.6 Outdoor Air: A mechanical system shall supply outdoor air as required in section 302.2.2. The mechanical system may consist of exhaust fans, supply fans, or both.

302.6.1 Outdoor Air Inlets: Inlets shall be screened or otherwise protected from entry by insects, leaves, or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

- Closer than ten feet from an appliance vent outlet, unless such vent outlet is three feet above the outdoor air inlet.
- Where it will pick up objectionable odors, fumes, or flammable vapors.
- A hazardous or unsanitary location.
- A room or space having any fuel-burning appliances therein.

- Closer than ten feet from a vent opening of a plumbing drainage system unless the vent opening is at least three feet above the air inlet.

- Attic, crawl spaces, or garages.

302.6.2 Individual Room Outdoor Air Inlets: Individual room outdoor air inlets shall have a controllable and secure opening and be capable of a total opening area of not less than four square inches and tested by a nationally recognized standard or approved agency and located to avoid drafts.

302.6.3 Ventilation Integrated with Forced-Air Systems: The outdoor air connection to the return air stream shall be located to prevent thermal shock to the heat exchanger.

302.6.4 Distribution: Outdoor air shall be distributed to each habitable room by individual inlets, separate duct systems, or a forced-air system. Where outdoor air supplies are separated from exhaust points by doors, provisions shall be made to ensure air flow by undercutting doors, installation of grilles, transoms, or similar means where permitted by the Uniform Building Code.

NEW SECTION

WAC 51-13-303 MECHANICAL VENTILATION CRITERIA AND MINIMUM VENTILATION PRESCRIPTIVE REQUIREMENTS FOR ALL GROUP R OCCUPANCIES

303.1 General: This section establishes minimum prescriptive design requirements for intermittently operated systems. Continuously operated systems shall comply with section 302. System characteristics not addressed in the following sections shall comply with section 302. A system which meets the requirements of this section shall be deemed to satisfy the requirements of this chapter.

303.1.1 Source Specific: Exhaust fans providing source specific ventilation shall have a minimum fan flow rating not less than fifty cfm at 0.25 inches water gauge for bathrooms, laundries, or similar rooms and one hundred cfm at 0.25 inches water gauge for kitchens. Manufacturers' fan flow ratings shall be determined as per HVI 916 (July 1989) or AMCA 210.

303.1.2 Whole House: Whole house ventilation systems may consist of whole house exhaust, integration with forced-air systems or dedicated heat recovery ventilation systems. Whole house exhaust systems shall meet the following requirements:

a) Exhaust fans providing whole house ventilation shall have a flow rating at 0.25 inches water gauge as specified in Table 3-2. Manufacturer's fan flow ratings shall be determined as per HVI 916 (July 1989) or AMCA 210. Table 3-2 shall not be used for dwelling units with more than four bedrooms.

b) Integrated forced-air ventilation systems shall have a six inch diameter or equivalent outdoor air inlet duct connecting a terminal element on the outside of the building to the return plenum of the forced-air system. The outdoor air inlet duct shall be equipped with a damper, or other device that regulates air flow to a minimum of 0.35 air changes per hour but not greater than the 0.50 air changes per hour under normal operating conditions.

c) Heat recovery ventilation systems: All duct work in heat recovery ventilation systems shall be not less than six inch diameter.

Balancing dampers shall be installed on the inlet and exhaust side. Flow measurement grids shall be installed on the supply and return. System minimum flow rating shall be not less than that specified in Table 3-2. Maximum flow rates in Table 3-2 do not apply to heat recovery ventilation systems.

303.2 Source Specific and Whole House Exhaust Ducts: Exhaust ducts shall meet all requirements of section 302.5. Duct diameter length and number of elbows shall not be less than four inches and duct length shall not exceed levels specified in Table 3-3. Terminal elements shall have at least the equivalent net free area of the duct work.

