

# **WASHINGTON STATE BUILDING CODE**

**CHAPTER 51-50 WAC**

## **INTERNATIONAL BUILDING CODE 2009 Edition**

**Includes adoption of and amendments to  
the 2009 International Existing Building Code  
and  
ICC/ANSI A117.1-2003**



Washington State Building Code Council

**Effective July 1, 2010**

Copies of the State Building Codes and  
complete copies of the 2009 International Residential Code  
as published by the International Code Council  
may be obtained from:

Washington Association of Building Officials  
Post Office Box 7310  
Olympia, Washington 98507-7310  
(360) 628-8669      [www.wabo.org](http://www.wabo.org)  
or toll free in Washington State at (888) 664-9515

Sixth Edition Titled  
International Building Code  
Chapter 51-50 WAC  
based on  
WSR 10-03-097  
Effective July 1, 2010

# Preface

**Authority:** The International Residential Code (Chapter 51-51 WAC) is adopted by the Washington State Building Code Council pursuant to Chapters 19.27 and 70.92 RCW. These codes were first adopted by reference by the Washington State Legislature in 1974. In 1985, the Legislature delegated the responsibility of adoption and amendment of these codes to the State Building Code Council.

**Code Precedence:** The State Building Code Act, Chapter 19.27 RCW, establishes the following order of precedence among the documents adopted as parts of the State Building Code:

- International Building Code, Standards and amendments -WAC 51-50;
- International Residential Code, Standards and amendments – WAC 51-51;
- International Mechanical Code, Standards and amendments - WAC 51-52;
- International Fire Code, Standards and amendments - WAC 51-54;
- Uniform Plumbing Code, Standards and amendments - WAC 51-56, 51-57.

Where there is a conflict between codes, an earlier named code takes precedence over a later named code. In the case of conflict between the duct insulation requirements of the International Mechanical Code and the duct insulation requirements of the Energy Code, the Energy Code, or where applicable, a local jurisdiction's energy code, shall govern.

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 conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.

**Organization and Numbering:** These rules are written to allow compatible use with the International Residential Code. All sections which are amended, deleted, or added are referenced.

**Enforcement:** The State Building Code Act requires that each local jurisdiction enforce the State Building Code within its jurisdiction. Any jurisdiction can contract with another jurisdiction or an inspection agency to provide the mandated enforcement activities.

## **Amendments to the State Building Code:**

The State Building Code Council has adopted review procedures and approval criteria for local amendments. These procedures and criteria are found in Chapter 51-04 WAC. The Council has exempted from its review any amendments to the administrative provisions of the various codes.

Forms for proposing statewide amendments to the State Building Code are available from the State Building Code Council staff.

- A. **Amendments of Statewide Application:** On a yearly basis the State Building Code Council will consider proposals to amend the State Building Code. Unless directed by the State Legislature, federal mandates or court order, the Council will not enter formal rulemaking until 2012 as part of its consideration of adoption of the 2012 series of codes.

Proposals to amend the State Building Code shall be made on forms provided by the Building Code Council.

Code Change Proposal Submittal Deadline: March 1st of each year.

- B. **Local Amendments:** Any jurisdiction may amend the State Building Code provided the amendments do not reduce the minimum performance standards of the codes. There are areas where local amendments are limited or prohibited:

**Prohibited Amendments:** Residential provisions of the State Energy Code (WAC 51-11), Ventilation provisions in Section 408 of the Mechanical Code (WAC 51-52) and Section M1508 of the IRC (WAC 51-51); any provision of the International Building Code or International Residential Code affecting accessibility; and standards specifically adopted in Chapters 19.27 and 19.27A RCW cannot be amended by any local jurisdiction.

**Residential Amendments:** Amendments by local jurisdictions which affect the construction of single family and multi-family residential buildings must be reviewed and approved by the State Building Code Council before such amendments can be enforced. The State Building Code Act provides the following definition:

“Multi-family residential building” means common wall residential buildings that consist of four or fewer units, that do not exceed two stories in height, that are less than 5,000 square feet in area, and that have a one-hour fire-resistive occupancy separation between units.

Application forms for Council review of local amendments are available from the State Building Code Council Staff.

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**Printing Format:** This version of the rules is published as a series of insert or replacement pages. Each page provides instructions for installing them in the model code book. Amendments to the model code which are new or revised from the previous edition of this code are indicated by a line in the margin next to the revised portions.

**Effective Date:** These rules were adopted by the State Building Code Council on November 12, 2009. The rules are effective throughout the state on July 1, 2010. (This version of the code is based on WAC 51-51 as published in WSR 10-03-098. It is subject to review by the State Legislature during the 2010 session.)

**Building Permit Fees:** The activities of the State Building Code Council are supported by permit fees collected by each city and county. Section 19.27.085 of the State Building Code Act requires that a fee of \$4.50 be imposed on each building permit issued by each city and county. In addition, a fee of \$2.00 per unit shall be imposed for each dwelling unit after the first unit, on each building containing more than one residential unit. For the purpose of this fee, WAC 365-110-035 defines building permits as any permit to construct, enlarge, alter, repair, move, improve, remove, convert or demolish any building or structure regulated by the Building Code. Exempt from the fee are plumbing, electrical, mechanical permits, permits issued to install a mobile/manufactured home, commercial coach or factory built structure, or permits issued pursuant to the International Fire Code.

Each city and county shall remit moneys collected to the state treasury quarterly. No remittance is required until a minimum of \$50.00 has accumulated.

These permit fees are the amounts current in January 2010. Such fees may be changed by the State Legislature.

**Opinions:** Only at the request of local enforcement official, the State Building Code Council may issue interpretations/opinions of those provisions of the State Building Code created by the Council, or provisions of the model codes amended by the Council. Final interpretation authority for any specific permit resides with the local enforcement official.

# Table of Contents

Section	Page
WAC 51-50-001	Authority ..... A
WAC 51-50-002	Purpose ..... A
WAC 51-50-003	International Building Code ..... A
WAC 51-50-005	International Building Code Regulations for Barrier-free Accessibility ..... A
WAC 51-50-007	Exceptions ..... A
WAC 51-50-008	Implementation ..... A
WAC 51-50-009	Recyclable Materials and Solid Waste Storage ..... A
<b>WAC 51-50-0100</b>	<b>Chapter 1 Administration</b>
	Section 108 – Temporary Structures and uses ..... 6
<b>WAC 51-50-0200</b>	<b>Chapter 2 Definitions</b>
	Section 202 – Definitions ..... 11
<b>WAC 51-50-0300</b>	<b>Chapter 3 Use and Occupancy Classification</b>
	Section 305 – Educational Group E ..... 24
	Section 308 – Institutional Group I ..... 33
	Section 310 – Residential Group R ..... 35
<b>WAC 51-50-0400</b>	<b>Chapter 4 Special Detailed Requirements Based on Use and Occupancy</b>
	Section 403 – High-Rise Buildings ..... 43
	Section 420 – Groups I-1, R-1, R-2, R-3 ..... 76
	Section 422 – Ambulatory Health Care ..... 77
<b>WAC 51-50-0500</b>	<b>Chapter 5 General Building Heights and Areas</b>
	Section 506 – Building Area Modifications ..... 82
<b>WAC 51-50-0700</b>	<b>Chapter 7 Fire-Resistance Rated Construction</b>
	Section 708 – Shaft Enclosures ..... 107
	Section 710 – Smoke Barriers ..... 109
<b>WAC 51-50-0900</b>	<b>Chapter 9 Special Detailed Requirements Based on Use and Occupancy</b>
	Section 902 – Definitions ..... 183
	Section 903 – Automatic Sprinkler Systems ..... 184
	Section 907 – Fire Alarms and Detection Systems ..... 197
	Section 909 – Smoke Control Systems ..... 206
	Section 911 – Fire Command Center ..... 213
<b>WAC 51-50-1000</b>	<b>Chapter 10 Means of Egress</b>
	Section 1007 – Accessible Means of Egress ..... 222
	Section 1008 – Doors, Gates and Turnstiles ..... 227
	Section 1009 – Stairways ..... 233
	Section 1010 – Ramps ..... 233
	Section 1014 – Exit Access ..... 238
	Section 1018 – Corridors ..... 242
<b>WAC 51-50-1100</b>	<b>Chapter 11 Accessibility</b>
	Section 1101 – General ..... 257
	Section 1106 – Parking and Passenger Loading Facilities ..... 260
	Section 1107 – Dwelling Units and Sleeping Units ..... 262

<b>WAC 51-50-1200</b>	<b>Chapter 12 Interior Environment</b>	
	Section 1203 – Ventilation .....	271
	Section 1204 – Temperature Control .....	272
	Section 1208 – Interior Space Dimensions .....	273
	Section 1210 – Surrounding Materials .....	274
<b>WAC 51-50-1400</b>	<b>Chapter 14 Exterior Walls</b>	
	Section 1403 – Performance Requirements .....	277
	Section 1405 – Installation of Wall Coverings .....	280
<b>WAC 51-50-1600</b>	<b>Chapter 16 Structural Design</b>	
	Section 1609 – Wind Loads.....	315
<b>WAC 51-50-1700</b>	<b>Chapter 17 Structural Tests and Special Inspections</b>	
	Section 1702 – Definitions .....	367
	Section 1715 – Preconstruction Load Tests .....	385
<b>WAC 51-50-2100</b>	<b>Chapter 21 Masonry</b>	
	Section 2104 – Construction .....	433
	Section 2107 – Allowable Stress Design .....	435
	Section 2108 – Strength Design of Masonry .....	436
	Section 2111 – Masonry Fireplaces .....	439
	Section 2114 – Emission Standards .....	445
<b>WAC 51-50-2400</b>	<b>Chapter 24 Glass and Glazing</b>	
	Section 2405 – Wind Loads.....	523
<b>WAC 51-50-2900</b>	<b>Chapter 29 Minimum Plumbing Fixtures and Sanitation Facilities</b>	
	Section 2901 – General .....	549
	Section 2902 – Fixtures .....	549
	Section 2903 – Facilities .....	549
	Section 2904 – Special Provisions .....	549
<b>WAC 51-50-3000</b>	<b>Chapter 30 Elevators and Conveying Systems</b>	
	Section 3002 – Hoistway Enclosures .....	553
	Section 3004 – Hoistway Venting .....	554
	Section 3006 – Machine Rooms .....	555
<b>WAC 51-50-3100</b>	<b>Chapter 31 Special Construction</b>	
	Section 3103 – Temporary Structures .....	560
	Section 3108 – Telecommunications and Broadcast Towers .....	562
	Section 3109 – Swimming Pool Enclosures .....	562
<b>WAC 51-50-3400</b>	<b>Chapter 34 Existing Structures</b>	
	Section 3401 – General .....	571
	Section 3404 – Alterations .....	572
	Section 3410 – Moved Structures .....	575
	Section 3411 – Accessibility for Existing Buildings .....	576
<b>WAC 51-50-3500</b>	<b>Chapter 35 Referenced Standards</b>	
	Washington State Building Code Standard 31-2: Standard Test Method for Particulate Emissions from Fireplaces .....	606

<b>WAC 51-50-480000</b>	<b>Washington State Amendments to the 2009 International Existing Building Code</b>	
	<b>Chapter 1 Administration</b>	
WAC 51-50-480101	Section 101 – General .....	1
WAC 51-50-480102	Section 102 – Applicability .....	3
	<b>Chapter 3 Prescriptive Compliance Method</b>	
WAC 51-50-480305	Section 305 – Change of Occupancy .....	18
	<b>Chapter 4 Classification of Work</b>	
WAC 51-50-480405	Section 405 – Alteration – Level 3 .....	23
	<b>Chapter 6 Alterations—Level 1</b>	
WAC 51-50-480607	Section 607 – Energy Conservation .....	29
	<b>Chapter 7 Alterations—Level 2</b>	
WAC 51-50-480704	Section 704 – Fire Protection .....	33
WAC 51-50-480711	Section 711 – Energy Conservation .....	40
	<b>Chapter 8 Alterations—Level 3</b>	
WAC 51-50-480807	Section 807 – Structural .....	42
WAC 51-50-480808	Section 808 – Energy Conservation .....	43
	<b>Chapter 9 Change of Occupancy</b>	
WAC 51-50-480912	Section 912 – Change of Occupancy Classification .....	47
	<b>Chapter 11 Historic Buildings</b>	
WAC 51-50-481101	Section 1101 – General .....	53
WAC 51-50-481103	Section 1103 – Fire Safety .....	54
WAC 51-50-481104	Section 1104 – Alterations .....	54
WAC 51-50-481105	Section 1105 – Change of Occupancy .....	55
	<b>Chapter 12 Relocated or Moved Buildings</b>	
WAC 51-50-481201	Section 1201 – General .....	57





**CHAPTER 51-50 WAC  
STATE BUILDING CODE ADOPTION AND AMENDMENT  
OF THE 2009 EDITION OF THE INTERNATIONAL BUILDING CODE**

**WAC 51-50-001 AUTHORITY**

These rules are adopted under the authority of Chapter 19.27 RCW.

**WAC 51-50-002 PURPOSE**

The purpose of these rules is to implement the provisions of Chapter 19.27 RCW, which provides that the State Building Code Council shall maintain the State Building Code in a status which is consistent with the purpose as set forth in RCW 19.27.020. In maintaining the codes the Council shall regularly review updated versions of the codes adopted under the act, and other pertinent information, and shall amend the codes as deemed appropriate by the Council.

**WAC 51-50-003 INTERNATIONAL BUILDING CODE**

The 2009 edition of the International Building Code, including Appendix E, published by the International Code Council is hereby adopted by reference with the exceptions noted in this chapter of the Washington Administrative Code.

**WAC 51-50-005 INTERNATIONAL BUILDING CODE REQUIREMENTS FOR BARRIER-FREE ACCESSIBILITY**

Chapter 11 and other International Building Code requirements for barrier-free access, including ICC A117.1-2003 and Appendix E, are adopted pursuant to Chapters 70.92 and 19.27 RCW.

Pursuant to RCW 19.27.040, Chapter 11 and requirements affecting barrier-free access shall not be amended by local governments.

**WAC 51-50-007 EXCEPTIONS**

The exceptions and amendments to the International Building Code contained in the provisions of Chapter 19.27 RCW shall apply in case of conflict with any of the provisions of these rules.

The provisions of this code do not apply to temporary growing structures used solely for the commercial production of horticultural plants including ornamental plants, flowers, vegetables, and fruits. "Temporary growing structure" means a structure that has the sides and roof covered with polyethylene, polyvinyl, or similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. A temporary growing structure is not considered a building for purposes of this code.

The provisions of this code do not apply to the construction, alteration, or repair of temporary worker housing except as provided by rule adopted under chapter 70.114A RCW or chapter 37, Laws of 1998 (SB 6168). "Temporary worker housing" means a place, area, or piece of land where sleeping places or housing sites are provided by an employer for his or her employees or by another person, including a temporary worker housing operator, who is providing such accommodations for employees, for temporary, seasonal occupancy, and includes "labor camps" under RCW 70.54.110.

Codes referenced which are not adopted through RCW 19.27.031 or RCW 19.27A shall not apply unless specifically adopted by the authority having jurisdiction. The 2009 International Existing Buildings Code is included in the adoption of this code in Section 3401.5 and amended in WAC 51-50-48000.

**WAC 51-50-008 IMPLEMENTATION**

The International Building Code adopted under Chapter 51-50 WAC shall become effective in all counties and cities of this state on July 1, 2010.

**WAC 51-50-009 RECYCLABLE MATERIALS AND SOLID WASTE STORAGE**

For the purposes of this section, the following definition shall apply:

**RECYCLED MATERIALS** means those solid wastes that are separated for recycling or reuse, such as papers, metals and glass.

All local jurisdictions shall require that space be provided for the storage of recycled materials and solid waste for all new buildings

**Exceptions:** Group R-3 and Group U occupancies.

The storage area shall be designed to meet the needs of the occupancy, efficiency of pickup, and shall be available to occupants and haulers.



**108.1 General.** The building official is authorized to issue a permit for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The building official is authorized to grant extensions for demonstrated cause.

**Exception:** The building official may authorize unheated tents and yurts under 500 square feet accommodating an R-1 occupancy for recreational use as a temporary structure and allow them to be used indefinitely.

(Insert Facing Page 6)





**AIR-PERMEABLE INSULATION.** An insulation having an air permeance equal to or less than 0.02 L/s-m<sup>2</sup> at 75 Pa pressure differential tested in accordance with ASTM E2178 or ASTM E283.

**ADULT FAMILY HOME.** See Section 310.2

(Insert Facing Page 11)

**CHILD DAY CARE.** See Section 310.2

**CHILD DAY CARE HOME, FAMILY.** See Section 310.2.

(Insert Facing Page 12)







**NIGHTCLUB.** An A-2 occupancy use under the 2006 International Building Code in which the aggregate area of concentrated use of unfixed chairs and standing space that is specifically designated and primarily used for dancing or viewing performers exceeds three hundred fifty square feet, excluding adjacent lobby areas. “Nightclub” does not include theaters with fixed seating, banquet halls, or lodge halls.

