

**WASHINGTON STATE  
BUILDING CODE**

**CHAPTER 51-52  
2006 Edition**

**INTERNATIONAL MECHANICAL CODE**

**Includes adoption of and amendments to  
The 2006 International Fuel Gas Code  
and  
the 2006 National Fuel Gas Code**



**Washington State Building Code Council**

**Effective July 1, 2007**

Copies of the State Building Codes and  
complete copies of the 2007 Model Codes  
may be obtained from:

Washington Association of Building Officials  
Post Office Box 7310  
Olympia, Washington 98507-7310  
(360) 586-6725      [www.wabo.org](http://www.wabo.org)  
or toll free in Washington State at (888) 664-9515

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International Mechanical Code  
Chapter 51-52 WAC  
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WSR 07-01-092

## *Preface*

**Authority:** The International Mechanical Code (Chapter 51-52 WAC) is adopted by the Washington State Building Code Council pursuant to Chapters 19.27 and 70.92 RCW. This code was 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.

**Supersession of Previous Codes:** Chapter 51-52 WAC supersedes Chapter 51-42 WAC.

**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 Mechanical 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.

- A. **Amendments of Statewide Application:** On a yearly basis the State Building Code Council will consider proposals to amend the State Building Code. The Council is not scheduled to enter formal rulemaking until 2009 as part of its consideration of adoption of the 2009 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 two areas where local amendments are limited or prohibited:

**Prohibited Amendments:** Residential provisions of the State Energy Code (WAC 51-11), the Ventilation and Indoor Air Quality Code (WAC 51-13); 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 17, 2006. The rules are effective throughout the state on July 1, 2007. (This version of the code is based on WAC 51-52 as published in WSR 07-01-092. It is subject to review by the State Legislature during the 2007 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 2007. 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.

**WASHINGTON STATE AMENDMENTS  
INTERNATIONAL MECHANICAL CODE**

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**CHAPTER 51-52 WAC  
STATE BUILDING CODE ADOPTION AND AMENDMENT  
OF THE 2006 EDITION OF THE INTERNATIONAL MECHANICAL CODE**

**WAC 51-52-001 AUTHORITY**

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

**WAC 51-52-002 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 51-52-003 INTERNATIONAL MECHANICAL CODE**

The 2006 edition of the International Mechanical Code published by the International Code Council is hereby adopted by reference with the exceptions noted in this Chapter of the Washington Administrative Code.

**WAC 51-52-004 CONFLICT BETWEEN INTERNATIONAL MECHANICAL CODE AND STATE ENERGY CODE CHAPTER 51-11 WAC**

In the case of conflict between the duct sealing or insulation requirements of Section 603 or Section 604 of this code and the duct sealing or insulation requirements of Chapter 51-11 WAC, the Washington State Energy Code, or where applicable, a local jurisdiction's energy code, the provisions of such energy codes shall govern.

**WAC 51-52-005 CONFLICT BETWEEN INTERNATIONAL MECHANICAL CODE AND STATE VENTILATION AND INDOOR AIR QUALITY CODE CHAPTER 51-13 WAC**

In the case of conflict between the Group R ventilation requirements of this code and the Group R ventilation requirements of Chapter 51-13 WAC, the Washington State Ventilation and Indoor Air Quality Code, the provisions of the Ventilation and Indoor Air Quality Code shall govern.

**WAC 51-52-007 EXCEPTIONS**

The exceptions and amendments to the International Mechanical 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.

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.

**WAC 51-52-008 IMPLEMENTATION**

The International Mechanical Code adopted by Chapter 51-52 WAC shall become effective in all counties and cities of this state on July 1, 2007.





**101.2 Scope.** This code shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings. This code shall also regulate those mechanical systems, system components, equipment and appliances specifically addressed herein. The installation of fuel gas distribution piping and equipment, fuel gas-fired appliances and fuel gas-fired appliance venting systems shall be regulated by the *International Fuel Gas Code*.

**Exceptions:**

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the International Residential Code.
2. The standards for liquefied petroleum gas installations shall be the 2004 Edition of NFPA 58 (Liquefied Petroleum Gas Code) and the 2006 Edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code).



**UNUSUALLY TIGHT CONSTRUCTION.** Construction meeting the following requirements:

1. Walls exposed to the outdoor atmosphere having a continuous water vapor retarder with a rating of one perm or less with openings gasketed or sealed; and
2. Openable windows and doors meeting the air leakage requirements of the International Energy Conservation Code, Section 502.1.4; and
3. Caulking or sealants are applied to areas such as joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical, and gas lines, and at other openings; or
4. Buildings built in compliance with the 1986 or later editions of the Washington State Energy Code, WAC 51-11, Northwest Energy Code, or Super Good Cents weatherization standards or equivalent.

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**401.4.2 Exhaust openings.** Outdoor exhaust openings shall be located in accordance with Chapter 5. Exhaust air shall not be directed onto walkways.

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

**EXCEPTIONS:** 1. Where the registered design professional demonstrates that an engineered ventilation system design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor air ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.

2. Alternate systems designed in accordance with ASHRAE Standard 62.1-2004 Section 6.2, Ventilation Rate Procedure, shall be permitted.