NEW SECTION

WAC 51-13-304 MECHANICAL VENTILATION CRITERIA AND MINIMUM VENTILATION PERFORMANCE FOR ALL OTHER OCCUPANCIES

304.1 Ventilation: The outdoor air quantities specified in Table 3-4 for each type of occupancy shall be used as the minimum for design. In no case shall the outdoor air quantities be less than five cfm per person.

The minimum requirements for operable area to provide natural ventilation are specified in the Uniform Building Code (UBC) as adopted by the state of Washington.

Where a mechanical ventilation system is installed, the mechanical ventilation system shall be capable of supplying ventilation air to each zone with the minimum outdoor air quantities specified in Table 3-4 based upon the greater of the occupant densities in Table 3-4 or the design occupant density. The outdoor air shall be ducted directly to every air handling unit in each zone not provided with sufficient operable area for natural ventilation. The maximum outdoor air quantities used as the basis for calculating the heating and cooling design loads shall not exceed three times the quantities specified in Table 3-4.

In all parking garages, other than open parking garages as defined in UBC 709 (b), used for storing or handling of automobiles operating under their own power and on all loading platforms in bus terminals, ventilation shall be provided at 1.5 cfm per square foot of gross floor area. The building official may approve an alternate ventilation system designed to exhaust a minimum fourteen thousand cfm for each operating vehicle. Such system shall be based on the anticipated instantaneous movement rate of vehicles but not less than 2.5 percent (or one vehicle) of the garage capacity. Automatic carbon monoxide sensing systems may be submitted for approval.

In all buildings used for the repair of automobiles, each repair stall shall be equipped with an exhaust extension duct, extending to the outside of the building, which if over ten feet in length, shall mechanically exhaust three hundred cfm. Connecting offices and waiting rooms shall be supplied with conditioned air under positive pressure.

Combustion air requirements shall conform to the requirements of Chapter 6 of the UMC.

Mechanical refrigerating equipment and rooms storing refrigerates shall conform to the requirements of Chapter 15 of the UMC.

Exception: If outdoor air quantities other than those specified in Table 3-4 are used or required because of special occupancy or process requirements, source control of air contamination, health, and safety or other standards, the required outdoor air quantities shall be used as the basis for calculating the heating and cooling design loads.

MINIMUM SOURCE SPECIFIC VENTILATION CAPACITY REQUIREMENTS
TABLE 3-1

	Bathrooms	Kitchens
Intermittently operating	50 cfm	100 cfm
Continuous operation	20 cfm	25 cfm

WHOLE HOUSE EXHAUST FAN PRESCRIPTIVE REQUIREMENTS
TABLE 3-2

Bedrooms	CFM Minimum	CFM Maximum
2 or less	50	75
3	80	120
4	100	150

PRESCRIPTIVE EXHAUST DUCT SIZING
TABLE 3-3

Fan Tested CFM @0.25 W.G.	Maximum Flex Diameter	Maximum Length Feet	Maximum Smooth Diameter	Maximum Length Feet	Maximum Elbows*
50	4 inch	25	4 inch	70	3
50	5 inch	90	5 inch	100	3
50	6 inch	Over 100	6 inch	Over 100	3
80	4 inch	Not Allowed	4 inch	20	3
80	5 inch	15	5 inch	100	3
80	6 inch	90	6 inch	Over 100	3
100	5 inch	Not Allowed	5 inch	50	3
100	6 inch	45	6 inch	Over 100	3
125	6 inch	15	6 inch	Over 100	3
125	7 inch	70	7 inch	Over 100	3

*For each additional elbow subtract 10 feet from length.