**PORTABLE SCHOOL CLASSROOM.** See Section  
902.1



**(Insert Facing Page 18)**

**RESIDENTIAL CARE/ASSISTED LIVING FACILITIES.** This definition is not adopted.

**(Insert Facing Page 19)**

**305.2 Day Care.** The use of a building or structure, or portion thereof, for educational, supervision or personal care services for more than five children older than 2-½ years of age, shall be classified as a Group E occupancy.

**Exception:** Family child day care homes licensed by Washington State for the care of twelve or fewer children shall be classified as Group R-3.

(Insert Facing Page 24)





**308.2 Group I-1.** This occupancy shall include buildings, structures or parts thereof housing more than 16 persons, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment that provides personal care services. The occupants are capable of responding to an emergency situation without physical assistance from staff. This group shall include, but not be limited to, the following:

- Alcohol and drug centers
- Assisted living facilities
- Congregate care facilities
- Convalescent facilities
- Group homes
- Halfway houses
- Residential board and care facilities
- Social rehabilitation facilities

A facility such as the above with five or fewer persons and adult family homes licensed by Washington State shall be classified as a Group R-3 or shall comply with the *International Residential Code* in accordance with Section 101.2.

A facility such as the above providing licensed care to clients in one of the categories listed in Section 310.1 licensed by Washington State shall be classified as Group R-2.

**308.3 Group I-2.** This occupancy shall include buildings and structures used for medical, surgical, psychiatric, nursing or custodial care on a 24-hour basis of more than five persons who are not capable of self-preservation. This group shall include, but not be limited to, the following:

- Child care facilities
- Detoxification facilities
- Hospice care centers
- Hospitals
- Nursing homes
- Mental hospitals

A facility such as the above providing licensed care to clients in one of the categories listed in Section 310.1 licensed by Washington State shall be classified as Group R-2.



**HOSPICE CARE CENTER.** A building or portion thereof used on a 24-hour basis for the provisions of hospice services to terminally ill inpatients.

**308.5.2 Child care facility.** A facility that provides supervision and personal care on a less than 24-hour basis for more than five children 2-½ years of age or less shall be classified as Group I-4.

**Exceptions:**

1. A child day care facility that provides care for more than five but no more than 100 children 2-½ years or less of age, where the rooms in which the children are cared for are located on the level of exit discharge serving such rooms and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.
2. Family child day care homes licensed by the Washington State Department of Social and Health Services for the care of twelve or fewer children shall be classified as Group R-3.

(Insert Facing Page 34)

**R-1** (no changes)

**R-2** Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

- Apartment houses
- Boarding houses (not transient)
- Boarding homes as licensed by Washington State under Chapter 388-78A WAC
- Convents
- Dormitories
- Fraternities and sororities
- Hotels (nontransient)
- Live/work units
- Monasteries
- Motels (nontransient)
- Residential treatment facilities as licensed by Washington State under Chapter 246-337 WAC
- Vacation timeshare properties

Congregate living facilities with 16 or fewer occupants are permitted to comply with the construction requirements for Group R-3.

**R-3** Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

- Buildings that do not contain more than two dwelling units.
- Adult care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.
- Child care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.
- Congregate living facilities with sixteen or fewer persons.
- Adult care within a single-family home, or adult family homes and family child day care homes are permitted to comply with the International Residential Code.
- Foster Family Care Homes licensed by Washington State are permitted to comply with the International Residential Code, as an accessory use to a dwelling, for six or fewer children including those of the resident family.

**R-4** **R-4 classification is not adopted. Any reference in this code to R-4 does not apply.**

**ADULT FAMILY HOME** means a dwelling in which a person or persons provide personal care, special care, room and board to more than one but not more than six adults who are not related by blood or marriage to the person or persons providing the services.

**CHILD DAY CARE**, shall, for the purposes of these regulations, mean the care of children during any period of a 24 hour day.

**CHILD DAY CARE HOME, FAMILY** is a child day care facility, licensed by the state, located in the dwelling of the person or persons under whose direct care and supervision the child is placed, for the care of twelve or fewer children, including children who reside at the home.

**RESIDENTIAL CARE/ASSISTED LIVING FACILITIES.** This definition is not adopted.



**403.5.4 Smokeproof exit enclosure.** Every required exit stairway serving floors more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall comply with Sections 909.20 and 1022.9.

**Exception:** Unless required by other sections of this code, portions of such stairways which extend to serve floors below the level of exit discharge need not comply with Sections 909.20 and 1022.9 provided the portion of the stairway below is separated from the level of exit discharge with a 1-hour fire barrier.

**420.4 Subdivision of building spaces--Smoke barriers.**  
Smoke barriers complying with Section 710 shall be installed on floors other than the level of exit discharge of a Group R-2 boarding home or residential treatment facility licensed by Washington State, where a fire-resistance rated corridor is required by Table 1018.1. The smoke barrier shall subdivide the floor into at least two compartments complying with Section 407.4.

**(Insert Facing Page 76)**

**422.1 General.** Occupancies classified as ambulatory health care facilities shall comply with the provisions of Sections 422.1 through 422.7 and other applicable provisions of this code by the services provided.

**422.2 Separation.** Ambulatory health care facilities where four or more care recipients are rendered incapable of self-preservation at any given time shall be separated from adjacent spaces, corridors or tenants with a fire partition installed in accordance with Section 709.

**422.3 Smoke compartments.** Where the aggregate area of one or more ambulatory health care facility exceeds 10,000 square feet on one story, the story shall be provided with a smoke barrier to subdivide the story into not less than two smoke compartments. Smoke barriers shall be installed in accordance with Section 710. The area of any one such smoke compartment shall not exceed 22,500 square feet (2092 m<sup>2</sup>). The travel distance from any point in a smoke compartment to a smoke barrier door shall not exceed 200 feet (60,960 mm).

**Exception:** Where the ambulatory health care facility is completely surrounded by the required smoke barrier, such smoke barriers shall not be required to be continuous from an outside wall to outside wall.

**422.4 Refuge area.** At least 15 net square feet (2.8 m<sup>2</sup>) per occupant shall be provided within the aggregate area of corridors, patient rooms, treatment rooms, lounge or dining areas and other low-hazard areas on each side of each smoke barrier. Each ambulatory health care facility shall be provided with access to the required refuge areas without passing through or utilizing adjacent tenant spaces.

**422.5 Independent egress.** A means of egress shall be provided from each smoke compartment created by smoke barriers without having to return through the smoke compartment from which means of egress originated.

**422.6 Automatic sprinkler systems.** Automatic sprinkler systems shall be provided for ambulatory care facilities in accordance with Section 903.2.2.

**422.7 Fire alarm systems.** A fire alarm system shall be provided for ambulatory health care facilities in accordance with Section 907.2.2.1.

**506.4 Single occupancy buildings with more than one story.** The total allowable building area of a single occupancy building with more than one story above grade plane shall be determined in accordance with this section. The actual aggregate building area at all stories in the building shall not exceed the total allowable building area.

**Exception:** Basements below the first story above grade plane need not be included in the total allowable building area, provided each basement does not exceed the area permitted for a building with no more than one story above grade plane.

(Insert Facing Page 82)

**506.5 Mixed occupancy area determination.** The total allowable building area for buildings containing mixed occupancies shall be determined in accordance with the applicable provisions of this section. Basements below the first story above grade plane need not be included in the total allowable building area, provided each such basement does not exceed the area permitted for a building with no more than one story above grade plane.





**708.14.2.12 Hoistway venting.** Hoistway venting required by Section 3004 need not be provided for pressurized elevator shafts.

**708.14.2.13 Machine rooms.** Elevator machine rooms shall be pressurized in accordance with this section unless separated from the hoistway shaft by construction in accordance with Section 707.

**710.4 Continuity.** Smoke barriers shall form an effective membrane continuous from outside wall to outside wall and from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, deck or slab above, including continuity through concealed spaces, such as those found above suspended ceiling, and interstitial structural and mechanical spaces. The supporting construction shall be protected to afford the required fire-resistance rating of the wall or floor supported in buildings of other than Type IIB, IIIB, or VB construction.

**Exceptions:**

1. Smoke-barrier walls are not required in interstitial spaces where such spaces are designed and constructed with ceilings that provide resistance to the passage of fire and smoke equivalent to that provided by the smoke-barrier walls.
2. Smoke barriers provided to enclose areas of refuge as required by Section 1007.6 are not required to extend from outside wall to outside wall.

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**PORTABLE SCHOOL CLASSROOM.** A structure, transportable in one or more sections, which requires a chassis to be transported, and is designed to be used as an educational space with or without a permanent foundation. The structure shall be trailerable and capable of being demounted and relocated to other locations as needs arise.

**903.2.1.6 Nightclub.** An automatic sprinkler system shall be provided throughout Group A-2 nightclubs as defined in this code. An existing nightclub constructed prior to July 1, 2006, shall be provided with automatic sprinklers not later than December 1, 2009.

(Insert facing page 184)

**903.2.3 Group E.** An automatic sprinkler system shall be provided for Group E occupancies.

**Exceptions:**

1. Portable school classrooms, provided aggregate area of any cluster or portion of a cluster of portable school classrooms does not exceed 5,000 square feet (1465 m<sup>2</sup>); and clusters of portable school classrooms shall be separated as required by the Building Code.
2. Group E occupancies with an occupant load of 50 or less, calculated in accordance with Table 1004.1.1

**903.2.8 Group R.** An automatic fire sprinkler system installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R fire area.

**Exception:** Group R-1 if all the following conditions apply:

1. The Group R fire area is no more than 500 square feet and is used for recreational use only.
2. The Group R fire area is only one story.
3. The Group R fire area does not include a basement.
4. The Group R fire area is no closer than 30 feet from another structure.
5. Cooking is not allowed within the Group R fire area.
6. The Group R fire area has an occupant load of no more than 8.
7. A hand held (portable) fire extinguisher is in every Group R fire area.





**907.2.8 Group R-1.** Fire alarm systems, smoke alarms and carbon monoxide alarms shall be installed in Group R-1 occupancies as required in Sections 907.2.8.1 through 907.2.8.4.

(Insert Facing Page 197)

**907.2.8.4. Carbon monoxide alarms.** For new construction, an approved carbon monoxide alarm shall be installed by January 1, 2011, outside of each separate sleeping area in the immediate vicinity of the bedroom in sleeping units. In a building where a tenancy exists, the tenant shall maintain the CO alarm as specified by the manufacturer including replacement of the batteries.

**907.2.8.4.1 Existing sleeping units.** Existing sleeping units shall be equipped with carbon monoxide alarms by July 1, 2011.

**907.2.8.4.2 Alarm requirements.** Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions.

**907.2.9 Group R-2.** Fire alarm systems, smoke alarms and carbon monoxide alarms shall be installed in Group R-2 occupancies as required in Sections 907.2.9.1 through 907.2.9.3.

**907.2.10.2 Existing dwelling units.** Existing dwelling units shall be equipped with carbon monoxide alarms by July 1, 2011.

**Exception:** Owner-occupied Group R-3 residences legally occupied prior to July 1, 2010.

**907.2.10.3 Alarm requirements.** Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions.

**907.2.9.3. Carbon monoxide alarms.** For new construction, an approved carbon monoxide alarm shall be installed by January 1, 2011, outside of each separate sleeping area in the immediate vicinity of the bedroom in dwelling units. In a building where a tenancy exists, the tenant shall maintain the CO alarm as specified by the manufacturer including replacement of the batteries.

**907.2.9.3.1 Existing dwelling units.** Existing dwelling units shall be equipped with carbon monoxide alarms by July 1, 2011.

**907.2.9.3.2 Alarm requirements.** Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions.

**907.2.10 Group R-3.** Carbon monoxide alarms shall be installed in Group R-3 occupancies as required in Sections 907.2.10.1 through 907.2.10.3.

**907.2.10.1 Carbon monoxide alarms.** For new construction, an approved carbon monoxide alarm shall be installed by January 1, 2011, outside of each separate sleeping area in the immediate vicinity of the bedroom in dwelling units. In a building where a tenancy exists, the tenant shall maintain the CO alarm as specified by the manufacturer including replacement of the batteries.

(Insert Facing Page 198)



**909.6.3 Elevator Shaft Pressurization.** Where elevator shaft pressurization is required to comply with Exception 6 of Section 708.14.1, the pressurization system shall comply with and be maintained in accordance with Section 708.14.2.

**909.6.3.1 Activation.** The elevator shaft pressurization system shall be activated by a fire alarm system which shall include smoke detectors or other approved detectors located near the elevator shaft on each floor as approved by the building official and fire code official. If the building has a fire alarm panel, detectors shall be connected to, with power supplied by, the fire alarm panel.

**909.6.3.2 Power systems.** The power source for the fire alarm system and the elevator shaft pressurization system shall be in accordance with Section 909.11.

(Insert Facing Page 206)





**911.1.2 Separation.** The fire command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 707 or horizontal assembly constructed in accordance with Section 712, or both.



**1007.1 Accessible means of egress required.** Accessible means of egress shall comply with this section. Accessible spaces shall be provided with not less than one accessible means of egress. Where more than one means of egress are required by Section 1015.1 or 1021.1 from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress.

**Exceptions:**

1. Accessible means of egress are not required in alterations to existing buildings.
2. One accessible means of egress is required from an accessible mezzanine level in accordance with Section 1007.3, 1007.4 or 1007.5.
3. In assembly areas with sloped or stepped aisles, one accessible means of egress is permitted where the common path of travel is accessible and meets the requirements in Section 1028.8.
4. In parking garages, accessible means of egress are not required to serve parking areas that do not contain accessible parking spaces.

**1007.8.1 System requirements.** Two-way communication systems shall provide communication between each required location and the fire command center or a central control point location approved by the fire department. Where the central control point is not constantly attended, a two-way communication system shall have a timed automatic telephone dial-out capability to a monitoring location. The two-way communication system shall include both audible and visible signals. The two-way communication system shall have a battery backup or an approved alternate source of power that is capable of 90 minutes use upon failure of the normal power source.





**1008.1.9.3 Locks and latches.** Locks and latches shall be permitted to prevent operation of doors where any of the following exists:

1. Places of detention or restraint.
2. In buildings in occupancy Group A having an occupant load of 300 or less, Groups B, F, M and S, and in places of religious worship, the main exterior door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:
  - 2.1 The locking device is readily distinguishable as locked;

(Insert Facing Page 227)

- 2.2 A readily visible sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background; and
- 2.3 The use of the key-operated locking device is revocable by the building official for due cause.
- 3. Where egress doors are used in pairs, approved automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts has no doorknob or surface mounted hardware.
- 4. Doors from individual dwelling or sleeping units of Group R occupancies having an occupant load of 10 or less are permitted to be equipped with a night latch, dead bolt, or security chain, provided such devices are openable from the inside without the use of a key or a tool.
- 5. Fire doors after the minimum elevated temperature has disabled the unlatching mechanism in accordance with listed fire door test procedures.
- 6. Approved, listed locks without delayed egress shall be permitted in Group R-2 boarding homes licensed by Washington state, provided that:
  - 6.1. The clinical needs of one or more patients require specialized security measures for their safety.
  - 6.2. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.
  - 6.3. The doors unlock upon loss of electrical power controlling the lock or lock mechanism.
  - 6.4. The lock shall be capable of being deactivated by a signal from a switch located in an approved location.
  - 6.5. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.

**1008.1.9.6 Special locking arrangements in Group I-2.**

- Approved locks shall be permitted in a Group I-2 Occupancy where the clinical needs of persons receiving care require such locking. Locks shall be permitted in such occupancies where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or an approved automatic smoke or heat detection system installed in accordance with Section 907, provided that the doors unlock in accordance with Items 1 through 6 below.
- 1. The doors unlock upon actuation of the automatic sprinkler system or automatic fire detection system.
  - 2. The doors unlock upon loss of power controlling the lock or lock mechanism.
  - 3. The door locks shall have the capability of being unlocked by a signal from the fire command center, a nursing station or other approved location.
  - 4. The procedures for the operation(s) of the unlocking system shall be described and approved as part of the emergency planning and preparedness required by Chapter 4 of the International Fire Code.
  - 5. There is a system, such as a keypad and code, in place that allows visitors, staff persons and appropriate residents to exit. Instructions for exiting shall be posted within six feet of the door.
  - 6. Emergency lighting shall be provided at the door.

**Exception:** Items 1, 2, 3, and 5 shall not apply to doors to areas where persons which because of clinical needs require restraint or containment as part of the function of a Group I-2 mental hospital provided that all clinical staff shall have the keys, codes or other means necessary to operate the locking devices.





**1010.1 Scope.** The provisions of this section shall apply to ramps used as a component of a means of egress.

**Exceptions:**

1. Other than ramps that are part of the accessible routes providing access in accordance with Section 1108.2 through 1108.2.4 and 1108.2.6, ramped aisles within assembly rooms or spaces shall conform with the provisions of Section 1028.11.
2. Curb ramps shall comply with ICC A117.1
3. Vehicle ramps in parking garages for pedestrian exit access shall not be required to comply with Section 1010.3 through 1010.9 when they are not an accessible route serving accessible parking spaces or other required accessible elements.
4. In a parking garage where one accessible means of egress serving accessible parking spaces or other accessible elements is provided, a second accessible means of egress serving that area may include a vehicle ramp that does not comply with Sections 1010.4, 1010.5 and 1010.8. A landing complying with Sections 1010.6.1 and 1010.6.4 shall be provided at any change of direction in the accessible means of egress.