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

1. Ventilation air shall not be recirculated from one dwelling to another or to dissimilar occupancies.
2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces.
3. Where mechanical exhaust is required by Note b in Table 403.3, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.

(Item 4 is not adopted.)

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

**Exception:** Where occupancy density is known and documented in the plans, the outside air rate may be based on the design occupant density. Under no circumstance shall the occupancies used result in outside air less than one-half that resulting from application of Table 403.3 estimated maximum occupancy rates.

**TABLE 403.3  
REQUIRED OUTDOOR VENTILATION AIR**

<b>Occupancy Classification</b>	<b>Estimated Maximum Occupant Load, Persons per 1,000 Sq Ft<sup>a</sup></b>	<b>Outdoor Air [Cubic feet per minute (cfm) per person] Unless Noted<sup>e</sup></b>
<b>Correctional facilities</b>		
Cells		
w/o plumbing fixtures	20	20
with plumbing fixtures <sup>g</sup>	20	20
Dining halls	100	15
Guard stations	40	15
<b>Dry cleaners, laundries</b>		
Coin-operated dry cleaner	20	15
Coin-operated laundries	20	15
Commercial dry cleaner	30	30
Commercial laundry	10	25
Storage, pick up	30	35
<b>Education</b>		
Auditoriums	150	15
Classrooms	50	15
Corridors	--	0.10 cfm/ft <sup>2</sup>
Laboratories	30	20
Libraries	20	15
Locker rooms	--	0.50 cfm/ft <sup>2</sup>
Music rooms	50	15
Smoking lounges <sup>b,g</sup>	70	60
Training shops	30	20
<b>Food and beverage service</b>		
Bars, cocktail lounges	100	30
Cafeteria, fast food	100	20
Dining rooms	70	20
Kitchens (cooking) <sup>f,g</sup>	20	15
<b>Hospitals, nursing and convalescent homes</b>		
Autopsy rooms <sup>b</sup>	--	0.50 cfm/ft <sup>2</sup>
Medical procedure rooms	20	15
Operating rooms	20	30
Patient rooms	10	25
Physical therapy	20	15
Recovery and ICU	20	15
<b>Hotels, motels, resorts and dormitories</b>		
Assembly rooms	120	15
Bathrooms <sup>g</sup>	--	35
Bedrooms	--	30 cfm per room
Conference rooms	50	20
Dormitory sleeping areas	20	15
Gambling casinos	120	30
Living rooms	--	30 cfm per room
Lobbies	30	15
<b>Offices</b>		
Conference rooms	50	20
Office spaces	7	20
Reception areas	60	15
Telecommunication centers and data entry	60	20

(Continued)

**TABLE 403.3—continued  
REQUIRED OUTDOOR VENTILATION AIR**

<b>Private dwellings, single and multiple</b>		
Garages, common for multiple units <sup>b</sup>	--	1.5 cfm/ft <sup>2</sup>
Garages, separate for each dwelling	--	100 cfm per car
Kitchens <sup>g</sup>	--	100 cfm intermittent or 25 cfm continuous
Living areas <sup>c</sup>	Based upon number of bedrooms. First bedroom: 2; each additional: 1	0.35 air changes per hour or 15 cfm per person, whichever is greater
Toilet rooms and bathrooms <sup>g</sup>	--	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous
<b>Public spaces</b>		
Corridors and utilities	--	0.05 cfm/ft <sup>2</sup>
Elevator car <sup>g</sup>	--	1.00 cfm/ft <sup>2</sup>
Locker rooms		0.5 cfm/ft <sup>2</sup>
Shower rooms (per shower head) <sup>g</sup>		50 cfm intermittent or 20 cfm continuous
Smoking lounges <sup>b</sup>	70	60
Toilet rooms <sup>g</sup>		75 cfm per water closet or urinal
<b>Retail stores, sales floors and showroom floors</b>		
Basement and street	--	0.30 cfm/ft <sup>2</sup>
Dressing rooms	--	0.20 cfm/ft <sup>2</sup>
Malls and arcades	--	0.20 cfm/ft <sup>2</sup>
Shipping and receiving	--	0.15 cfm/ft <sup>2</sup>
Smoking lounges <sup>b</sup>	70	60
Storage rooms	--	0.15 cfm/ft <sup>2</sup>
Upper floors	--	0.20 cfm/ft <sup>2</sup>
Warehouses	--	0.05 cfm/ft <sup>2</sup>
<b>Specialty shops</b>		
Automotive motor-fuel-dispensing stations	--	1.5 cfm/ft <sup>2</sup>
Barber	25	15
Beauty	25	25
Clothiers, furniture	--	0.30 cfm/ft <sup>2</sup>
Embalming room <sup>b</sup>		2.0 cfm/ft <sup>2</sup>
Florist	8	15
Hardware, drug, fabrics	8	15
Nail salon <sup>b,i</sup>	--	50 cfm intermittent or 20 cfm continuous per station
Pet shops	--	1.00 cfm/ft <sup>2</sup>
Reducing salons	20	15
Supermarkets	8	15

(Continued)