TABLE 3-4
OUTDOOR AIR REQUIREMENTS FOR VENTILATION[1]
COMMERCIAL FACILITIES

Application	Estimated Maximum[2] Occupancy P/1000 ft^2 or 100 m^2	Outdoor Air Requirements cfm/person
Dry Cleaners, Laundries[3]		
Commercial laundry	10	25
Commercial dry cleaner	30	30
Storage, pick up	30	35
Coin-operated laundries	20	15
Coin-operated dry cleaner	20	15
Food and Beverage Service		
Dinning rooms	70	20
Cafeteria, fast food	100	20
Bars, cocktail lounges[4]	100	30
Kitchens(cooking)[23]	20	15
Garages, Repair, Service Stations		
Enclosed parking garage[5]		1.50 cfm/ft.sq.
Auto repair rooms		1.50 cfm/ft.sq.
Hotels, Motels, Resorts, Domitories[6]		
Bedrooms		30 cfm/ft.sq.
Living Rooms		30 cfm/ft.sq.
Bath[7]		35 cfm/ft.sq.
Lobbies	30	15
Conference rooms	50	20
Assembly rooms	120	15
Dormitory sleeping area[8]	20	15
Gambling casinos[4]	120	30
Offices		
Office space[9]	7	20
Reception area	60	15
Telecommunication centers and data entry areas	60	20
Conference rooms	50	20
Public Spaces		
Corridors and utilities		0.005 cfm/ft.sq.
Public restroom, cfm/wc or urinal[10]		50
Lockers and dressing rooms		.05 cfm/ft.sq.
Smoking lounge[11]	70	60
Elevators[12]		1.0 cfm/ft.sq.

TABLE 3-4 Cont.
OUTDOOR AIR REQUIREMENTS FOR VENTILATION[1]
COMMERCIAL FACILITIES

Application	Estimated Maximum[2] Occupancy P/1000 ft^2 or 100 m^2	Outdoor Air Requirements cfm/person
Retail Stores, Sales Floors, and Show Room Floors		
Basement and street	30	0.3 cfm/ft.sq.
Upper floors	20	0.2 cfm/ft.sq.
Storage rooms	15	0.15 cfm/ft.sq.
Dressing rooms		0.20 cfm/ft.sq.
Malls and arcades	20	0.20 cfm/ft.sq.
Shipping and receiving	10	0.15 cfm/ft.sq.
Warehouses	5	0.05 cfm/ft.sq.
Smoking lounge[11]	70	60
Specialty Shops		
Barber	25	15
Beauty	25	25
Reducing salons	20	15
Florists[13]	8	15
Clothiers, furniture		.30 cfm/ft.sq.
Hardware, drugs, fabric	8	15
Supermarkets	8	15
Pet shops		1.00 cfm/ft.sq.
Sports and Amusement[14]		
Spectator areas	150	15
Game rooms	70	25
Ice arenas(playing areas)		0.50 cfm/ft.sq
Swimming Pools(pool and deck area)[15]		0.50 cfm/ft.sq.
Playing floor(gymnasium)	30	20
Ballrooms and discos	100	25
Bowling alleys(seating areas)	70	25
Theaters[16]		
Ticket booths	60	20
Lobbies	150	20
Auditorium	150	20
Stages, studios	70	15
Transportation[17]		
Waiting rooms	100	15
Platforms	100	15
Vehicles	150	15
Workrooms		
Meat processing[18]	10	15

TABLE 3-4 Cont.
OUTDOOR AIR REQUIREMENTS FOR VENTILATION[1]
COMMERCIAL FACILITIES

Application	Estimated Maximum[2] Occupancy P/1000 ft^2 or 100 m^2	Outdoor Air Requirements cfm/person
Photo studios	10	15
Darkrooms	10	0.50 cfm/ft.sq.
Pharmacy	20	15
Bank vaults	5	15
Duplicating, printing[19]		0.50 cfm/ft.sq.
INSTITUTIONAL FACILITIES		
Education		
Classroom	50	15
Laboratories[20]	30	20
Training shop	30	20
Music rooms	50	15
Libraries	20	15
Locker rooms		0.50 cfm/ft.sq.
Corridors		0.10 cfm/ft.sq.
Auditoriums	150	15
Smoking lounges[11]	70	60
Hospitals, Nursing and Convalescent Homes		
Patient rooms[21]	10	25
Medical procedure	20	15
Operating rooms	20	30
Recovery and ICU	20	15
Autopsy rooms[22]		0.50 cfm/ft.sq.
Physical Therapy	20	15
Correctional Facilities		
Cells	20	20
Dining halls	100	15
Guard station	40	15