**1009.15 Stairways in individual dwelling units.** Stairs or ladders within an individual dwelling unit used for access to areas of 200 square feet (18.6 m<sup>2</sup>) or less, and not containing the primary bathroom or kitchen, are exempt from the requirements of Section 1009.

(Insert Facing Page 233)



**1014.2.2.5 Suites not containing patient sleeping areas.**

Areas other than patient sleeping areas in Group I-2 occupancies shall be permitted to be divided into suites.

**1014.2.2.5.1 Area.** Suites of rooms, other than patient sleeping rooms, shall not exceed 10,000 square feet (929 m<sup>2</sup>).

**1014.2.2.5.2 Exit access.** Any rooms or suite of rooms, other than patient sleeping rooms, of more than 2,500 square feet (232 m<sup>2</sup>) shall have at least two exit access doors located in accordance with Section 1015.2.

**1014.2.2.5.3 One intervening room.** For rooms other than patient sleeping rooms, suites of rooms are permitted to have one intervening room if the travel distance within the suite to the exit access door is not greater than 100 feet (30,480 mm).

**1014.2.2.5.4 Two intervening rooms.** For rooms other than patient sleeping rooms located within a suite, exit access travel from within the suite shall be permitted through two intervening rooms where the travel distance to the exit access door is not greater than 50 feet (15,240 mm).

**1014.2.2 Group I-2, General.** Habitable spaces and suites in Group I-2 occupancies are permitted to comply with Section 1014.2.2.

**1014.2.2.1 Exit access doors.** Habitable spaces and suites in Group I-2 occupancies shall have an exit access door leading directly to a corridor.

**Exception:** Rooms with exit doors opening directly to the outside at ground level.

**1014.2.2.2 Exit access through suites.** Exit access from areas not classified as a Group I-2 Occupancy suite shall not pass through a suite. In a suite required to have more than one exit, one exit access may pass through an adjacent suite if all other requirements of Section 1014.2 are satisfied.

**1014.2.2.3 Separation.** Suites in Group I-2 Occupancies shall be separated from other portions of the building by a smoke partition complying with Section 711. Partitions within suites are not required to be smoke-resistant or fire-resistance-rated unless required by another section of this Code.

**1014.2.2.4 Suites containing patient sleeping areas.** Patient sleeping areas in Group I-2 occupancies shall be permitted to be divided into suites with one intervening room if one of the following conditions is met:

1. The intervening room within the suite is not used as an exit access for more than eight patient beds.
2. The arrangement of the suite allows for direct and constant visual supervision by nursing personnel.

**1014.2.2.4.1 Area.** Suites of sleeping rooms shall not exceed 5,000 square feet (465 m<sup>2</sup>).

**1014.2.2.4.2 Exit access.** Any patient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet (93 m<sup>2</sup>) shall have at least two exit access doors located in accordance with Section 1015.2.

**1014.2.2.4.3 Travel distance.** The travel distance between any point in a suite of sleeping rooms and an exit access door of that suite shall not exceed 100 feet (30,480 mm). The travel distance between any point in a Group I-2 occupancy patient sleeping room and an exit access door in that room shall not exceed 50 feet.



3. Where located within tenant spaces of 1,000 square feet (93 m<sup>2</sup>) or less in area, utilization of corridors for conveying return air is permitted.
4. Incidental air movement from pressurized rooms within health care facilities, provided that a corridor is not the primary source of supply or return to the room.
5. Where such air is part of an engineered smoke control system.
6. Air supplied to corridors serving residential occupancies shall not be considered as providing ventilation air to the dwelling units subject to the following:
  - 6.1 The supply air is one hundred percent outside 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 which shall be spaced at no more than thirty feet (9,144 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.

**1018.6 Corridor continuity.** Fire-resistance-rated corridors shall be continuous from the point of entry to an exit, and shall not be interrupted by intervening rooms.

**Exceptions:**

1. Foyers, lobbies or reception rooms constructed as required for corridors shall not be construed as intervening rooms.
2. In Group R-2 boarding rooms and residential treatment facilities licensed by Washington State, seating areas shall be allowed to be open to the corridor provided:
  - 2.1 The seating area is constructed as required for the corridor;
  - 2.2 The floor is separated into at least two compartments complying with Section 407.4;
  - 2.3 Each individual seating area does not exceed 150 square feet, excluding the corridor width;
  - 2.4 The combined total space of seating areas per compartment does not exceed 300 square feet, excluding the corridor width;
  - 2.5 Combustible furnishings located within the seating area shall be in accordance with the International Fire Code Section 805; and
  - 2.6 Emergency means of egress lighting is provided as required by Section 1006 to illuminate the area.

**1018.5 Air movement in corridors.** 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.

(Insert Facing Page 242)





**1101.2 Design.** Buildings and facilities shall be designed and constructed to be accessible in accordance with this code and ICC A117.1, except those portions of ICC A117.1 amended by this section.

**1101.2.1 (ICC A117.1 Section 403) Landings for walking surfaces.** The maximum rise for any run is 30 inches (762 mm). Landings shall be provided at the top and bottom of any run. Landings shall be level and have a minimum dimension measured in the direction of travel of not less than 60 inches (1525 mm).

**1101.2.2 (ICC A117.1 Section 403.5) Clear width of accessible route.** Clear width of an accessible route shall comply with ICC A117.1 Table 403.5. For exterior routes of travel, the minimum clear width shall be 44 inches (1118 mm).

**1101.2.3 (ICC A117.1 Section 404.2.8) Door-Opening Force.** Fire doors shall have the minimum opening force allowable by the appropriate administrative authority. The force for pushing or pulling open doors other than fire doors shall be as follows:

1. Interior hinged door: 5.0 pounds (22.2 N) maximum
2. Interior sliding or folding doors: 5.0 pounds (22.2 N) maximum
3. Exterior hinged, sliding or folding door: 10 pounds (44.4 N) maximum

**Exception:** Interior or exterior automatic doors complying with Section 404.3 of ICC A117.1.

These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.

**1101.2.4 (ICC A117.1 Section 407.4.6.2.2) Arrangement of elevator car buttons.** This section is not adopted.

**1101.2.5 (ICC A117.1 Section 603.4) Coat hooks and shelves.** Coat hooks shall be located within one of the reach ranges specified in Section 308. Shelves shall be installed so the top of the shelf is 40 inches (1015 mm) minimum and 42 inches (1067 mm) maximum above the floor.

**1101.2.6 (ICC A117.1 Section 604.11) Coat hooks and shelves.** Coat hooks provided within toilet compartments shall be located within one of the reach ranges specified in Section 308. Shelves shall be installed so the top of the shelf is 40 inches (1015 mm) minimum and 42 inches (1067 mm) maximum above the floor.

**1101.2.7 (ICC A117.1 Section 606.7) Operable parts.** Operable parts on drying equipment, towel or cleansing product dispensers, and disposal fixtures shall comply with Table 606.7, except the maximum reach height shall be 40 inches (1015 mm) for reach depths less than 6 inches.

**1101.2.8 (ICC A117.1 Section 604.6) Flush controls.** Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with Section 309, except the maximum height above the floor shall be 44 inches (1118 mm). Flush controls shall be located on the open side of the water closet.

**Exception:** In ambulatory accessible compartments complying with Section 604.9, flush controls shall be permitted to be located on either side of the water closet.

**1101.2.9 (ICC A117.1 Section 703.6.3.1) International symbol of accessibility.** Where the International Symbol of Accessibility is required, it shall be proportioned complying with ICC A117.1 Figure 703.6.3.1. All interior and exterior signs depicting the International Symbol of Accessibility shall be white on a blue background.

**1101.2.10 (ICC A117.1 Section 404.3.5) Control switches.** Manually operated control switches shall comply with Section 309, except they shall be placed 32 inches (815 mm) minimum and 40 inches (1015 mm) maximum above the floor. The clear floor space adjacent to the control switch shall be located beyond the arc of the door swing and centered on the control switch.



**1106.6 Location.** Accessible parking spaces shall be located on the shortest accessible route of travel from adjacent parking to an accessible building entrance. In parking facilities that do not serve a particular building, accessible parking spaces shall be located on the shortest route to an accessible pedestrian entrance to the parking facility. Where buildings have multiple accessible entrances with adjacent parking, accessible parking spaces shall be dispersed and located near the accessible entrances. Wherever practical, the accessible route shall not cross lanes of vehicular traffic. Where crossing traffic lanes is necessary, the route shall be designated and marked as a crosswalk.

**Exceptions:**

1. In multilevel parking structures, van accessible parking spaces are permitted on one level.
2. Accessible parking spaces shall be permitted to be located in different parking facilities if substantially equivalent or greater accessibility is provided in terms of distance from an accessible entrance or entrances, parking fee and user convenience.

**1106.3 Group I-2 outpatient facilities.** Ten percent, but not less than one, of patient and visitor parking spaces provided to serve Group I-2 outpatient facilities shall be accessible.

(Insert Facing Page 260)





**1107.6 Group R.** Accessible units, Type A units and Type B units shall be provided in Group R occupancies in accordance with Sections 1107.6.1 through 1107.6.4. Accessible and Type A units shall be apportioned among efficiency dwelling units, single bedroom units and multiple bedroom units, in proportion to the numbers of such units in the building.

**1107.6.2.1.1 Type A units.** In Group R-2 occupancies containing more than 10 dwelling units or sleeping units, at least 5 percent, but not less than one, of the units shall be a Type A unit. All units on a site shall be considered to determine the total number of units and the required number of Type A units. Type A units shall be dispersed among the various classes of units.

**Exceptions:**

1. The number of Type A units is permitted to be reduced in accordance with Section 1107.7.
2. Existing structures on a site shall not contribute to the total number of units on a site.

**1107.6.2.2 Group R-2 other than apartment houses, monasteries and convents.** In Group R-2 occupancies, other than apartment houses, monasteries and convents, Accessible units and Type B units shall be provided in accordance with Sections 1107.6.2.2.1 and 1107.6.2.2.2. Accessible units shall be dispersed among the various classes of units.





2. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all the following conditions are met:
  - 2.1 The unvented attic space is completely contained within the building thermal envelope.
  - 2.2 No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
  - 2.3 Where wood shingles or shakes are used, a minimum 1/4 inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.
  - 2.4 Any air-impermeable insulation shall be a vapor retarder, or shall have a vapor retarder coating or covering in direct contact with the underside of the insulation.
  - 2.5 Either items a, b, or c below shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
    - a. Air-impermeable insulation only. Insulation shall be applied in direct contact to the underside of the structural roof sheathing.
    - b. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified per WA Climate Zone for condensation control.
      - i. Climate Zone #1 - R-10 minimum rigid board or air-impermeable insulation R-value.
      - ii. Climate Zone #2 - R-25 minimum rigid board or air-impermeable insulation R-value.
    - c. Air-impermeable and air-permeable insulation. The air-impermeable insulation shall be applied in direct contact to the underside of the structural roof sheathing as specified per WA Climate Zone for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.
      - i. Climate Zone #1 - R-10 minimum rigid board or air-impermeable insulation R-value.
      - ii. Climate Zone #2 - R-25 minimum rigid board or air-impermeable insulation R-value.



**1203.2 Attic spaces.** Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing members shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow. Blocking and bridging shall be arranged so as not to interfere with the movement of air. A minimum of 1 inch (25 mm) of airspace shall be provided between the insulation and the roof sheathing. The net free ventilating area shall not be less than 1/150th of the area of the space ventilated, with 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.

**Exceptions:**

1. The minimum required net free ventilating shall be 1/300 of the area of the space ventilated, provided a vapor retarder having a transmission rate not exceeding one perm in accordance with ASTM E 96 is installed on the warm side of the attic insulation and provided 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated is at least 3 feet (914 mm) above eave or cornice vents, with the balance of the required ventilation provided by eave or cornice vents.

(Insert Facing Page 271)

**1203.4 Natural ventilation.** For other than Group R occupancies, natural ventilation of an occupied space shall be 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. Group R occupancies shall comply with the International Mechanical Code.

**1203.6 Radon resistive construction standards.** The criteria of this section establishes minimum radon resistive construction requirements for Group R Occupancies.

**1203.6.1 Application.** The requirements of Section 1203.6 shall be adopted and enforced by all jurisdictions of the state according to the following subsections.

**1203.6.1.1** All jurisdictions of the state shall comply with Section 1203.6.2.

**1203.6.1.2** Clark, Ferry, Okanogan, Pend Oreille, Skamania, Spokane, and Stevens counties shall also comply with Section 1203.6.3.

**1203.6.2 State wide radon requirements.**

**1203.6.2.1 Crawlspace.** All crawlspaces shall comply with the requirements of this section.

**1203.6.2.2 Ventilation.** All crawlspaces shall be ventilated as specified in Section 1203.3.

*(Continued next column)*

**1204.1 Equipment and systems.** Interior spaces intended for human occupancy shall be provided with active or passive space-heating systems capable of maintaining a minimum indoor temperature of 68°F (20°C) at a point 3 feet (914 mm) above the floor on the design heating day.

**Exceptions:**

1. Interior spaces where the primary purpose is not associated with human comfort.
2. Group R-1 occupancies not more than 500 square feet.

**1204.2 Heating.**

**1204.2.1 Definitions.** For the purposes of this section only, the following definitions apply.

**DESIGNATED AREAS** are those areas designated by a county to be an urban growth area in Chapter 36.70A RCW and those areas designated by the US Environmental Protection Agency as being in nonattainment for particulate matter.

**SUBSTANTIALLY REMODELED** means any alteration or restoration of a building exceeding 60 percent of the appraised value of such building within a 12 month period. For the purpose of this section, the appraised value is the estimated cost to replace the building and structure in kind, based on current replacement costs.

**1204.2.2 Primary Heating Source.** Primary heating sources in all new and substantially remodeled buildings in designated areas shall not be dependent upon wood stoves.

**1204.2.3 Solid Fuel Burning Devices.** No used solid fuel burning device shall be installed in new or existing buildings unless such device is United States Environmental Protection Agency certified or a pellet stove either certified or exempt from certification by the United States Environmental Protection Agency.

**Exception:** Antique wood cook stoves and heaters manufactured prior to 1940.

If the installed ventilation in a crawlspace is less than one square foot for each 300 square feet of crawlspace area, or if the crawlspace vents are equipped with operable louvers, a radon vent shall be installed to originate from a point between the ground cover and soil. The radon vent shall be installed in accordance with Sections 1203.6.3.2.6 and 1203.6.3.2.7.

**1203.6.2.3 Crawlspace plenum systems.** In crawlspace plenum systems used for providing supply air for an HVAC system, aggregate, a permanently sealed soil gas retarder membrane and a radon vent pipe shall be installed in accordance with Section 1203.6.3.2. Crawlspace shall not be used for return air plenums.

In addition, an operable radon vent fan shall be installed and activated. The fan shall be located as specified in Section 1203.6.3.2.7. The fan shall be capable of providing at least 100 cfm at 1-inch water column static pressure. The fan shall be controlled by a readily accessible manual switch. The switch shall be labeled "RADON VENT FAN."

**1203.6.3 Radon prescriptive requirements.**

**1203.6.3.1 Scope.** This section applies to those counties specified in Section 1203.6.1.2. 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.

In all crawlspaces, except crawlspace plenums used for providing supply air for an HVAC system, a continuous air barrier shall be installed between the crawlspace area and the occupied area to limit air transport between the areas. If a wood sheet subfloor or other material is utilized as an air barrier, in addition to the requirements of Section 502.1.6.2 of the Washington State Energy Code, all joints between sheets shall be sealed.

**1203.6.3.2 Floors in contact with the earth.**

**1203.6.3.2.1 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.

**1203.6.3.2.2 Aggregate.** A layer of aggregate of 4-inch minimum thickness shall be placed beneath concrete slabs. The aggregate shall be continuous to the extent practical.

**1203.6.3.2.3 Gradation.** Aggregate shall:

1. Comply with ASTM Standard C-33 Standard Specification for Concrete Aggregate and shall be size No. 8 or larger size aggregate as listed in Table 2, Grading Requirements for Course Aggregate; or
2. 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 8 or larger as listed in Section 9-03.1 (3) C, "Grading"; or
3. Be screened, washed pea gravel free of deleterious substances in a manner consistent with ASTM Standard C-33 with 100 percent passing a 1/2-inch sieve and less than 5 percent passing a No. 16 sieve. Sieve characteristics shall conform to those acceptable under ASTM Standard C-33.

**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.

**1203.6.3.2.4 Soil-gas retarder membrane.** A soil-gas retarder membrane, consisting of at least one layer of virgin polyethylene with a thickness of at least 6 mil, or equivalent flexible sheet material, shall be either placed directly under all concrete slabs so that the slab is in direct contact with the membrane, or on top of the aggregate with 2 inches minimum of fine sand or pea gravel installed between the concrete slab and membrane. The flexible sheet shall extend to the foundation wall or to the outside edge of the

monolithic slab. Seams shall overlap at least 12 inches. The membrane shall also be fitted tightly to all pipes, wires, and other penetrations of the membrane and sealed with an approved sealant or tape. All punctures or tears shall be repaired with the same or approved material and similarly lapped and sealed.

**1203.6.3.2.5 Sealing of penetrations and joints.** All penetrations and joints in concrete slabs or other floor systems and walls below grade 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.

