



Oregon

Kate Brown, Governor

Department of Consumer and Business Services

Building Codes Division

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Mechanical Board

Regular meeting agenda

Wednesday, March 2, 2016, 9:30 a.m.

Conference Room A

Board meetings are broadcast live via the Internet at

<http://bcd.oregon.gov/>

Click on "View live meetings"

I. Board business

- A. Call to order
- B. Roll call
- C. Approval of agenda and order of business
- D. Approval of the board meeting minutes of September 2, 2015
- E. Date of the next regularly scheduled meeting: June 2, 2016
- F. Welcome new Board member Zory Hill: Public member position

II. Public comment

*This time is available for individuals wanting to address the Board on **non-agenda items only**. The Board will not take action on non-agenda items raised under public comment at this meeting. Testimony on agenda items will be heard when the item is called. (See "Issues to remember when addressing Board" at the end of this agenda).*

III. Reports

- A. Program update
- B. ePermitting update
- C. Code cycle update

IV. Communications

V. Appeals - None

VI. Unfinished business - None

VII. New business

Board review and provide a recommendation to the Division on the technical and scientific facts of approving the 2015 International Mechanical Code and the 2015 International Fuel Gas Code as an alternate method to the provision of the 2014 Oregon Mechanical Specialty Code

VIII. Announcements – None

IX. Adjournment

Issues to remember when addressing the board:

- All public participation is subject to the discretion of the board Chair for order of testimony, length and relevance.
- Speakers are generally limited to five minutes.
- Please register on the attendance registration form and on the public testimony registration form, listing the appropriate agenda item.
- The board Chair will call you to the front testimony table.
- Please state your name and the organization you represent (if any).
- Always address your comments through the Chair.
- If written material is included, please provide 20 three-hole-punched copies of all information to the boards coordinator prior to the start of the meeting and, when possible, staff respectfully requests an electronic copy of materials 24 hours prior to the meeting.

Interpreter services or auxiliary aids for persons with disabilities are available upon advance request. Persons making presentations including the use of video, DVD, PowerPoint, or overhead projection equipment are asked to contact boards coordinator 24 hours prior to the meeting. For assistance, please contact Debi Barnes-Woods at (503) 378-6787.

Please do not park vehicles with "E" plates in "customer only" spaces.

Note: For information regarding re-appointments or board vacancies, please visit the Governor's website.

Mechanical Board
Meeting minutes
September 2, 2015

Mechanical members present: Jay Winchester, Chair, building official
Linda Kennedy, Vice-chair, natural gas Company, or other utility
Chris Miller, sheet metal contractor
Gerald Scheuermann, plumbing industry
Darrell Skondin, municipal mechanical inspector

Members absent: Stan Danielson, heat and frost insulation craftsperson
Eric Fanning, HVAC installer
Derek Frazier, sheet metal installer
Vacancy, member of the general public

Staff present: Mark Long, Administrator, Building Codes Division
Linda Rabe, administrative assistant, Administration
Brett Salmon, manager, Policy and Technical Services
Mark Heizer, mechanical & energy code specialist, Policy and Technical Services
Rex Turner, structural program chief, Policy and Technical Services
Steve Judson, commercial structures and accessibility code specialist, Policy and Technical Services
Shawn Haggin, electrical program assistant chief, Policy and Technical Services
Tony Rocco, building code specialist, Policy and Technical Services
Debi Barnes-Woods, boards administrator/coordinator

Guests Present: None

I. Board business

A. Call to order

Chairman Jay Winchester, called the Mechanical Board meeting to order at 9:30 a.m. The meeting was held at Building Codes Division, Conference Room "A," 1535 Edgewater Street NW, Salem, Oregon.

B. Roll call

New Board member Stan Danielson, Derek Frazier, and Eric Fanning were all absent excused.

This board has one vacant position: Member of the general public.

C. Approval of agenda and order of business

Agenda Item I.F. Welcome new Board member, Stan Danielson, was moved to be heard after VIII. Announcements.

The agenda was **RULED** approved as amended.

D. Approval of the combined board meeting minutes with the Construction Industry Energy Board meeting of October 30, 2014

Board meeting minutes were approved as written.

E. Date of the next regularly scheduled meetings: December 2, 2015

(Agenda Item I.F. was moved following Agenda Item VIII.)

II. Public comment – None

III. Reports

A. Building Codes Division report

Mark Long, Administrator, Building Codes Division, gave a brief update on the BCD Annual Report. The most current version of this document is located on the Division website: <http://bcd.oregon.gov/pub/AnnualReportSept2015Final.pdf>

B. Program update

Mark Heizer, mechanical & energy code specialist, discussed the development of residential inspector training program curriculum, which includes mechanical code issues.

IV. Communications

A. Updated errata

Mr. Heizer updated the Board on Chapter 3 General requirements. The addition to 304.11 Guards was adding an exception.

B. Statewide Code Interpretation: No. 15-02 Craft Distillery Occupancy Classification

Mr. Heizer explained this interpretation was written for clarification.

V. Appeals – None

VI. Unfinished business - None

VII. New business

Board review and recommend to the Administrator proposed code change to the definition of a conveyor pizza oven in the Oregon Mechanical Specialty Code

Mr. Heizer explained the current model mechanical code defines a gas or electric conveyor pizza oven as a medium duty cooking appliance. This definition comes to the Oregon Mechanical Specialty Code via the International Mechanical Code. Medium duty cooking appliances are required to have a Type 1 Hood per OMSC Section 507.2.1. Light duty cooking appliances may be installed under less restrictive Type II Hoods.