1. Derived from ASHRAE Standard 62-1989.
2. Net occupiable space
3. Dry-cleaning process may require more air.
4. Supplementary smoke-removal equipment may be required.
5. Distribution among people must consider worker location and concentration of running engine; stands where engine are run must incorporate systems for positive engine exhaust withdrawal. Contaminant sensors may be used to control ventilation.
6. Independent of room size.

7. Installed capacity for intermittent use.
8. See also food and beverage service, merchandising, barber and beauty shops, garages.
9. Some office equipment may require local exhaust.
10. Mechanical exhaust with no recirculation is recommended.
11. Normally supplied by transfer air, local mechanical exhaust; with no recirculation recommended.
12. Normally supplied by transfer air.
13. Ventilation to optimize plant growth may dictate requirements.
14. When internal combustion engines are operated for maintenance of playing surfaces, increased ventilation rates may be required.
15. Higher values may be required for humidity control.
16. Special ventilation will be needed to eliminate special stage effects.
17. Ventilation within vehicles may require special considerations.
18. Spaces maintained at low temperatures(-10°F. to +50°F.) are not covered by these requirements unless the occupancy s continuous. Ventilation from adjoining spaces is permissible. When the occupancy is intermittent, infiltration will normally exceed the ventilation requirements.
19. Installed equipment must incorporate positive exhaust and control of undesirable contaminants.
20. Special contamination control systems may be required for processes or functions including laboratory animal occupancy.
21. Special requirements or codes and pressure relationships may determine minimum ventilation rates and filter efficiency. Procedures generating contaminants may require higher rates.
22. Air shall not be recirculated into other spaces.
23. Makeup air for hood exhaust may require more ventilating air.

NEW SECTION

WAC 51-13-400 CHAPTER 4 INDOOR AIR QUALITY

NEW SECTION

WAC 51-13-401 POLLUTANT SOURCE CONTROL

401.1 Formaldehyde Reduction Measures: All structural panel components of the house such as softwood plywood, particle board, wafer board, and oriented strand board shall be identified as "EXPOSURE 1", "EXTERIOR" or "HUD-APPROVED".

NEW SECTION

WAC 51-13-402 SOLID FUEL BURNING APPLIANCES AND FIREPLACES

402.1 General: Solid fuel burning appliances and fireplaces shall satisfy one of the following criteria.

402.2 Solid Fuel Burning Appliances: Solid fuel burning appliances shall be provided with the following:

a) Tight fitting glass or metal doors.

b) An outside source of combustion air directly connected to the fire box, or tested and listed to the performance requirements of the carbon monoxide test required by the Department of Housing and Urban Development Mobile Home Construction and Safety Standards.

Exception: If existing construction prohibits the introduction of outside combustion air directly to the appliance or the solid fuel burning appliance is part of the central heating system and is installed in an unconditioned space, combustion air may be supplied to the room in which the solid fuel burning appliance is located in lieu of direct ducting. The combustion air terminus shall be located as close to the solid fuel burning appliance as possible and shall be provided with a barometric damper or equivalent. The combustion air source shall be no less than four inches in diameter or the equivalent in area or as approved.

402.3 Fireplaces: Fireplaces shall be provided with each of the following:

a) Tightly fitting flue dampers, operated by a readily accessible manual or approved automatic control.

b) An outside source for combustion air ducted into the firebox. The duct shall be at least six square inches, and shall be provided with an operable outside air duct damper.

c) Tightly fitting glass or metal doors, or flue draft induction fan, or as approved for minimizing back-drafting.