**1203.6.3.2.6 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 permanently gas tight. The continuous sealed pipe shall interface with the aggregate in the following manner, or by other approved equal method. The pipe shall be permanently connected to a "T" within the aggregate area so that the two end openings of the "T" lie within the aggregate area. A minimum of 5 feet of perforated drain pipe of 3 inches minimum diameter shall join to and extend from the "T." The perforated pipe shall remain in the aggregate area and shall not be capped at the ends. The "T" and its perforated pipe extensions shall be located at least 5 feet horizontally from the exterior perimeter of the aggregate area.

The continuous sealed pipe shall terminate no less than 12 inches above the eave, and more than 10 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 3 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 to the subslab aggregate.

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 for subslab depressurization system includes the following:

1. Soil-gas retarder membrane as specified in Section 1203.6.3.2.4;
2. Sealing of penetrations and joints as specified in Section 1203.6.3.2.5;

3. A 3-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 connections 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 an occupant;
6. Fan circuit and wiring as specified in Section 1203.6.3.2.7 and a fan.

If the subslab depressurization system is exhausted through the concrete foundation wall or rim joist, the exhaust terminus shall be a minimum of 6 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 reentrainment.

**1203.6.3.2.7 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 inline fan on the radon vent pipe without the need to place new wiring. A 110 volt power supply shall be provided at a junction box near the fan location.

**1203.6.3.2.8 Separate aggregate areas.** If the 4-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 3-inch diameter connection joining the separate areas is provided for every 30 feet of barrier separating those areas.

**1203.6.3.2.9 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.

**1208.3 Room area.** Every dwelling unit shall have at least one room that shall have not less than 120 square feet (13.9 m<sup>2</sup>) of net floor area. Other habitable rooms shall have a net floor area of not less than 70 square feet (6.5 m<sup>2</sup>).

**Exception:** Kitchens in one- and two-family dwellings.

Portions of a room with a sloped ceiling measuring less than 5 feet (1524 mm) or a flat ceiling measuring less than 7 feet (2134 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum habitable area for that room.



**1210.5 Toilet rooms.** This section is not adopted. (The requirements of this section have been moved to Section 2902.2.1.1)

**(Insert Facing Page 274)**





**1403.2 Weather protection.** Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section 1405.4. The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer, as described in Section 1404.2, and a means of draining water that enters the assembly to the exterior. An air space cavity is not required under the exterior cladding for an exterior wall clad with lapped or panel siding made of plywood, engineered wood, hardboard, or fiber cement. Protection against condensation in the exterior wall assembly shall be provided in accordance with Section 1405.3

**Exceptions:**

*(Exceptions are unchanged and remain as printed in the 2009 IBC)*

**1405.6.2 Seismic requirements.** Anchored masonry veneer located in Seismic Design Category C, D, E, or F shall conform to the requirements of Section 6.2.2.10, except Section 6.2.2.10.3.2, of TMS 402/ACI 530/ASCE 5. |

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**1609.1.1 Determination of wind loads.** Wind loads on every building or structure shall be determined in accordance with Chapter 6 of ASCE 7 or provisions of the alternate all-heights method in Section 1609.6. The type of opening protection required, the basic wind speed and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

**Exceptions:**

1. Subject to the limitations of Section 1609.1.1.1, the provisions of ICC 600 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the AF&PA WFCM.
3. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AISI S230.
4. Designs using NAAMM FP 1001.
5. Designs using TIA-222 for antenna-supporting structures and antennas. In section 2.6.6.2, the extent of Topographic Category 2, escarpments, shall extend 16 times the height of the escarpment.
6. Wind tunnel test in accordance with Section 6.6 of ASCE 7, subject to the limitations in Section 1609.1.1.2.





**SMALL BUSINESS.** Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees, or which has a million dollars or less per year in gross sales, of window and door products.



**1715.5 Exterior window and door assemblies.** The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1714.5.1 or 1714.5.2.

**Exceptions:**

1. Structural wind load design pressures for window units smaller than the size tested in accordance with Section 1714.5.1 or 1714.5.2 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. All components of the small unit shall be the same as the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the window unit having the highest allowable design pressure.
2. Custom exterior windows and doors manufactured by a small business shall be exempt from all testing requirements in Section 1714 of the International Building Code provided they meet the applicable provisions of Chapter 24 of the International Building Code.



**2104.1 Masonry construction.** Masonry construction shall comply with the requirements of Sections 2104.1.1 through 2104.6 and with TMS 602/ACI 530.1/ASCE 6 except as modified by Sections 2104.5 and 2104.6.

(Insert Facing Page 433)

**2104.5 TMS 602/ACI 530.1/ASCE 6, Article 3.5 D, grout lift heights.** Modify items 1.b, 1.c, and 2.b of Article 3.5 D as follows:

3.5 D.1.b When the conditions of Articles 3.5 D.1.a.i and 3.5 D.1.a.ii are met but there are intermediate bond beams within the grout pour, limit the grout lift height to the bottom of the lowest bond beam that is more than 5.33 ft. (1.63 m) above the bottom of the lift, but do not exceed a grout lift height of 12.67 ft. (3.86 m).

3.5 D.1.c When the conditions of Article 3.5 D.1.a.i or Article 3.5 D.1.a.ii are not met, place grout in lifts not exceeding 5.33 ft. (1.63 m).

3.5 D.2.b When placed in masonry that has not cured for at least 4 hours, place in lifts not exceeding 5.33 ft. (1.63 m).

**2104.6 TMS 602/ACI 530.1/ASCE 6, Article 3.2F, cleanouts.** Modify the first sentence of Article 3.2F as follows:

Provide cleanouts in the bottom course of masonry for each grout pour when the grout pour height exceeds 5.33 ft. (1.63 m).

**2107.1 General.** The design of masonry structures using allowable stress design shall comply with Sections 2106, 2107.2 and the requirements of Chapters 1 and 2 of TMS 402/ACI 530/ASCE 5 except as modified by Sections 2107.3 through 2107.5.

**2107.2 Load combinations.** Structures and portions thereof shall be designed to resist the most critical effects resulting from the load combinations of Section 1605.3. When using the alternative load combinations of Section 1605.3.2 that include wind or seismic loads, allowable stresses are permitted to be increased by one third.



**2108.5 TMS 402/ACI 530/ASCE 5, Section 1.16.1 anchor bolts.** Modify the second paragraph of Section 1.16.1 as follows: Anchor bolts placed in the top of grouted cells and bond beams shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the bolts and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the bolts and the masonry unit. Anchor bolts placed in drilled holes in the face shells of hollow masonry units shall be permitted to contact the masonry unit where the bolt passes through the face shell, but the portion of the bolt that is within the grouted cell shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the head or bent leg of the bolt and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the head or bent leg of the bolt and the masonry unit.

**2107.6 TMS 402/ACI 530/ASCE 5, Section 1.16.1 anchor bolts.** Modify the second paragraph of Section 1.16.1 as follows: Anchor bolts placed in the top of grouted cells and bond beams shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the bolts and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the bolts and the masonry unit. Anchor bolts placed in drilled holes in the face shells of hollow masonry units shall be permitted to contact the masonry unit where the bolt passes through the face shell, but the portion of the bolt that is within the grouted cell shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the head or bent leg of the bolt and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the head or bent leg of the bolt and the masonry unit.

**2108.4 TMS 402/ACI 530/ASCE 5, Section 3.1.6.** Modify Section 3.1.6 as follows:

3.1.6 Headed and bent-bar anchor bolts. All embedded bolts shall be grouted in place, except that 1/4 inch (6.4 mm) diameter bolts are permitted to be placed in bed joints that are at least 1/2 inch (12.7 mm) in thickness.





**2111.7 Fireplaces.** Fireplaces shall be provided with each of the following:

1. Tightly fitting flue dampers, operated by a readily accessible manual or approved automatic control.  
**Exception:** Fireplaces with gas logs shall be installed in accordance with the International Mechanical Code Section 901, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (Liquefied Petroleum Gas Code) and NFPA 54 (National Fuel Gas Code).
2. An outside source for combustion air ducted into the firebox. The duct shall be at least 6 square inches, and shall be provided with an operable outside air duct damper.  
**Exception:** Washington certified fireplaces shall be installed with the combustion air systems necessary for their safe and efficient combustion and specified by the manufacturer in accordance with the Washington State Building Standard 31-2 (WAC 51-50-31200) and IBC Section 2114 (WAC 51-50-2114).
3. Site built fireplaces shall have tight fitting glass or metal doors, or a flue draft induction fan or as approved for minimizing back-drafting. Factory built fireplaces shall use doors listed for the installed appliance.

**2111.7.1 Lintel and throat.** Masonry over a fireplace opening shall be supported by a lintel of noncombustible material. The minimum required bearing length on each end of the fireplace opening shall be 4 inches (102 mm). The fireplace throat or damper shall be located a minimum of 8 inches (203 mm) above the top of the fireplace opening.

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**SECTION 2114  
EMISSION STANDARDS**

**2114.1 Emission Standards for Factory-built Fireplaces.**

After January 1, 1997, no new or used factory-built fireplace shall be installed in Washington State unless it is certified and labeled in accordance with procedures and criteria specified in the Washington State Building Code Standard 31-2.

To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington State Department of Ecology (DOE) approved and U. S. Environmental Protection Agency (EPA) accredited laboratory.

**2114.2 Emission Standards for Certified Masonry and Concrete Fireplaces.**

After January 1, 1997, new certified masonry or concrete fireplaces installed in Washington State shall be tested and labeled in accordance with procedures and criteria specified in the Washington State Building Code Standard 31-2.

To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying is required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington State Department of Ecology (DOE) approved and U. S. Environmental Protection Agency (EPA) accredited laboratory.



3. Any glazing material, including annealed glass, is permitted to be installed without screens in the sloped glazing systems of commercial or detached noncombustible greenhouses used exclusively for growing plants and not open to the public, provided that the height of the greenhouse at the ridge does not exceed 30 feet (9144 mm) above grade.
4. Screens shall not be required within individual dwelling units in Groups R-2, R-3 and R-4 where fully tempered glass is used as single glazing or as both panes in an insulating glass unit, and the following conditions are met:
  - 4.1. Each pane of the glass is 16 square feet (1.5 m<sup>2</sup>) or less in area.
  - 4.2. The highest point of the glass is 12 feet (3658 mm) or less above any walking surface or other accessible area.
  - 4.3. The glass thickness is 3/16 inch (4.8 mm) or less.
5. Screens shall not be required for laminated glass with a 15 mil (0.38 mm) polyvinyl butyral (or equivalent) interlayer within the following limits:
  - 5.1. Each pane of glass is 16 square feet (1.5 m<sup>2</sup>) or less in area.
  - 5.2. The highest point of the glass is 12 feet (3658 mm) or less above a walking surface or other accessible area.



**2405.3 Screening.** Where used in monolithic glazing systems, heat strengthened glass and fully tempered glass shall have screens installed below the glazing material. The screens and their fastenings shall: (1) be capable of supporting twice the weight of the glazing; (2) be firmly and substantially fastened to the framing members; and (3) be installed within 4 inches (102 mm) of the glass. The screens shall be constructed of a noncombustible material not thinner than No. 12 B&S gage (0.0808 inch) with mesh not larger than 1 inch by 1 inch (25 mm by 25 mm). In a corrosive atmosphere, structurally equivalent noncorrosive screen materials shall be used. Heat-strengthened glass, fully tempered glass and wired glass, when used in multiple-layer glazing systems as the bottom glass layer over the walking surface, shall be equipped with screening that conforms to the requirements for monolithic glazing systems.

**Exception:** In monolithic and multiple-layer sloped glazing systems, the following applies:

1. Fully tempered glass installed without protective screens where glazed between intervening floors at a slope of 30 degrees (0.52 rad) or less from the vertical plane shall have the highest point of the glass 10 feet (3048 mm) or less above the walking surface.
2. Screens are not required below any glazing material, including annealed glass, where the walking surface below the glazing material is permanently protected from the risk of falling glass or the area below the glazing material is not a walking surface.

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## Chapter 29 – MINIMUM PLUMBING FIXTURES AND SANITATION FACILITIES

(This chapter replaces IBC Chapter 29 in its entirety)

### SECTION 2901 GENERAL

**2901.1 Scope.** The provisions of this chapter shall apply to the number of plumbing fixtures and sanitation facilities to be provided in an occupancy regulated by this Code.

**2901.2 Minimum requirements.** Plumbing fixtures and sanitation facilities shall be provided in the minimum number shown in Table 2902.1 and in this Chapter. Where the proposed occupancy is not listed in Table 2902.1, the building official shall determine fixture requirements based on the occupancy which most nearly resembles the intended occupancy. The number of occupants used for determining minimum fixtures and facilities shall be computed at the rate of one occupant per unit of net floor area as prescribed in Table 2902.1

Plumbing fixtures need not be provided for unoccupied buildings or facilities.

### SECTION 2902 FIXTURES

#### 2902.1 Number of fixtures.

**2902.1.1 Private offices.** Fixtures only accessible to private offices shall not be counted to determine compliance with this section.

**2902.1.2 Occupancy load distribution.** The occupant load shall be divided equally between the sexes, unless data approved by the building official indicates a different distribution of the sexes.

**2902.1.3 Food preparation areas.** In food preparation, serving and related storage areas, additional fixture requirements may be dictated by health codes.

**2902.1.4 Other requirements.** For other requirements for plumbing facilities, see Section 1210 and Chapter 11.

#### 2902.2 Access to fixtures.

**2902.2.1 Location.** Plumbing fixtures shall be located in each building or conveniently in a building adjacent thereto on the same property.

**2902.2.1.1 Toilet rooms.** Toilet rooms shall not open directly into a room used for the preparation of food for service to the public or residents of Group R-2 boarding homes and residential treatment facilities licensed by Washington State.

**2902.2.2 Multiple tenants.** Access to toilets serving multiple tenants shall be through a common use area and not through an area controlled by a tenant.

**2902.2.3 Multistory buildings.** Required fixtures shall not be located more than one vertical story above or below the area served.

### SECTION 2903 FACILITIES

**2903.1 Requirements.** Separate toilet facilities shall be provided for each sex.

**Exception:** In occupancies serving 15 or fewer persons, one toilet facility designed for use by no more than one person at a time shall be permitted for use by both sexes.

**2903.2 Food service establishments.** When customers and employees share the same toilet rooms, customer access to the toilet rooms shall not pass through food preparation and unpackaged food storage areas.

**2903.3 Pay facilities.** Required facilities shall be free of charge. Where pay facilities are installed, they shall be in addition to the minimum required facilities.

### SECTION 2904 SPECIAL PROVISIONS

**2904.1 Dwelling units.** Dwelling units shall be provided with a kitchen sink.

**2904.2 Water closet space requirements.** The water closet stool in all occupancies shall be located in a clear space not less than 30 inches (762 mm) in width, with a clear space in front of the stool of not less than 24 inches (610 mm).

**2904.3 Water.** Each required sink, lavatory, bathtub and shower stall shall be equipped with hot and cold running water necessary for its normal operation.

#### 2904.4 Drinking fountains.

**2904.4.1 Number.** Occupant loads over 30 shall have one drinking fountain for the first 150 occupants, then one per each additional 500 occupants.

##### Exceptions:

1. Sporting facilities with concessions serving drinks shall have one drinking fountain for each 1000 occupants.
2. A drinking fountain need not be provided in a drinking or dining establishment.

**2904.4.2 Multistory buildings.** Drinking fountains shall be provided on each floor having more than 30 occupants in schools, dormitories, auditoriums, theaters, offices and public buildings.

**2904.4.3 Penal Institutions.** Penal institutions shall have one drinking fountain on each cell block floor and one on each exercise floor.