**TABLE 403.3—continued  
REQUIRED OUTDOOR VENTILATION AIR**

<b>Sports and amusement</b>		
Ballrooms and discos	100	25
Bowling alleys (seating areas)	70	25
Game rooms	70	25
Ice arenas	--	0.50 cfm/ft <sup>2</sup>
Playing floors (gymnasiums)	30	20
Spectator areas	150	15
Swimming pools (pool and deck area)	--	0.50 cfm/ft <sup>2</sup>
<b>Storage</b>		
Repair garages, enclosed parking garage <sup>d</sup>	--	1.5 cfm/ft <sup>2</sup>
Warehouses	--	0.05 cfm/ft <sup>2</sup>
<b>Theaters</b>		
Auditoriums	150	15
Lobbies	150	20
Stages, studios	70	15
Ticket booths	60	20
<b>Transportation</b>		
Platforms	100	15
Vehicles	150	15
Waiting rooms	100	15
<b>Workrooms</b>		
Bank vaults	5	15
Darkrooms	--	0.50 cfm/ft <sup>2</sup>
Duplicating, printing	--	0.50 cfm/ft <sup>2</sup>
Meat processing <sup>c</sup>	10	15
Pharmacy	20	15
Photo studios	10	15

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

- a. Based upon net floor area.
- b. Mechanical exhaust required and the recirculation of air from such spaces as permitted by Section 403.2.1 is prohibited (see Section 403.2.1, Items 1 and 3).
- c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.
- d. Ventilation systems in enclosed parking garages shall comply with Section 404.
- e. Where the ventilation rate is expressed in cfm/ft<sup>2</sup>, such rate is based upon cubic feet per minute per square foot of the floor area being ventilated.
- f. The sum of the outdoor and transfer air from adjacent spaces shall be sufficient to provide an exhaust rate of not less than 1.5 cfm/ft<sup>2</sup>.
- g. Transfer air permitted in accordance with Section 403.2.2.
- h. Reserved.
- i. The required exhaust system shall capture the contaminants and odors at their source.

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

**Exceptions:** 1. Whole-house cooling attic fans shall be permitted to discharge into the attic space of dwelling units having private attics.

2. Commercial cooking recirculating systems.

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

1. **For ducts conveying explosive or flammable vapors, fumes or dusts:** 30 feet (9144 mm) from the property line; 10 feet (3048 mm) from operable openings into the building; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into the building which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.
2. **For other product-conveying outlets:** 10 feet (3048 mm) from property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into the building; 10 feet (3048 mm) above adjoining grade.
3. **For environmental air duct exhaust:** 3 feet (914 mm) from property lines, 3 feet (914 mm) from operable openings into the building for all occupancies other than Group U, and 10 feet (3048 mm) from a mechanical air intake.

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

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

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

4. **For specific systems:** For clothes dryer exhaust, see Section 504.4; for kitchen hoods, see Section 506.3; for dust, stock and refuse conveying systems, see Section 511.2; and for subslab soil exhaust systems, see Section 512.4.

(Insert Facing Page 33)

**504.6.3 Protection Required.** Plates or clips shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Plates or clips shall be placed on the finished face of all framing members where there is less than 1-1/4 inches (32 mm) between the duct and the finished face of the framing material. The plate or clip shall be steel not less than 1/16 inch (1.59 mm) in thickness and of sufficient width to protect the duct.

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**506.3.3.1 Grease Duct Test.** Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the duct work from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test. A light test or approved equivalent test method shall be performed to determine that all welded and brazed joints are liquid tight. A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of duct work to be tested. The lamps shall be open so as to emit light equally in all directions perpendicular to the duct walls.

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

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

**Exceptions:**

1. Use of a corridor as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted provided that each such corridor is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the corridor.
2. Where located within a dwelling unit, the use of corridors for conveying return air shall not be prohibited.
3. Where located within tenant spaces of 1,000 square feet (93 m<sup>2</sup>) or less in area, utilization of corridors for conveying return air is permitted.
4. Where such air is part of an engineered smoke control system.
5. Make up or relief air in corridors of Group I-2 occupancies.
6. Corridors serving residential occupancies shall be permitted to be supplied without specific mechanical exhaust subject to the following:
  - 6.1 The supply air is 100% 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 30 feet (9144 mm) on center along the corridor, or
  - 6.4 For high-rise buildings, corridor smoke detector activation will close required smoke/fire dampers at the supply inlet to the corridor at the floor receiving the alarm.

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**Sections 1003 through 1011 are not adopted.**

Pressure Vessels and Boilers are regulated by Chapter 70.79 RCW and chapter 296-104 WAC, and may be further regulated by the local jurisdiction.



**WAC 51-52-21000 – International Fuel Gas Code**

**101.2 Scope.** This code shall apply to the installation of fuel gas piping systems, fuel gas utilization equipment, gaseous hydrogen systems and regulated accessories in accordance with Section 101.2.1 through 101.2.5.

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

2. The standards for liquefied petroleum gas installations shall be the 2004 Edition of NFPA 58 (Liquefied Petroleum Gas Code) and the 2006 Edition of ANSI Z223.1/NFPA 54 (National Fuel Gas Code).