Exception: Fireplaces with gas logs shall be installed in accordance with the Uniform Mechanical Code Chapter 803.

NEW SECTION

WAC 51-13-500 CHAPTER 5 RADON RESISTIVE CONSTRUCTION STANDARDS

NEW SECTION

WAC 51-13-501 SCOPE

501.1 General: The criteria of this chapter establishes minimum radon resistive construction requirements for all Group R Occupancies. These requirements are adopted pursuant to the ventilation requirements of Section 7, of Chapter 2 of the Session Laws of 1990.

501.2 Application: The requirements of this chapter shall be adopted and enforced by all jurisdictions of the state according to the following subsections:

501.2.1: All jurisdictions of the state shall comply with section 502.

501.2.2: Ferry, Grant, Okanogan, Pend Oreille, Skamania, Spokane, Stevens, and Wahkiakum counties shall also comply with section 503.

NEW SECTION

WAC 51-13-502 STATE-WIDE RADON REQUIREMENTS

502.1: Crawlspaces

502.1.1 General: All crawlspaces shall comply with the requirements of this section.

502.1.2 Ventilation: All crawlspaces shall be ventilated as specified in section 2516 (c) of the Washington State Uniform Building Code (chapter 51-16 WAC).

If the installed ventilation in a crawlspace is less than one square foot for each three hundred square feet of crawlspace area, or if the crawlspace vents are equipped with operable louvers, a radon vent shall be installed from a point between the ground cover and soil. The radon vent shall be installed in accordance with sections 503.2.6 and 503.2.7.

502.1.3 Crawlspace plenum systems: In crawlspace plenum systems used for providing supply or return air for an HVAC system, aggregate, a soil gas retarder membrane and a radon vent pipe shall be installed in accordance with section 503.2.

In addition, a radon vent fan shall be installed and activated. The fan shall be located as specified in section 503.2.7. The fan shall be capable of providing at least one hundred cfm at one inch water column static pressure.

502.2 Radon monitoring

502.2.1 Three month etched track radon monitoring: A three month etched track radon monitor, installation instructions, and radon information sheets shall be provided by the builder at the final

inspection to all single family residences and to all first floor dwelling units in multi-unit structures. It is not the responsibility of the builder to administer the radon test.

NEW SECTION

WAC 51-13-503 RADON PRESCRIPTIVE REQUIREMENTS

503.1 Scope: This section establishes prescriptive construction requirements for reducing the potential for radon entry into all Group R occupancies, and for preparing the building for future mitigation if desired.

503.2 Floors in Contact with the Earth

503.2.1 General: Concrete slabs that are in direct contact with the building envelope shall comply with the requirements of this section.

Exception: Concrete slabs located under garages or other than Group R occupancies need not comply with this chapter.

503.2.2 Aggregate: A layer of aggregate of four inch minimum thickness shall be placed beneath concrete slabs. The aggregate shall be continuous to the extent practical.

503.2.3 Gradation: Aggregate shall:

a) Comply with Uniform Building Standard 26-2 and shall be No. 67 or larger size aggregate as listed in Table 26-2-A, Grading Requirements for Concrete Aggregates; or

b) Meet the 1988 Washington State Department of Transportation specification 9-03.1 (3) "Coarse Aggregate for Portland Cement Concrete", or any equivalent successor standards. Aggregate size shall be of Grade 5 or larger as listed in section 9-03.1 (3) C, "Grading"; or

c) Be screened, washed, and free of deleterious substances in a manner consistent with UBC Standard 26-2 with one hundred percent of the gravel passing a one inch sieve and less than two percent passing a four-inch sieve. Sieve characteristics shall conform to those acceptable under UBC Standard 26-2.

Exception: Aggregate shall not be required if a substitute material or system, with sufficient load bearing characteristics, and having approved capability to provide equal or superior air flow, is installed.