**2904.4.4 Location.** Drinking fountains shall not be located in toilet rooms.

(Insert Replacing Page 549)

**TABLE 2902.1 – MINIMUM PLUMBING FIXTURES 1,2,4,6**

TYPE OF BUILDING OR OCCUPANCY <sup>8</sup>	WATER CLOSETS (fixtures per person)		LAVATORIES <sup>9</sup> (fixtures per person)		BATHTUB OR SHOWER (fixtures per person)
	MALE <sup>3</sup>	FEMALE	MALE	FEMALE	
For the occupancies listed below, use 30 square feet (2.79 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
<b>Group A</b> Assembly places -- Conference rooms, dining rooms, drinking establishments, exhibit rooms, gymnasiums, lounges, stages and similar uses including restaurants classified as Group B occupancies	1:1-25 2:26-75 3:76-125 4:126-200 5:201-300 6:301-400 Over 400, add one fixture for each additional 200 males or 150 females.	1:1-25 2:26-75 3:76-125 4:126-200 5:201-300 6:301-400	one per 2 water closets		
For the assembly occupancies listed below, use the number of fixed seating or, where no fixed seating is provided, use 15 square feet (1.39 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
Assembly places <sup>9</sup> -- Theaters, auditoriums, convention halls, dance floors, lodge rooms, casinos, and such places which have limited time for fixture use (intermissions)	1:1-100 2:101-200 3:201-400 Over 400, add one fixture for each additional 250 males or 50 females.	One per 25 up to 400	1:1-200 2:201-400 3:401-750 Over 750, add one fixture for each additional 500 persons.	1:1-200 2:201-400 3:401-750	
Assembly places -- Stadiums, arena and other sporting facilities where fixture use is not limited to intermissions.	1:1-100 2:101-200 3:201-400 Over 400, add one fixture for each additional 300 males or 100 females.	One per 50 up to 400	1:1-200 2:201-400 3:401-750 Over 750, add one fixture for each additional 500 persons.	1:1-200 2:201-400 3:401-750	
For the assembly occupancies listed below, use the number of fixed seating or, where no fixed seating is provided, use 30 square feet (2.79 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
Worship places Principal assembly area Educational & activity unit	one per 150 one per 125	one per 75 one per 75	one per 2 water closets one per 2 water closets		
For the occupancies listed below, use 200 square feet (18.58 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures					
<b>Group B</b> and other clerical or administrative employee accessory use	1:1-15 2:16-35 3:36-55 Over 55, add one for each additional 50 persons.	1:1-15 2:16-35 3:36-55	one per 2 water closets		
For the occupancies listed below, use 100 square feet ( 9.3 m <sup>2</sup> ) per student for the minimum number of plumbing fixtures.					
<b>Group E</b> Schools -- for staff use All schools (One staff per 20 students)  Schools -- for student use Day care  Elementary Secondary	1:1-15 2:16-35 3:36-55 Over 55, add one fixture for each additional 40 persons.  1:1-20 2:21-50 Over 50, add one fixture for each additional 50 persons.  one per 30 one per 40	1:1-15 2:16-35 3:36-55  1:1-20 2:21-50  one per 25 one per 30	one per two water closets  1:1-20 2:21-50 Over 50, add one fixture for each additional 50 persons.  one per two water closets one per two water closets		

(Insert Replacing Page 550)

**TABLE 2902.1 – MINIMUM PLUMBING FIXTURES 1,2,4,6**  
(Continued)

TYPE OF BUILDING OR OCCUPANCY <sup>8</sup>	WATER CLOSETS (fixtures per person)		LAVATORIES <sup>5</sup> (fixtures per person)		BATHTUB OR SHOWER (fixtures per person)
	MALE <sup>3</sup>	FEMALE	MALE	FEMALE	
For the occupancies listed below, use 50 square feet (4.65 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
<b>Education Facilities other than Group E</b> Others (colleges, universities, adult centers, etc.)	one per 40	one per 25	one per two water closets		
For the occupancies listed below, use 2,000 square feet (185.8 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
<b>Group F and Group H</b> Workshop, foundries and similar establishments, and hazardous occupancies	1:1-10 2:11-25 3:26-50 4:51-75 5:76-100 Over 100, add one fixture for each additional 30 persons.	1:1-10 2:11-25 3:26-50 4:51-75 5:76-100	one per two water closets		one shower for each 15 persons exposed to excessive heat or to skin contamination with irritating materials
For the occupancies listed below, use the designated application and 200 square feet (18.58 m <sup>2</sup> ) per occupant of the general use area for the minimum number of plumbing fixtures.					
<b>Group I</b> <sup>7</sup> Hospital waiting rooms  Hospital general use areas	one per room (usable by either sex)  1:1-15 2:16-35 3:36-55 Over 55, add one fixture for each additional 40 persons.	1:1-15 3:16-35 4:36-55	one per room  one per two water closets		
<b>Hospital patient rooms:</b> Single Bed  Isolation  Multi-Bed Long-term	one adjacent to and directly accessible from  one adjacent to and directly accessible from  one per four patients one per four patients		one per toilet room  one per toilet room  one per four patients one per four patients		one per toilet room  one per toilet room  one per eight patients one per 15 patients
<b>Jails and reformatories</b> Cell Exercise room	one per cell one per exercise room		one per cell one per exercise room		
<b>Other institutions</b> (on each occupied floor)	one per 25	one per 25	one per two water closets		one per eight
For the occupancies listed below, use 200 square feet (18.58 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
<b>Group M</b> Retail or wholesale stores	1:1-50 2:51-100 3:101-400  Over 400, add one fixture for each additional 300 males or 150 females.	1:1-50 2:51-100 3:101-200 4:201-300 5:301-400	one per two water closets		

(Insert Replacing Page 551)

**TABLE 2902.1 – MINIMUM PLUMBING FIXTURES 1,2,4,6**  
(Continued)

TYPE OF BUILDING OR OCCUPANCY <sup>8</sup>	WATER CLOSETS (fixtures per person)		LAVATORIES <sup>5</sup> (fixtures per person)		BATHTUB OR SHOWER (fixtures per person)
	MALE <sup>3</sup>	FEMALE	MALE	FEMALE	
For Group R occupancies containing dwelling units or guest rooms, use the table below. For dormitories, use 200 square feet (18.58 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
<b>Group R</b>					
Dwelling units	one per dwelling unit		one per dwelling unit		one per dwelling unit
Hotel, Motel, and Boarding house guest rooms	one per guest room		one per guest room		one per guest room
Boarding homes licensed by the Department of Social and Health Services	one per 8	one per 8	one per 8	one per 8	one per 12
Dormitories	one per 10 Over 10, add one fixture for each additional 25 males and over 8, add one for each additional 20 females.	one per 8	one per 12 over 12, add one fixture for each additional 20 males and one for each additional 15 females.	one per 12	one per eight For females, add one additional unit per each additional 30. Over 150 persons, add one additional unit per each additional 20 persons.
For the occupancies listed below, use 5,000 square feet (464.5 m <sup>2</sup> ) per occupant for the minimum number of plumbing fixtures.					
<b>Group S</b>					
Warehouses	1:1-10 2:11-25 3:26-50 4:51-75 5:76-100 Over 100, add one for each 30 persons.	1:1-10 2:11-25 3:26-50 4:51-75 5:76-100	One per 40 occupants of each sex.		one shower for each 15 persons exposed to excessive heat or to skin contamination with poisonous, infectious or irritating materials.

<sup>1</sup>The figures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction thereof.

<sup>2</sup>For occupancies not shown, see Section 2901.2.

<sup>3</sup>Where urinals are provided, one water closet less than the number specified may be provided for each urinal installed, except the number of water closets in such cases shall not be reduced to less than one quarter (25%) of the minimum specified. For men's facilities serving 26 or more persons, not less than one urinal shall be provided.

<sup>4</sup>For drinking fountains, see Section 2904.4.

<sup>5</sup>Twenty-four inches (610 mm) of wash sink or 18 inches (457 mm) of a circular basin, when provided with water outlets for such space, shall be considered equivalent to one lavatory.

<sup>6</sup>For when a facility may be usable by either sex, see Section 2903.1.

<sup>7</sup>See WAC 246-320 for definitions, other fixtures and equipment for hospitals.

<sup>8</sup>When a space is accessory to or included as a part of a different occupancy group per Chapter 3, the area per occupant for the minimum plumbing fixture number is to be determined by its own specific use or purpose, not by that of the building's occupancy group.

<sup>9</sup>In multiplex movie theaters, where shows are scheduled at different times, the number of occupants for toilet fixture use may be based upon one-half (50%) of the total in all the auditoriums, but no less than the number in the largest auditorium.



**3002.4 Elevator car to accommodate ambulance stretcher.** In buildings four stories in height or more, and in buildings which are required to have an elevator and contain Group R-1, R-2 or I Occupancies on a level other than the exit discharge level, at least one elevator shall be provided for fire department emergency access to all floors. Such elevator car shall be of such a size and arrangement to accommodate a 24-inch by 84-inch (610 mm by 2134 mm) ambulance stretcher with not less than 5-inch (127 mm) radius corners, in the horizontal, open position and shall be identified by the international symbol for emergency medical services (star of life). The symbol shall not be less than 3 inches (76 mm) high and shall be placed inside on both sides of the hoistway door frame.

car in the hoistway, whichever is greater. The total required vent area shall be equipped with dampers that remain powered closed until activated open by the fire alarm system panel. The dampers shall open upon loss of power.



**3004.3 Area of vents.** Except as provided for in Section 3004.3.1, the area of the vents shall not be less than 3-1/2 percent of the area of the hoistway nor less than 3 square feet (0.28m<sup>2</sup>) for each elevator car, and not less than 3-1/2 percent nor less than 0.5 square feet (0.047 m<sup>2</sup>) for each dumbwaiter

**(Insert Facing Page 554)**

**3006.2 Venting.** Machinery spaces, machine rooms, control spaces, and control rooms that contain solid-state equipment for elevator operation shall be provided with an independent ventilation or air-conditioning system to protect against the overheating of the electrical equipment. Ventilation systems shall use outdoor makeup air. The system shall service the equipment space only, and shall be capable of maintaining the temperature and humidity within the range established by the manufacturer's specifications. Where no manufacturer specifications are available, the equipment space temperature shall be maintained at no less than 55°F and no more than 90°F.

The cooling load for the equipment shall include the BTU output of the elevator operation equipment as specified by the manufacturer based on one hour of continuous operation. The outdoor design temperature for ventilation shall be from the 0.5% column for summer from the Puget Sound Chapter of ASHRAE publication "*Recommended Outdoor Design Temperatures, Washington State.*" The following formula shall be used to calculate flow rate for ventilation:

$$\text{CFM} = \text{BTU output of elevator machine room equipment} / [1.08 \times (\text{acceptable machine room temp} - \text{makeup air temp})]$$

**Exception:** For buildings four stories or less, natural or mechanical means may be used in lieu of an independent ventilation or air-conditioning system to keep the equipment space ambient air temperature and humidity in the range specified by the elevator equipment manufacturer.



**3103.1 General.** The provisions of this section shall apply to structures erected for a period of less than 180 days. Tents and other membrane structures erected for a period of less than 180 days shall comply with the International Fire Code. Those erected for a longer period of time shall comply with the applicable sections of this code.

**Exception:** The building official may authorize unheated tents and yurts under 500 square feet accommodating an R-1 occupancy for recreational use as a temporary structure and allow them to be used indefinitely.

(Insert Facing Page 560)



**3109.3 Public swimming pools.** This section is not adopted. Public swimming pools barriers are regulated by WAC 246-260-031(4).

**3108.1 General.** Towers shall be designed and constructed in accordance with the provisions of TIA-222. In Section 2.6.6.2, the extent of Topographic Category 2, escarpments, shall extend 16 times the height of the escarpment. Towers shall be designed for seismic loads. The exceptions to the requirement of seismic design listed in Section 2.7.3 shall not apply. Class I structures per Table 2-1 of the standard may be exempted from seismic design, if approved by the building official.

**Exception:** Single free-standing poles used to support antennas not greater than 75 feet (22,860 mm), measured from the top of the pole to grade, shall not be required to be noncombustible.

**(Insert Facing Page 562)**





**3401.5 Alternative compliance.** Work performed in accordance with the 2009 International Existing Building Code as amended in WAC 51-50-480000 shall be deemed to comply with the provisions of this chapter.

**(Insert Facing Page 571)**

**3404.1 General.** Except as provided by Section 3401.4 or this section, alterations to any building or structure shall comply with the requirements of the Code for new construction. Alterations shall be such that the existing building or structure is no less conforming with the provisions of this Code than the existing building or structure was prior to the alteration.

**Exceptions:**

1. An existing stairway shall not be required to comply with the requirements of Section 1009 where the existing space and construction does not allow a reduction in pitch or slope.
2. Handrails otherwise required to comply with Section 1009.12 shall not be required to comply with the requirements of Section 1012.6 regarding full extension of the handrails where such extensions would be hazardous due to plan configuration.
3. In buildings considered existing structures on July 1, 2010, dwelling units shall be permitted to have a ceiling height of not less than 7 feet (2134 mm).







**3410.1 Conformance.** Buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code, the International Residential Code (WAC 51-51), the International Mechanical Code (WAC 51-52), the International Fire Code (WAC 51-54), the Uniform Plumbing Code and Standards (WAC 51-56 and 51-57), the Washington State Energy Code (WAC 51-11) and the Washington State Ventilation and Indoor Air Quality Code (WAC 51-13) for new buildings or structures.

**Exception:** Group R-3 buildings or structures are not required to comply if:

1. The original occupancy classification is not changed, and
2. The original building is not substantially remodeled or rehabilitated.

For the purposes of this section a building shall be considered to be substantially remodeled when the costs of remodeling exceed 60 percent of the value of the building exclusive of the costs relating to preparation, construction, demolition or renovation of foundations.

**Exceptions:**

1. The costs of providing the accessible route are not required to exceed 20 percent of the costs of the alteration affecting the area of primary function.
2. This provision does not apply to alterations limited solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to alterations limited solely to mechanical systems, electrical systems, installation or alteration of fire protection systems and abatement of hazardous materials.
4. This provision does not apply to alterations undertaken for the primary purpose of increasing the accessibility of an existing building, facility or element.

**3411.7 Alterations affecting an area containing a primary function.** Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities, telephones or drinking fountains serving the area of primary function.

**(Insert Facing Page 576)**

**3411.8.11 Toilet rooms.** Where it is technically infeasible to alter existing toilet and bathing facilities to be accessible, an accessible family or assisted use toilet or bathing facility constructed in accordance with Section 1109.2.1 is permitted. The family or assisted use facility shall be located on the same floor and in the same area as the existing facility. The number of toilet facilities and water closets required by the State Building Code is permitted to be reduced by one, in order to provide accessible features.

**WAC 51-50-31200****Washington State Building Code Standard 31-2  
STANDARD TEST METHOD FOR PARTICULATE EMISSIONS FROM FIREPLACES**

See Section 2114, International Building Code

*(Insert Following Page 606)***SECTION 31.200 — TITLE and SCOPE****SECTION 31.200.1 TITLE**

This Appendix Chapter 31-2 shall be known as the "Washington State Standard Test Method for Particulate Emissions from Fireplaces" and may be cited as such; and will be referred to herein as "this Standard".

**SECTION 31.200.2 SCOPE**

This Standard covers emissions performance, approval/certification procedures, test laboratory accreditation, record keeping, reporting requirements, and the test protocol for measuring particulate emissions from fireplaces.

All testing, reporting and inspection requirements of this Standard shall be conducted by a Washington State Department of Ecology (DOE) approved testing laboratory. In order to qualify for DOE approval, the test laboratory must be a U. S. Environmental Protection Agency (EPA) accredited laboratory (40 CFR Part 60, Subpart AAA). DOE may approve a test laboratory upon submittal of the following information:

1. A copy of their U. S. EPA accreditation certificate; and
2. A description of their facilities, test equipment, and test-personnel qualifications including education and work experience.

DOE may revoke a test laboratory approval when the test laboratory is no longer accredited by the U. S. EPA or if DOE determines that the test laboratory does not adhere to the testing requirements of this Chapter.

**SECTION 31.201 — DEFINITIONS**

For the purpose of this Standard certain terms are defined as follows:

**ANALYZER CALIBRATION ERROR** is the difference between the gas concentration exhibited by the gas analyzer and the known concentration of the calibration gas when the calibration gas is introduced directly to the analyzer.

**BURN RATE** is the average rate at which test-fuel is consumed in a fireplace measured in kilograms of wood (dry basis) per hour (kg/hr) during a test-burn.

**CALIBRATION DRIFT** is the difference in the analyzer reading from the initial calibration response at a mid-range calibration value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

**CALIBRATION GAS** is a known concentration of Carbon Dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), or Oxygen (O<sub>2</sub>) in Nitrogen (N<sub>2</sub>).

**CERTIFICATION or AUDIT TEST** is the completion of at least one, three-fuel-load test-burn cycle in accordance with Section 31.202.

**FIREBOX** is the chamber in the fireplace in which a test-fuel charge(s) is placed and combusted.

**FIREPLACE** is a wood burning device which is exempt from U. S. EPA 40 CFR Part 60, Subpart AAA and:

1. is not a cookstove, boiler, furnace, or pellet stove as defined in 40 CFR Part 60, Subpart AAA, and
2. is not a masonry heater as defined in Section 31.201.

**FIREPLACE, CERTIFIED**, is a fireplace that meets the emission performance standards when tested according to Washington State Building Code Standard 31-2.

**FIREPLACE, NON-CERTIFIED**, (masonry or concrete) is any fireplace that is not a certified fireplace. A non-certified fireplace will be subject to applicable burn ban restrictions.

**FIREPLACE DESIGN** is the construction and/or fabrication specifications including all dimensions and materials required for manufacturing or building fireplaces with identical combustion function and particulate emissions factors.

**FIREPLACE MODEL LINE** is a series of fireplace models which all have the same internal assembly. Each model in a model line may have different facade designs and external decorative features.

**INTERNAL ASSEMBLY** is the core construction and firebox design which produces the same function and emissions factor for a fireplace model line.

**(Insert as Page 606a)**

**MASONRY HEATER** is a heating system of predominantly masonry construction having a mass of at least 800 kg (1760 lbs), excluding the chimney and foundation, which is designed to absorb a substantial portion of the heat energy from a rapidly-burned charge of solid fuel by:

- a) routing of exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes at least one 180 degree change in flow direction, usually downward, before entering the chimney, and
- b) being constructed of sufficient mass such that under normal operating conditions the external surface of the heater, except in the region immediately surrounding the fuel loading door(s), does not exceed 110°C (230°F).

Masonry heaters shall be listed or installed in accordance with ASTM E-1602.

**RESPONSE TIME** is the amount of time required for the measurement system to display 95 percent of a step change in gas concentration.

**SAMPLING SYSTEM BIAS** is the difference between the gas concentrations exhibited by the analyzer when a known concentration gas is introduced at the outlet of the sampling probe and when the sample gas is introduced directly to the analyzer.

**SPAN** is the upper limit of the gas concentration measurement range (25 percent for CO<sub>2</sub>, O<sub>2</sub>, and 5 percent for CO).

**TEST FACILITY** is the area in which the fireplace is installed, operated, and sampled for emissions.

**TEST FUEL LOADING DENSITY** is the weight of the as-fired test-fuel charge per unit area of usable firebox floor (or hearth).

**TEST-BURN** is an individual emission test which encompasses the time required to consume the mass of three consecutively burned test-fuel charges.

**TEST-FUEL CHARGE** is the collection of test fuel pieces placed in the fireplace at the start of certification test.

**USABLE FIREBOX AREA** is the floor (or hearth) area, within the fire chamber of a fireplace upon which a fire may be, or is intended to be built. Usable firebox area is calculated using the following definitions:

1. Length. The longest horizontal fire chamber dimension along the floor of the firebox that is parallel to a wall of the fire chamber.
2. Width. The shortest horizontal fire chamber dimension along the floor of the firebox that is parallel to a wall of the fire chamber.

3. For angled or curved firebox walls and/or sides, the effective usable firebox area shall be determined by calculating the sum of standard geometric areas or sub-areas of the firebox floor.

If a fireplace has a floor area within the fire chamber which is larger than the area upon which it is intended that fuel be placed and burned, the usable firebox area shall be calculated as the sum of standard geometric areas or sub-areas of the area intended for fuel placement and burning. For fireplace grates which elevate the fuel above the firebox floor, usable firebox area determined in this manner shall be multiplied by a factor of 1.5. The weight of test-fuel charges for fireplace-grate usable-firebox-area tests, shall not exceed the weight of test-fuel charges determined for the entire fireplace floor area.

**ZERO DRIFT** is the difference in the analyzer reading from the initial calibration response at the zero concentration level after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

## SECTION 31.202 — TESTING

**31.202.1 Applicability.** This method is applicable for the certification and auditing of fireplace particulate emission factors. This method describes the test facility, fireplace installation requirements, test-fuel charges, and fireplace operation as well as procedures for determining burn rates and particulate emission factors.

**31.202.2 Principle.** Particulate matter emissions are measured from a fireplace burning prepared test-fuel charges in a test facility maintained at a set of prescribed conditions.

### 31.202.3 Test Apparatus.

**31.202.3.1 Fireplace Temperature Monitors.** Devices capable of measuring flue-gas temperature to within 1.5 percent of expected absolute temperatures.

**31.202.3.2 Test Facility Temperature Monitor.** A thermocouple located centrally in a vertically oriented pipe shield 6 inches (150 mm) long, 2 inches (50 mm) diameter that is open at both ends, capable of measuring air temperature to within 1.5 percent of expected absolute temperatures.

**31.202.3.3 Balance.** Balance capable of weighing the test-fuel charge(s) to within 0.1 lb (0.05 kg).

**31.202.3.4 Moisture Meter.** Calibrated electrical resistance meter for measuring test-fuel moisture to within 1 percent moisture content (dry basis).

**31.202.3.5 Anemometer.** Device capable of detecting air velocities less than 20 ft/min (0.10 m/sec), for measuring air velocities near the fireplace being tested.

**31.202.3.6 Barometer.** Mercury, aneroid or other barometer capable of measuring atmospheric pressure to within 0.1 inch Hg (2.5 mm Hg).

**31.202.3.7 Draft Gauge.** Electromanometer or other device for the determination of flue draft (i.e., static pressure) readable to within 0.002 inches of water column (0.50 Pa).

**31.202.3.8 Combustion Gas Analyzer.** Combustion gas analyzers for measuring Carbon Dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), and Oxygen (O<sub>2</sub>) in the fireplace exhaust-gas stream must meet all of the following measurement system performance specifications:

1. **Analyzer Calibration Error.** Shall be less than  $\pm 2$  percent of the span value for the zero, mid-range, and high-range calibration gases.

2. **Sampling System Bias.** Shall be less than  $\pm 5$  percent of the span value for the zero, mid-range, and high-range calibration gases.

3. **Zero Drift.** Shall be less than  $\pm 3$  percent of the span over the period of each run.

4. **Calibration Drift.** Shall be less than  $\pm 3$  percent of the span value over the period of each run.

5. **Response Time.** Shall be less than 1.5 minutes.

**31.202.4 Emissions Sampling Method.** Use the emission sampler system (ESS) as described in Section 31.203.12 or an equivalent method as determined by the application of the U. S. EPA Method 301 Validation Procedure (Federal Register, December 12, 1992, Volume 57, Number 250, page 11998) and upon approval of DOE.

**31.202.5 Fireplace Installation and Test Facility Requirements.** The fireplace being tested must be constructed, if site-built, or installed, if manufactured, in accordance with the designer's / manufacturer's written instructions. The chimney shall have a total vertical height above the base of the fire chamber of not less than 15 feet (4 600 mm). The fireplace chimney exit to the atmosphere must be freely communicating with the fireplace combustion makeup-air source. There shall be no artificial atmospheric pressure differential imposed between the chimney exit to the atmosphere and the fireplace makeup-air inlet.

**31.202.6 Fireplace Aging and Curing.** A fireplace of any type shall be aged before certification testing begins. The aging procedure shall be conducted and documented by the testing laboratory.

**31.202.6.1 Catalyst-Equipped Fireplaces.** Operate the catalyst-equipped fireplace using fuel described in Section 31.203. Operate the fireplace with a new catalytic combustor in place and in operation for at least 50 hours. Record and report hourly catalyst exit temperatures, the hours of operation, and the weight of all fuel used.

**31.202.6.2 Non-Catalyst-Equipped Fireplaces.** Operate the fireplace using the fuel described in Section 31.203 for at least 10 hours. Record and report the hours of operation and weight of all fuel used.

**31.202.7 Pretest Preparation.** Record the test-fuel charge dimensions, moisture content, weights, and fireplace (and catalyst if equipped) descriptions.

The fireplace description shall include photographs showing all externally observable features and drawings showing all internal and external dimensions needed for fabrication and/or construction. The drawings must be verified as representing the fireplace being tested and signed by an authorized representative of the testing laboratory.

**31.202.8 Test Facility Conditions.** Locate the test facility temperature monitor on the horizontal plane that includes the primary air intake opening for the fireplace. Locate the temperature monitor 3 to 6 feet (1 000 to 2 000 mm) from the front of the fireplace in the 90° sector in front of the fireplace. Test facility temperatures shall be maintained between 65° and 90°F (18° and 32°C). Use an anemometer to measure the air velocity. Measure and record the room-air velocity within 2 feet (600 mm) of the test fireplace before test initiation and once immediately following the test-burn completion. Air velocity shall be less than 50 feet/minute (250 mm/second) without the fireplace operating.

## SECTION 31.203 — TEST PROTOCOL

**31.203.1 Test Fuel.** Fuel shall be air dried Douglas fir dimensional lumber or cordwood without naturally associated bark. Fuel pieces shall not be less than 1/2 nor more than 5/6 of the length of the average fire chamber width. Fuel shall be split or cut into pieces with no cross-sectional dimension greater than 6 inches (152 mm). Spacers, if used, shall not exceed 3/4 inches (19 mm) in thickness and 15 percent of the test-fuel charge weight. Fuel moisture shall be in the range of 16 to 20 percent (wet basis) or 19 to 25 percent (dry basis) meter reading.

**31.203.2 Test-Fuel Loading Density.** The wet (with moisture) minimum weight of each test-fuel charge shall be calculated by multiplying the hearth area in square feet by 7.0 pounds per square foot (square meters x 0.30 kg/m<sup>2</sup>) ( $\pm 10$  percent). Three test-fuel charges shall be prepared for each test-burn.

**31.203.3 Kindling.** The initial test-fuel charge of the three test-fuel charge test-burn shall be started by using a kindling-fuel charge which is up to 50 percent of the first test-fuel charge weight. Kindling-fuel pieces can be any size needed to start the fire or whatever is recommended in the manufacturer's (builder's) instructions to consumers. The kindling-fuel charge weight is not part of the initial test-fuel charge weight but is in addition to it.

(Insert as Page 606c)

**31.203.4 Test-Burn Ignition.** The fire can be started with or without paper. If used, the weight of the paper must be included in test-fuel charge weight. The remainder of the test-fuel charge may be added at any time after kindling ignition except that the entire first test-fuel charge must be added within 10 minutes after the start of the test (i.e., the time at which the flue-gas temperature at the 8-foot (2 440 mm) level is over 25°F (14°C) greater than the ambient temperature of the test facility).

**31.203.5 Test Initiation.** Emissions and flue-gas sampling are initiated immediately after the kindling has been ignited and when flue-gas temperatures in the center of the flue at an elevation of 8 feet (2 440 mm) above the base (floor) of the fire chamber reach 25°F (14°C) greater than the ambient temperature of the test facility.

**31.203.6 Sampling Parameters.** Sampling (from the 8-foot [2 440 mm] flue-gas temperature measurement location) must include:

1. Particulate Emissions
2. Carbon Dioxide (CO<sub>2</sub>)<sup>1</sup>
3. Carbon Monoxide (CO)<sup>1</sup>
4. Oxygen (O<sub>2</sub>)<sup>1</sup>
5. Temperature(s)

<sup>1</sup> These gases shall be measured on-line (real-time) and recorded at a frequency of not less than once every 5 minutes. These 5-minute readings are to be arithmetically averaged over the test-burn series or alternatively, a gas bag sample can be taken at a constant sample rate over the entire test-burn series and analyzed for the required gases within one hour of the end of the test-burn.

If a fireplace is equipped with an emissions control device which is located downstream from the 8-foot (2 440 mm) flue-gas temperature measurement location, a second temperature, particulate, and gaseous emissions sampling location must be located downstream from the emissions control device but not less than 4 flue diameters upstream from the flue exit to the atmosphere. The two sampling locations must be sampled simultaneously during testing for each fireplace configuration being tested.

**31.203.7 Test-Fuel Additions and Test Completion.** The second and third test-fuel charges for a test-burn may be placed and burned in the fire chamber at any time deemed reasonable by the operator or when recommended by the manufacturer's and/or builder's instructions to consumers.

No additional kindling may be added after the start of a test-burn series and the flue-gas temperature at the 8-foot (2 440 mm) level above the base of the hearth must always be 25°F (14°C) greater than the ambient temperature of

the test facility for a valid test-burn series. Each entire test-fuel charge must be added within 10 minutes from the addition of the first piece.

A test (i.e., a three test-fuel charge test-burn series) is completed and all sampling and measurements are stopped when all three test-fuel charges have been consumed (to more than 90 percent by weight) in the firebox and the 8-foot (2 440 mm) level flue-gas temperature drops below 25°F (14°C) greater than the ambient temperature of the test facility. Within 5 minutes after the test-burn is completed and all measurements and sampling has stopped, the remaining coals and/or unburned fuel, shall be extinguished with a carbon dioxide fire extinguisher. All of the remaining coals, unburned fuel, and ash shall be removed from the firebox and weighed to the nearest 0.1 pound (0.05 kg). The weight of these unburned materials and ash shall be subtracted from the total test-burn fuel weight when calculating the test-burn burn rate. A test-burn is invalid if less than 90 percent of the weight of the total test-fuel charges plus the kindling weight have been consumed in the fireplace firebox.

**31.203.8 Test-Fuel Charge (Load) Adjustments.** Test-fuel charges may be adjusted (i.e., repositioned) once during the burning of each test-fuel charge. The time used to make this adjustment shall be less than 15 seconds.

**31.203.9 Air Supply Adjustment.** Air supply controls, if the fireplace is equipped with controls, may not be adjusted during any test-burn series after the first 10 minutes of startup of each fuel load. All air supply settings must be set to the lowest level at the start of a test and shall remain at the lowest setting throughout a test-burn.

**31.203.10 Auxiliary Fireplace Equipment Operation.** Heat exchange blowers (standard or optional) sold with the fireplace shall be operated during all test-burns following the manufacturer's written instructions. If no manufacturer's written instructions are available, operate the heat exchange blower in the "high" position. (Automatically operated blowers shall be operated as designed.) Shaker grates, bypass controls, afterburners, or other auxiliary equipment may be adjusted only once per test-fuel charge following the manufacturer's written instructions. Record and report all adjustments on a fireplace operational written-record.

**31.203.11 Fireplace Configurations.** One, 3 test-fuel charge test-burn shall be conducted for each of the following fireplace operating configurations:

1. Door(s) closed, with hearth grate;
2. Door(s) open, with hearth grate;
3. Door(s) closed, without hearth grate;
4. Door(s) open, without hearth grate; and
5. With no door(s), and draft inducer on.



No test-burn series is necessary for any configuration the appliance design cannot or is not intended to accommodate. If a configuration is not tested, the reason must be submitted with the test report and the appliance label must state that the appliance cannot be used in that configuration by consumer users.

One emission factor result, or one emission factor average, as provided in paragraph 31.203.11.2, from each fireplace configuration tested shall be compiled into an arithmetic average of all the configurations tested for determining compliance with the requirements of paragraph 31.204.2.

**31.203.11.1 Closed-Door(s) Testing.** For all closed-door test configurations, the door(s) must be closed within 10 minutes from the addition of the first test-fuel piece of each test-fuel charge in a test-burn. During a test-burn, the door(s) cannot be re-opened except during test-fuel reload and adjustment as referenced in Sections 31.203.7 and 31.203.8.

**31.203.11.2 Additional Test-Burn.** The testing laboratory may conduct more than one test-burn series for each of the applicable configurations specified in Section 31.203.11. If more than one test-burn is conducted for a specified configuration, the results from at least 2/3 of the test-burns for that configuration shall be used in calculating the arithmetic average emission factor for that configuration. The measurement data and results of all tests conducted shall be reported regardless of which values are used in calculating the average emission factor for that configuration.

**31.203.12 Emissions Sampling System (ESS).**

**31.203.12.1 Principle.** Figure 31-2-1 shows a schematic of an ESS for sampling solid-fuel-fired fireplace emissions. Except as specified in Section 31.202.4, an ESS in this configuration shall be used to sample all fireplace emissions. The ESS shall draw flue gases through a 15 inch (380 mm) long, 3/8 inch (10 mm) O.D. stainless steel probe which samples from the center of the flue at an elevation which is 8 feet (2 440 mm) above the floor of the firebox (i.e., the hearth). A flue-gas sample shall then travel through a 3/8 inch (10 mm) O.D. Teflon® tube, and a heated U. S. EPA Method 5-type glass-fiber filter (40 CFR Part 60, Appendix A) for collection of particulate matter. The filter shall be followed by an in-line flow-through cartridge containing 20 grams of XAD-2 sorbent resin for collecting semi-volatile hydrocarbons. Water vapor shall then be removed from the sampled gas by a silica-gel trap. Flue-gas oxygen concentrations, which shall be used to determine the ratio of flue-gas volume to the amount of fuel burned, are measured within the ESS system by an electrochemical cell meeting the performance specifications presented in Section 31.202.3.8 (1).

The ESS shall use a critical orifice to maintain a nominal flue-gas sampling rate of 0.035 cfm (0.0167 liters per second). The actual flow rate through each critical orifice shall be determined to within 0.000354 cubic feet (0.01 liters) per second before and after each test-burn with a bubble flow meter to document exact sampling rates. The post-test-burn critical-orifice flow-rate determinations shall be performed before the ESS is dismantled for sample recovery and clean-up. Pre-test-burn and post-test-burn critical-orifice flow-rate measurements shall be within 0.0000117 cubic feet (0.00033 liters) per second of each other or the test-burn emissions results shall be invalid. Temperatures shall be monitored using type K ground-isolated, stainless-steel-sheathed thermocouples.

The ESS unit shall return particle-free and dry exhaust gas to the flue via a 1/4 inch (6 mm) Teflon® line and a 15 inch (380 mm) stainless steel probe inserted into the flue. A subsample aliquot of the flue-gas sample-gas stream exiting the ESS unit, shall be pumped into a 1 cubic foot (29 liter) Tedlar® bag for measuring the average carbon dioxide, carbon monoxide, and confirmation of average oxygen concentrations for the test period. Flow to the subsample gas bag shall be controlled by a solenoid valve connected to the main pump circuit and a fine-adjust needle-controlled flow valve. The solenoid valve shall be open only when the pump is activated, allowing the subsample gas to be pumped into the gas bag at all times when the ESS pump is on. The rate of flow into the bag shall be controlled by the fine-adjust metering needle-valve which is adjusted at setup so that 4.7 to 5.2 gal (18 to 20 liters) of gas is collected over the entire 3 test-fuel charge test-burn without over-pressurizing the gas sample bag.

**31.203.12.2 The Data Acquisition and Control System.** The data acquisition and control system for the ESS is shown in Figure 31-2-2. This system consists of a personal computer (PC) containing an analog-to-digital data processing board (12-bit precision), a terminal (connection) box, and specialized data acquisition and system control software (called CONLOG).