503.2.4 Soil-Gas Retarder Membrane: A soil-gas retarder membrane, consisting of at least one layer of virgin polyethylene with a thickness of at least six mil, or equivalent flexible sheet material, shall be placed directly under all concrete slabs. The flexible sheet shall extend to the foundation wall or to the outside edge of the monolithic slab. Seams shall overlap at least twelve inches.

503.2.5 Sealing of Penetrations and Joints: All penetrations and joints in concrete slabs or other floor systems and walls below grade, that will not be accessible at the time the certificate of occupancy is granted, shall be sealed by an approved sealant to create an air barrier to limit the movement of soil-gas into the indoor air.

Sealants shall be approved by the manufacturer for the intended purpose. Sealant joints shall conform to manufacturer's specifications. The sealant shall be placed and tooled in accordance with manufacturer's specifications. There shall be no gaps or voids after the sealant has cured.

503.2.6 Radon Vent: One continuous sealed pipe shall run from a point within the aggregate under each concrete slab to a point outside the building. Joints and connections shall be gas tight.

The continuous sealed pipe shall terminate no less than twelve inches above the eave, and more than ten horizontal feet from a woodstove or fireplace chimney, or operable window. The continuous sealed pipe shall be labeled "radon vent." The label shall be placed so as to remain visible to an occupant.

The minimum pipe diameter shall be three inches unless otherwise approved. Acceptable sealed plastic pipe shall be smooth walled, and may include either PVC schedule 40 or ABS schedule of equivalent wall thickness.

The entire sealed pipe system shall be sloped to drain. The exterior pipe opening shall be protected from blockage by snow accumulation.

The sealed pipe system may pass through an unconditioned attic before exiting the building; but to the extent practicable, the sealed pipe shall be located inside the thermal envelope of the building in order to enhance passive stack venting.

Exception: A fan forced sub-slab depressurization system includes:

1) Soil-gas retarder membrane as specified in section 503.2.4;

2) Sealing of penetrations and joints as specified in section 503.2.5;

3) A three-inch continuous sealed radon pipe shall run from a point within the aggregate under each concrete slab to a point outside the building;

4) Joints and connection shall be gas tight, and may be of either PVC schedule 40 or ABS schedule of equivalent in wall thickness;

5) A label of "radon vent" shall be placed on the pipe so as to remain visible to the occupant;

6) Fan circuit and wiring as specified in section 503.2.7 and a fan.

If the sub-slab depressurization system is exhausted through the concrete foundation wall or rim joist, the exhaust terminus shall be a minimum of six feet from operable windows or outdoor air intake vents and shall be directed away from operable windows and outdoor air intake vents to prevent radon re-entrainment.

503.2.7 Fan Circuit and Wiring and Location: An area for location of an in-line fan shall be provided. The location shall be as close as practicable to the radon vent pipe's point of exit from the building, or shall be outside the building shell; and shall be located so that the fan and all downstream piping is isolated from the indoor air.

Provisions shall be made to allow future activation of an in-line fan on the radon vent pipe without the need to place new wiring. A

one hundred ten volt power supply shall be provided at a junction box near the fan location.

503.2.8 Separate Aggregate Areas: If the four-inch aggregate area underneath the concrete slab is not continuous, but is separated into distinct isolated aggregate areas by a footing or other barrier, a minimum of one radon vent pipe shall be installed into each separate aggregate area.

Exception: Separate aggregate areas may be considered a single area if a minimum three-inch diameter connection joining the separate areas is provided for every thirty feet of barrier separating those areas.

503.2.9 Concrete Block Walls: Concrete block walls connected to below grade areas shall be considered unsealed surfaces. All openings in concrete block walls that will not remain accessible upon completion of the building shall be sealed at both vertical and horizontal surfaces, in order to create a continuous air barrier to limit the transport of soil-gas into the indoor air.