For fireplace testing, the CONLOG software is configured to control, collect, and store the following data:

1. Test-period starting and ending times and dates, and total length of sampling period,
2. Pump-cycle on/off, cycle length and thermocouple (TC) cycle recording interval (frequency),
3. Temperature records, including flue-gas and ambient temperatures, averaged over pre-selected intervals,
4. Date, times, and weights of each added fuel load, and

(Insert as Page 606e)

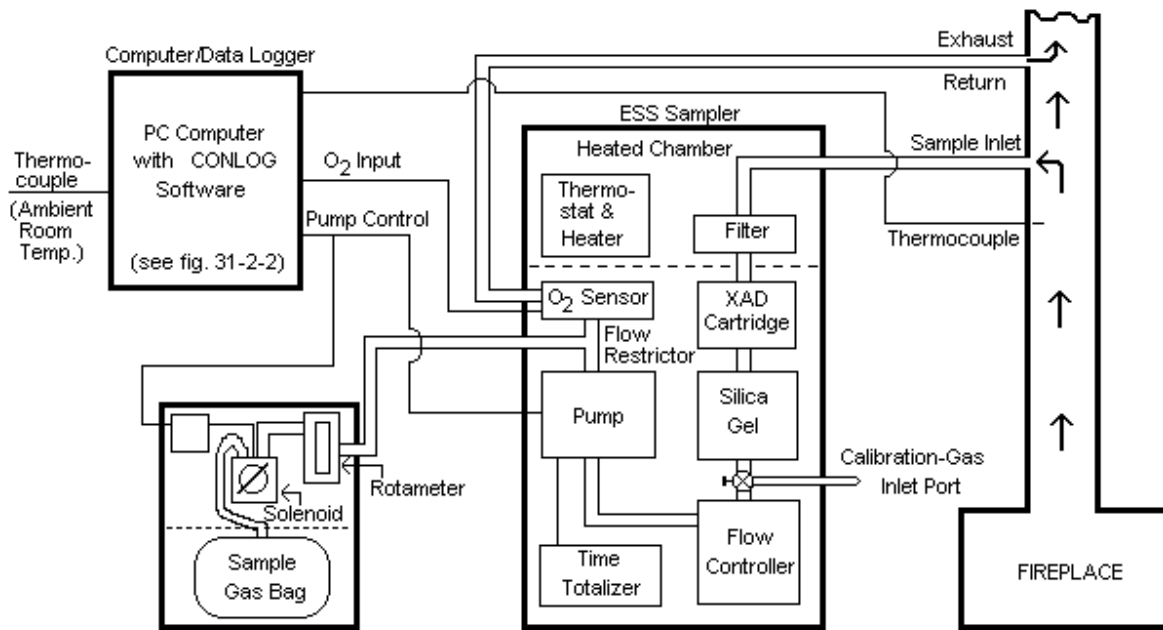


Figure 31-2-1. Schematic of ESS/Data Logger system.

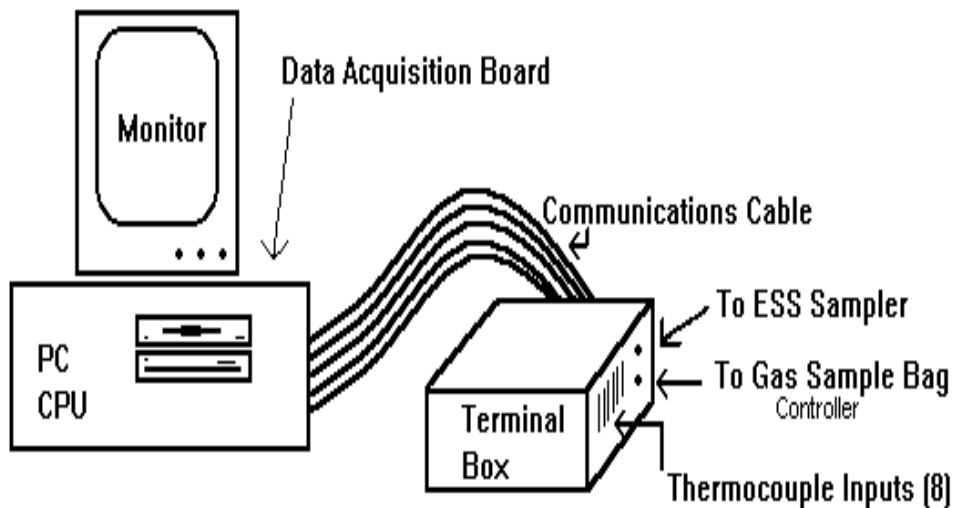


Figure 31-2-2. ESS data logger system.

5. Flue-gas oxygen measurements taken during each sample cycle.

During testing, instantaneous readings of real-time data shall be displayed on the system status screen. These data shall include the date, time, temperatures for each of the TCs, and flue-gas oxygen concentrations. The most recent 15 sets of recorded data shall also be displayed.

Flue-gas sampling and the recording of flue-gas oxygen concentrations shall only occur when flue-gas temperatures are above 25°F (14°C) greater than the ambient temperature of the test facility. Temperatures and fueling shall always be recorded at five-minute intervals regardless of flue-gas temperature. The ESS sampling-pump operating cycle shall be adjustable as described in Section 31.203.12.3.

**31.203.12.3 ESS Sampling-Pump Operating Cycle.** The ESS sampling-pump operating cycle shall be adjusted to accommodate variable test-fuel charge sizes, emission factors, and the length of time needed to complete a test-burn series. The sampler-pump operation shall be adjustable from 1 second to 5 minutes (100 percent) "on" for every 5-minute test-burn data-recording interval. This will allow adjustment for the amount of anticipated emissions materials that will be sampled and deposited on the ESS filter, XAD-2, and the other system components. It is recommended that the minimum sample quantities stipulated in Section 31.203.12.4 be used to calculate the appropriate pump cycle "on" and "off" periods. It should be noted that if the sampler collects too much particulate material on the filter and in the XAD-2 cartridge, the unit may fail the sample flow calibration check required at the end of each test-burn.

**31.203.12.4 Minimum Sample Quantities.** For each complete 3 test-fuel charge test-burn, the ESS must catch a minimum total particulate material mass of at least 0.231 grains (15 mg). Alternatively, the ESS must sample a minimum of 10 cubic feet (283 liters) during each 3 test-fuel charge test-burn. If this volume cannot be sampled in the test-burn time period, two ESS samplers must be utilized to sample fireplace emissions simultaneously during each test-burn. If emissions results from the two ESSs are different by more than 10 percent of the lower emissions-factor result, the test-burn results are invalid. An arithmetic average is calculated for test-burn results when two ESSs are utilized.

**31.203.12.5 Equipment Preparation and Sample Processing Procedures.**

**31.203.12.5.1.** Prior to emissions testing, the ESS unit shall be prepared with a new, tared glass-fiber filter and a clean XAD-2 sorbent-resin cartridge. Within 3 hours after testing is completed, the stainless steel sampling probe,

Teflon® sampling line, filter holder, and XAD-2 cartridge(s) shall be removed from the test site and transported to the laboratory for processing. Each component of the ESS sampler shall be processed as follows:

1. Filter: The glass fiber filter (4 inches (102 mm) in diameter) shall be removed from the ESS filter housing and placed in a petri dish for desiccation and gravimetric analysis.

2. XAD-2 sorbent-resin cartridge: The sorbent-resin cartridge shall be extracted in a Soxhlet extractor with dichloromethane for 24 hours. The extraction solution shall be transferred to a tared glass beaker and evaporated in an ambient-air dryer. The beaker with dried residue shall then be desiccated to constant weight (less than  $\pm 0.5$  mg change within a 2-hour period), and the extractable residue shall be weighed.

3. ESS hardware: All hardware components which are in the flue-gas sample stream (stainless steel probe, Teflon® sampling line, stainless steel filter housing, and all other Teflon® and stainless steel fittings) through the top of the sorbent-resin cartridge, shall be cleaned with a solvent mixture of 50 percent dichloromethane and 50 percent methanol. The cleaning solvent solutions shall be placed in tared glass beakers, evaporated in an ambient-air dryer, desiccated to constant weight (less than  $\pm 0.5$  mg change within a 2-hour period), and weighed.

EPA Method 5H procedures (40 CFR Part 60, Appendix A) for desiccation and weighing time intervals shall be followed for steps 1 through 3 above.

**31.203.12.5.2** The ESS shall be serviced both at the start and end of a fireplace testing period. During installation, leak checks shall be performed; the thermocouples, fuel-weighing scale, and oxygen-cell shall be calibrated, and the data logger shall be programmed. At the end of the test period, final calibration, and leak-check procedures shall again be performed, and the ESS sampling line, filter housing, XAD-2 cartridge, sampling probe, and Tedlar® bag shall be removed, sealed, and transported to the laboratory for analysis. If the pre-test and post-test leak checks of the ESS system exceed 0.00033 liters per second, the test-burn emission results shall be invalid.

**31.203.12.6 Data Processing and Quality Assurance.**

**31.203.12.6.1** Upon returning to the laboratory facilities, the data file (computer disk) shall be reviewed to check for proper equipment operation. The data-logger data files, log books, and records maintained by field staff shall be reviewed to ensure sample integrity.

The computer-logged data file shall be used in conjunction with the ESS particulate samples and sample-

gas bag analyses to calculate the emission factor, emission rate, and fireplace operational parameters. An example ESS results report is presented in Table 31-2-A.

**31.203.12.6.2 Burning Period.** The total burning period is calculated by:

$$\text{Total Burning Period} = (\text{Length of each sample cycle}) \times (\text{Number of flue temperature readings over } 25^{\circ}\text{F (} 14^{\circ}\text{C) greater than the ambient temperature of the test facility}).$$

**WHERE:**

1. Length of each sample cycle: The time between each temperature recording as configured in the CONLOG software settings (standardized at 5 minutes).
2. Number of flue temperature readings during fireplace use: The total number of temperature readings when the calibrated temperature value was more than 25°F (14°C) greater than the ambient temperature of the test facility.

**31.203.12.6.3 Particulate Emissions.**

**31.203.12.6.3.1 ESS Particulate Emission Factor.** The equation for the total ESS particulate emission factor for each test-burn presented below produces reporting units of grams per dry kilogram of fuel burned (g/kg):

$$\text{Particulate emission factor (g/kg)} = \frac{(\text{Particulate Catch}) \times (\text{Stoichiometric Volume}) \times (\text{Flue-gas Dilution Factor})}{(\text{Sampling Time}) \times (\text{Sampling Rate})}$$

**WHERE:**

1. Particulate Catch: The total mass, in grams, of particulate material caught on the filter, in the XAD-2 resin cartridge (semi-volatile compounds); and in the probe clean-up and rinse solutions.
2. Stoichiometric Volume: Stoichiometric volume is the volume of dry air needed to completely combust one dry kilogram of fuel with no "excess air". This value is determined by using a chemical reaction balance between the specific fuel being used and the chemical components of air. The stoichiometric volume for Douglas fir is 86.78 cubic feet per pound (5 404 liters per dry kilogram) at 68°F (20°C) and 29.92 inches (760 mm) of mercury pressure.
3. Flue-gas Dilution Factor: The degree to which the sampled combustion gases have been diluted in the flue by air in excess of the stoichiometric volume (called excess air). The dilution factor is obtained by using the average sampled carbon dioxide and carbon monoxide values obtained from the sample gas bag analyses and the following equation:

$$\text{Flue-Gas Dilution Factor} = \frac{18.53 + \left( \frac{e_{CO_2} + \frac{1}{2} e_{CO}}{18.53} \right) \times 2.37}{(CO_2 + \frac{1}{2} CO)}$$

(Insert as Page 606h)

Note: Multiplying the g/kg emission factor by the burn rate (dry kg/hr) yields particulate emissions in grams per hour (g/hr). Burn rate is calculated by the following equation:

$$\text{Burn Rate (kg/hr)} = \frac{\text{Total Fuel (kg)}}{\text{Total Burn Period (hours)}}$$

**WHERE:**

Total Fuel is the total fuel added during the entire test-burn minus the remaining unburned materials at the end of the test burn.

**4. Sampling Time: The number of minutes the sampler pump operated during the total test-burn period.**

5. Sampling Rate: Sampling rate is controlled by the critical orifice installed in the sampler. The actual calibrated sampling rate is used here.

**31.203.12.6.3.2 EPA Method 5H Particulate Emissions.**

ESS-measured emissions factors submitted to DOE for approval must first be converted to U. S. EPA Method 5H equivalents. The ESS particulate emissions factor results obtained in Section 31.203.12.6.1 are converted to be equivalent to the U. S. EPA Method 5H emissions factor results by the following equation:

$$1.254 + (0.302 \times \text{PEF}) + (1.261 \times 10^{-5} \times \text{PEF}^2)$$

**WHERE:**

PEF is the ESS-measured particulate emission factor for a test burn.

**31.203.12.6.4 CO Emissions.** The carbon monoxide (CO) emission factor equation produces grams of CO per dry kilogram of fuel burned. The grams per kilogram equation includes some equation components described above.

$$\text{CO emission factor (g/kg)} = \frac{(\text{Fraction CO}) \times (\text{Stoich. Volume}) \times (\text{Dilution Factor}) \times (\text{Molecular Weight of CO})}{(24.45 \text{ L/mole})}$$

**WHERE:**

1. Fraction CO: The fraction of CO measured in the gas sampling bag.

**Note:** Percent CO divided by 100 gives the fraction CO.

2. Molecular Weight of CO: The gram molecular weight of CO, 28 pounds per pound-mole (28.0 g/g-mole).

Multiplying the results of the above equation by the burn rate (dry kg/hr) yields the grams per hour (g/hr) CO emission rate.

**Table 31-2-A Example ESS Data Results Format**

**ESS Emission Results**

Test Facility Location: xxxx  
 Test Laboratory: xxxx  
 Test-Burn Number: xxxx  
 Start Time/Date: xxxx  
 End Time/Date: xxxx  
 Fireplace Model: xxxx

**TIME**

Total Test Period 152.3 hours  
 Total Burn Time 64.6 hours  
 Flue >25 Degrees F above ambient temperature 42.4 %

**CARBON MONOXIDE EMISSIONS**

Gram / Kilogram 48.0 g/kg  
 Gram / Hour 64.0 g/hr  
 Gram / Cubic Meter 1.25 g/m<sup>3</sup>

**ESS SETTINGS**

ESS Sample Rate 1.004 l/min  
 Sample Cycle 5.0 min  
 Sample Time / Sample Cycle 0.443 min

**AVERAGE TEMPERATURES**

Fuel-Gas Temperatures 275 °F  
 135 °C  
 Flue Exit Temperature 308 °F  
 154 °C  
 Test Facility Ambient Temperature 66 °F  
 19 °C

**TEST FUEL**

Total Fuel Used (wet weight) 101.3 kg  
 Ave. Fuel Moisture (dry basis) 17.7 %  
 Total Fuel Used (dry weight) 86.1 kg  
 Average Test-Fuel Charge 14.5 kg  
 Average Burn Rate 1.33 dry kg/hr

**AVERAGE FLUE-GAS CONCENTRATIONS**

Flue Oxygen (SE) 18.15 %  
 Flue Oxygen (gas bag or analyzer) 18.05 %  
 Flue CO (gas bag or analyzer) 0.10 %  
 Flue CO<sub>2</sub> (gas bag or analyzer) 2.60 %

**PARTICULATE EMISSIONS (EPA Method 5H Equivalent)**

Gram / Kilogram 2.6 g/kg  
 Gram / Hour 3.4 g/hr  
 Gram / Cubic Meter 0.06 g/m<sup>3</sup>

**BREAKDOWN OF ESS PARTICULATE SAMPLE**

Rinse 25.5 mg  
 XAD 6.3 mg  
 Filter 15.7 mg  
 Blank 0.0 mg  
**TOTAL 47.4 mg**

Notes:

NM = Not Measured, NA = Not Applicable, NU = Not Used  
 Total time flue temperature greater than 25°F over ambient temperature.

TEST PERFORMED BY: XYZ Testing International, Olympia Washington, 98504

**31.203.13 Calibrations.**

**31.203.13.1 Balance.** Before each certification test, the balance used for weighing test-fuel charges shall be audited by weighing at least one calibration weight (Class F) that corresponds to 20 percent to 80 percent of the expected test-fuel charge weight. If the scale cannot reproduce the value of the calibration weight within 0.1 lb (0.05 kg) or 1 percent of the expected test-fuel charge weight, whichever is greater, re-calibrate the scale before use with at least five calibration weights spanning the operational range of the scale.

**31.203.13.2 Temperature Monitor.** Calibrate the Temperature Monitor before the first certification test and semiannually thereafter.

**31.203.13.3 Fuel Moisture Meter.** Calibrate the Fuel Moisture Meter as per the manufacturer's instructions before each certification test.

**31.203.13.4 Anemometer.** Calibrate the anemometer as specified by the manufacturer's instructions before the first certification test and semiannually thereafter.

**31.203.13.5 Barometer.** Calibrate the Barometer against a mercury barometer before the first certification test and semiannually thereafter.

**31.203.13.6 Draft Gauge.** Calibrate the Draft Gauge as per the manufacturer's instructions; a liquid manometer does not require calibration.

**31.203.13.7 ESS.** The ESS shall be calibrated as specified in Section 31.203.12.1.

**31.203.14 Reporting Criteria.** Submit both raw and reduced data for all fireplace tests. Specific reporting requirements are as follows:

**31.203.14.1 Fireplace Identification.** Report fireplace identification information including manufacturer, model, and serial number. Include a copy of fireplace installation and operation manuals.

**31.203.14.2 Test Facility Information.** Report test facility location, temperature, and air velocity information.

**31.203.14.3 Test Equipment Calibration and Audit Information.** Report calibration and audit results for the test-fuel balance, test-fuel moisture meter, analytical balance, and sampling equipment including volume metering systems and gaseous analyzers.

**31.203.14.4 Pretest Information and Conditions.** Report all pretest conditions including test-fuel charge weight, fireplace temperatures, and air supply settings.

**31.203.14.5 Particulate Emission Data.** Report a summary of test results for all test-burns conducted and the arithmetically averaged emission factor for all test-burns used for certification. Submit copies of all data sheets and other records collected during the testing. Submit examples of all calculations.

**31.203.14.6 Required Test Report Information and Suggested Format.** Test report information requirements to be provided to DOE for approval/certification of fireplaces are presented in this Standard. The requirements are presented here in a recommended report format.

**31.203.14.6.1 Introduction.**

1. Purpose of test: certification or audit.
2. Fireplace identification: manufacturer, model number, catalytic/non-catalytic, and options. Include a copy of fireplace installation and operation manuals.
3. Laboratory: name, location, and participants.
4. Test information: date fireplace was received, date of tests, sampling methods used, and number of test-burns.

**31.203.14.6.2 Summary and Discussion of Results.**

1. Table of results: test-burn number, burn rate, particulate emission factor (in U. S. EPA Method 5H equivalents), efficiency (if determined), and averages (indicate which test-burns are used).
2. Summary of other data: test facility conditions, surface temperature averages, catalyst temperature averages, test-fuel charge weights, and test-burn times.
3. Discussion: specific test-burn problems and solutions.

**31.203.14.6.3 Process Description.**

1. Fireplace dimensions: volume, height, width, lengths (or other linear dimensions), weight, and hearth area.
2. Firebox configuration: air supply locations and operation, air supply introduction location, refractory location and dimensions, catalyst location, baffle and by-pass location and operation (include line drawings and photographs).
3. Process operation during test: air supply settings and adjustments, fuel bed adjustments, and draft.
4. Test fuel: test fuel properties (moisture and temperature), test fuel description (include line drawing or photograph), and test fuel charge density.

**31.203.14.6.4 Sampling Locations.** Describe sampling location relative to fireplace. Include line drawings and photographs.

**31.203.14.6.5 Sampling and Analytical Procedures.**

1. Sampling methods: brief reference to operational and sampling procedures, and optional and alternative procedures used.
2. Analytical methods: brief description of sample recovery and analysis procedures.

### **31.203.14.6.6 Quality Control and Assurance Procedures and Results.**

1. Calibration procedures and results: Certification, sampling, and analysis procedures.
2. Test method quality control procedures: leak-checks, volume-meter checks, stratification (velocity) checks, and proportionality results.

### **31.203.14.6.7 Appendices.**

1. Results and Example Calculations. Include complete summary tables and accompanying examples of all calculations.
2. Raw Data. Include copies of all uncorrected data sheets for sampling measurements, temperature records, and sample recovery data. Include copies of all burn rate and fireplace temperature data.
3. Sampling and Analytical Procedures. Include detailed description of procedures followed by laboratory personnel in conducting the certification test, emphasizing particularly, parts of the procedures differing from the prescribed methods (e.g., DOE approved alternatives).
4. Calibration Results. Summary of all calibrations, checks, and audits pertinent to certification test results including dates.
5. Participants. Test personnel, manufacturer representatives, and regulatory observers.
6. Sampling and Operation Records. Copies of uncorrected records of activities not included on raw data sheets (e.g., fireplace door open times and durations).
7. Additional Information. Fireplace manufacturer's written instructions for operation during the certification test and copies of the production-ready (print-ready) temporary and permanent labels required in Section 31.208 shall be included in the test report prepared by the test laboratory.

### **31.203.14.7 References.**

1. Code of Federal Regulations, U. S. EPA Title 40, Part 60, Subpart AAA and Appendix A (40 CFR Part 60).
2. Barnett, S. G. and P. G. Fields, 1991, In-Home Performance of Exempt Pellet Stoves in Medford, Oregon, prepared for U. S. Department of Energy, Oregon Department of Energy, Tennessee Valley Authority, and Oregon Department of Environmental Quality, July 1991.
3. Barnett, S. G. and R. R. Roholt, 1990, In-Home Performance of Certified Pellet Stoves in Medford and Klamath Falls, Oregon, prepared for the U. S. Department of Energy, 1990.
4. Barnett, S. G., 1990, "Field Performance of Advanced Technology Woodstoves in Glens Falls, New York, 1988-1989", for New York State Energy Research

and Development Authority, U. S. EPA, Coalition of Northeastern Governors, Canadian Combustion Research Laboratory, and the Wood Heating Alliance, December 1989.

### **SECTION 31.204 — APPROVAL PROCEDURE FOR FIREPLACES.**

On or after the effective date of this regulation, a manufacturer or builder of a fireplace who wishes to have a fireplace model line or fireplace design designated as an approved (or certified) fireplace, shall submit to DOE for its review the following information:

**31.204.1** Manufacturer name and street address, model or design identification, construction specifications, and drawings of the firebox and required chimney system.

**31.204.2** A test report prepared in accordance with Section 31.203.14.6 showing that testing has been conducted by a DOE approved and U. S. EPA accredited laboratory, and that the arithmetically averaged particulate emission factors for that fireplace model line or design, tested in accordance with UBC Standard Section 31.202, does not exceed 7.3 g/kg (U. S. EPA Method 5H equivalent as determined in Section 31.203.12.6.3.2) for factory-built fireplace model lines or designs or 12.0 g/kg (U. S. EPA Method 5H equivalent as determined in Section 31.203.12.6.3.2) for new certified masonry fireplace model lines or designs. After January 1, 1999, particulate emission factors for factory-built and new certified masonry fireplace model lines or designs shall not exceed 7.3 g/kg (U. S. EPA Method 5H equivalents as determined in Section 31.203.12.6.3.2).

### **SECTION 31.205 — APPROVAL OF NON-TESTED FIREPLACES.**

On or after the effective date of this regulation, DOE may grant approval for a fireplace model line or design that has not been tested pursuant to Section 31.204 upon submission of the following by the applicant:

**31.205.1** Manufacturer name and street address, model or design identification, construction specifications, and drawings of the internal assembly system.

**31.205.2** Documentation from an EPA accredited laboratory that the model is a fireplace within the definition of this regulation, has substantially the same core construction as a model already tested by a DOE approved and EPA accredited laboratory, and is substantially similar to the approved model in internal assembly design, combustion function, and probable emissions performance as listed in Section 31.204.2.

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**SECTION 31.206 — APPROVAL THROUGH ALTERNATIVE TEST PROTOCOL.**

As provided in Section 31.202.4, an alternative testing protocol may be submitted by a DOE approved and EPA accredited laboratory for acceptance by DOE as equivalent to UBC Standard 31-2.

**SECTION 31.207 — APPROVAL TERMINATION.**

All fireplace model line or design approvals shall terminate five years from the approval date. Previously approved fireplace model line and/or design may be granted re-approval (re-certification) upon application to and review by DOE. No testing shall be required for fireplace model line or design re-approvals unless DOE determines that design changes have been incorporated into the fireplace that could adversely affect the emissions factor, or testing is otherwise stipulated by DOE.

DOE may revoke a fireplace model line or design approval certification if it is determined that the fireplaces being produced in a specific model line do not comply with the requirements of Section 31.200. Such a determination shall be based on all available evidence, including:

1. Test data from a retesting (audit test) of the original unit on which the certification test was conducted or a sample unit from the current model line;
2. A finding that the certification test was not valid;
3. A finding that the labeling of the fireplace does not comply with the requirements of Section 31.200;
4. Failure by the fireplace manufacturer (builder) to comply with reporting and record keeping requirements under Section 31.200;
5. Physical examination showing that a significant percentage of production units inspected are not similar in all material respects to the fireplace submitted for testing; or
6. Failure of the manufacturer to conduct a quality assurance program in conformity with Section 31.208.

Revocation of certification under this section shall not take effect until the manufacturer (builder) concerned has been given written notice by DOE setting forth the basis for the proposed determination and an opportunity to request a hearing.

**SECTION 31.208 — QUALITY CONTROL.**

Once within 30 days of each annual anniversary after the initial approval/certification, a DOE approved and U. S. EPA accredited laboratory shall inspect the most recently produced fireplace of an approved model line or design at its manufacturing location (site, if site-built) to document adherence to the approved/certified fireplace design specifications. If no fireplaces of an approved mode line or design were produced (built) during the previous 12 months, no inspection is required.

An inspection report for each approved fireplace model line or design must be submitted to DOE within 30 days after the inspection date. The inspection report shall include, as a minimum, the model identification and serial number of the fireplace inspected, the location where the model was inspected, the names of the manufacturer's and/or builder's representatives present, the date of inspection, and a description of any changes made to the approved fireplace model line or design since the last inspection. The U. S. EPA accredited laboratory which conducts the annual quality control inspection is responsible for auditing the content and format of all labels to be applied to approved fireplaces as stipulated in 31.209.

A fireplace model line or design shall be re-tested in accordance with Section 31.202 if it is determined during inspection that design changes have been incorporated into the approved/certified fireplace design which adversely affect the fireplace particulate emissions factor. Design elements which can affect fireplace particulate emissions include:

1. Grate placement and height;
2. Air supply minimum and maximum controls;
3. Usable hearth area; and
4. Firebox height, width, and length dimensions.

**SECTION 31.209 — PERMANENT LABEL, TEMPORARY LABEL AND OWNER'S MANUAL.**

**31.209.1 Labels and the Owner's Manual.** Labels and owner's manual shall be prepared and installed in all certified "For Sale" fireplaces as specified in U. S. EPA 40 CFR Part 60, Section 60.536. Information that shall be presented on all labels includes:

1. Manufacturer's or Builder's name, address, and phone number;
2. Model number and/or name;
3. Month and year of manufacture;
4. Starting and ending dates for the 5-year approval period;
5. If a fireplace was tested and approved with an emissions control device which is not an integral part of the fireplace structure, the label shall state that "The fireplace cannot be sold or installed without the specified emissions control device in place and operational.";
6. On certified fireplaces the statement: "This appliance has been tested and has demonstrated compliance with Washington State amendment to the UBC Standard, Chapter 31-2 requirements."

**SECTION 31.210 — LIST OF APPROVED FIREPLACES.**

DOE shall maintain a list of approved fireplace model lines and designs, and that list shall be available to the public.



**WASHINGTON STATE  
AMENDMENTS TO THE**

**INTERNATIONAL EXISTING BUILDING CODE  
2009 Edition**

## INTERNATIONAL EXISTING BUILDING CODE, 2009 EDITION

**101.4 Applicability.** When requested by the permit applicant, this code shall apply to the repair, alteration, change of occupancy and relocation of buildings existing on the date of adoption of this code, regardless of occupancy, subject to the criteria of Sections 101.4.1 and 101.4.2. When compliance with this code has not been requested, compliance with the State Building Code as adopted in Title 51 WAC shall be demonstrated.

**101.4.1 Buildings not previously occupied.** A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall comply with the provisions of the State Building Code as adopted in Title 51 WAC, for new construction or with any current permit for such occupancy.

**101.4.2 Buildings previously occupied.** The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Fire Code, or as deemed necessary by the code official to mitigate an unsafe building. For the purpose of this section, "unsafe building" is not to be construed as mere lack of compliance with the current code.

**101.7 Appendices.** The code official is authorized to require rehabilitation and retrofit of buildings, structures, or individual structural members in accordance with the appendices of this code if such appendices have been individually adopted. Appendix A, Guidelines for the Seismic Retrofit of Existing Buildings, is hereby adopted as part of this code without any specific adoption by the local jurisdiction.

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**102.4.1 Fire prevention.** The provisions of the International Fire Code shall apply to matters affecting or relating to structures, processes and premises regarding : the hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices; conditions hazardous to life, property or public welfare in the occupancy of structures or premises; and the construction, extension, repair, alteration or removal of fire suppression and alarm systems or fire hazards in the structure or on the premises from occupancy or operation except as specifically provided for in this Code.

**307.1 Conformance.** No change shall be made in the use or occupancy of any building that would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of the International Building Code for such division or group of occupancy. Subject to the approval of the building official, the use or occupancy of existing buildings shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all the requirements of the International Building Code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use. The hazard tables of Chapter 9 may be used to demonstrate the relative fire and life risk of the existing and the new proposed uses.

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**405.1 Scope.** Level 3 alterations apply where the work area exceeds 50% of the floor area of the building.





**607.1 Minimum requirements.** Level 1 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC).

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**704.1 Scope.** The requirements of this section shall be limited to work areas in which Level 2 alterations are being performed, and where specified they shall apply throughout the floor on which the work areas are located or otherwise beyond the work area.

**Exception:** For Level 2 alteration projects in which the fire protection requirements constitute an excessive burden, the fire protection requirements may be modified or waived by the fire code official.

**704.2 Automatic sprinkler systems.** Automatic sprinkler systems shall be provided in accordance with the requirements of Sections 704.2.1 through 704.2.5. Installation requirements shall be in accordance with the International Fire Code and NFPA 13 or NFPA 13R.

**711.1 Minimum requirements.** Level 2 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC).

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**807.4.1 Evaluation and analysis.** An engineering evaluation and analysis that establishes the structural adequacy of the altered structure shall be prepared by a registered design professional and submitted to the code official. For structures assigned to Seismic Design Category D, the registered design professional shall submit to the code official a seismic evaluation report of the existing building based on one of the procedures specified in Section 101.5.4.2. This seismic evaluation report shall not be required for buildings in compliance with the benchmark building provisions of ASCE 31, Section 3.2.

**807.4.2 Substantial structural alteration.** Any building or structure undergoing substantial improvement shall have an

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evaluation and analysis to demonstrate that the altered building or structure complies with the *International Building Code* for wind loading and with reduced *International Building Code* level seismic forces as specified in Section 101.5.4.2 for seismic loading. For seismic considerations, the analysis shall be based on one of the procedures specified in Section 101.5.4.

**807.4.3 Limited structural alteration.** Where any building or structure undergoes less than substantial improvement, the evaluation and analysis shall demonstrate that the altered building or structure complies with the loads applicable at the time the building was constructed.

**808.1 Minimum requirements.** Level 3 alterations to existing buildings or structures shall comply with the Washington State Energy Code (chapter 51-11 WAC).





**912.1.1 Compliance with Chapter 8.** The requirements of Chapter 8 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 912.1.1.1 and 912.1.1.2. All existing buildings with a change of occupancy classification shall comply with the seismic provisions of Section 907.3.



**1101.1 Scope.** It is the intent of this chapter to provide means for the preservation of historic buildings as defined in Chapter 2. It is the purpose of this chapter to encourage cost-effective preservation of original or restored architectural elements and features and to provide a historic building that will result in a reasonable degree of safety, based on accepted life and fire safety practices, compared to the existing building. Historical buildings shall comply with the provisions of this chapter relating to their repair, alteration, relocation and change of occupancy.

**1104.1 Accessibility requirements.** The provisions of Sections 605 and 706 shall apply to buildings and facilities designated as historic structures that undergo alterations, unless technically infeasible. Where compliance with the requirements for accessible routes, ramps, entrances, or toilet facilities would threaten or destroy the historic significance of the building or facility, as determined by the professional responsible for the historical documentation of the project, the alternative requirements of Sections 1104.1.1 through 1104.1.4 for that element shall be permitted.

**1103.7 One-hour fire-resistant assemblies.** Where one-hour fire-resistance-rated construction is required by these provisions, it need not be provided, regardless of construction or occupancy, where the existing wall and ceiling finish is wood lath or metal lath and plaster.

**1103.9 Stairway railings.** Historically significant stairways shall be accepted without complying with the handrail and guard requirements. Existing handrails and guards at all stairs shall be permitted to remain, provided they are not structurally dangerous.

**1105.10 One-hour fire-resistant assemblies.** Where one-hour fire-resistance-rated construction is required by these provisions, it need not be provided, regardless of construction or occupancy, where the existing wall and ceiling finish is wood lath or metal lath and plaster.

**1105.14 Natural light.** When it is determined by the professional responsible for the historical documentation of the project that compliance with the natural light requirements of Section 911.1 will lead to loss of historic character or historic materials in the building, the existing level of natural lighting shall be considered acceptable.

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**1201.1 Conformance.** Buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code, the International Residential Code (chapter 51-51 WAC), the International Mechanical Code (chapter 51-52 WAC), the International Fire Code (chapter 51-54 WAC), the Uniform Plumbing Code and Standards (chapters 51-56 and 51-57 WAC), and the Washington State Energy Code (chapter 51-11 WAC) for new buildings or structures.

**Exception:** Group R-3 buildings or structures are not required to comply if:

1. The original occupancy classification is not changed; and
2. The original building is not substantially remodeled or rehabilitated.

For the purposes of this section, a building shall be considered to be substantially remodeled when the costs of remodeling exceed 60 percent of the value of the building exclusive of the costs relating to preparation, construction, demolition or renovation of foundations.

**SECTION 1202--REQUIREMENTS.** This section not adopted.