Building officials and pizza restaurants owners have called the Division questioning whether jurisdictions should enforce to the most restrictive code application or whether these installations are currently operating safely and meet the intent of the code.

The Division investigated and found that grease does not accumulate on the surfaces of the hood, cooking equipment or nearby walls therefor, it was found that these types of ovens were without risk to employees or the public.

Motion by Jay Hansen, to approve the conveyor pizza definition code change in the 2014 OMSC as proposed by the Division with the finding that the added cost, if any, is necessary to the health and safety of the occupants or the public or necessary to conserve scarce resources.

Motion carried unanimously

VIII. Announcements – None

(The Agenda was amended to hear I.F. out of order)

F. Welcome new board member Stan Danielson, heat and frost insulation craft person position created by House Bill 2005

Mr. Danielson was unable to attend this meeting, therefor was considered absent excused.

IX. Adjournment

Chair Winchester adjourned the meeting at 10:15 a.m.

Respectfully submitted by Debi Barnes-Woods
Boards administrator/coordinator



No. 16-03
2015 International Mechanical Code
2015 International Fuel Gas Code
(Ref.: ORS 455.060)

**Agenda
Item
VII.**

Statewide Alternate Methods are approved by the Division administrator in consultation with the appropriate advisory board. The advisory board's review includes technical and scientific facts of the proposed alternate method. In addition:

- *Building officials shall approve the use of any material, design or method of construction addressed in a statewide alternate method;*
- *The decision to use a statewide alternate method is at the discretion of the designer; and*
- *Statewide alternate methods do not limit the authority of the building official to consider other proposed alternate methods encompassing the same subject matter.*

Code Edition: 2014 Oregon Mechanical Specialty Code (OMSC)
2015 International Mechanical Code (IMC)
2015 International Fuel Gas Code (IFGC)

Date:

Initiated by: Building Codes Division

Subject:

To allow commercial structures the use of the 2015 *International Mechanical Code (IMC)* and the 2015 *International Fuel Gas Code (IFGC)* as an alternate method to the provisions of the 2014 *Oregon Mechanical Specialty Code (OMSC)*.

Background:

The 2014 *OMSC*, based on the 2012 *IMC and IFGC*, is the adopted building code for the State of Oregon; this alternate method will allow designers to voluntarily use the 2015 *IMC and IFGC* as an additional choice to the development community.

Discussion:

Oregon Building Codes Division finds the 2015 *IMC* and 2015 *IFGC* to be a contemporary building code advancing the public safety and general welfare through a timely evaluation and recognition of the latest advancements in construction techniques, energy efficiency, emerging technologies and science related to the built environment.



Conclusion:

Accordingly, the *2015 IMC* and *2015 IFGC* serves as an effective alternative to the *2014 OMSC* for the construction of buildings in Oregon subject to the following:

1. The use of this alternate method constitutes a separate compliance path from the *2014 OMSC* in that designs must comply with the *2015 IMC* and *2015 IFGC* in its entirety. Limited cross-over applications are allowed where approved by the building official.
2. Specified existing Oregon amendments as noted below are considered part of this ruling.

Contact:

Mark Heizer, P.E.
Energy Code Specialist
503-373-0205
Mark.R.Heizer@oregon.gov

Rex Turner
Structural Program Chief
503-373-7755
Rex.L.Turner@oregon.gov

The technical and scientific facts for this Statewide Alternate Method are approved.

Mark Long, Administrator
Building Codes Division

Date

The following Oregon amendments are made part of the 2015 IMC-IFGC Alternate Method Ruling (underlined text denotes addition to 2015 IMC and IFGC, strikethrough denotes deletion to 2015 IMC and IFGC):

References to chapters and sections with a C-prefix are sections found within Appendix C of this code.

References to chapters and sections without the C-prefix are references to the main body of the *Mechanical Code*.

References to “NFPA 70” are amended to “Electrical Code.”

References to “*International Plumbing Code*” are amended to “Plumbing Code.”

References to “*International Fuel Gas Code*” are amended to “Appendix C of this code.”

**CHAPTER 1
ADMINISTRATION**

Replace with
2014 Oregon Mechanical Specialty Code (OMSC)
Chapter 1 Administration

**CHAPTER 2
DEFINITIONS**

Section 201 General

201.4 Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

Words of common usage are given their plain, natural and ordinary meanings. Words that have well-defined legal meanings are given those meanings.

Section 202 General Definitions

BUILDING CODE. *The Oregon Structural Specialty Code.*

BUILDING OFFICIAL. *The officer charged with the administration and enforcement of this code, or a duly authorized representative.*

CODE OFFICIAL. *See “Building Official.”*

~~**[BS] DESIGN FLOOD ELEVATION.** The elevation of the “design flood,” including wave height, relative to the datum specified on the community’s legally designated flood hazard area map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building’s perimeter plus the depth number, in feet, specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).~~

DESIGN FLOOD ELEVATION. *The elevation of the “design flood” within the flood hazard area designated by the Flood Plain Administrator.*

OAR 918-008-0000 is not part of this code but is provided here for the readers’ convenience:

918-008-0000 Purpose and Scope

(1) The Department of Consumer and Business Services, Building Codes Division, adopts model building codes, standards and other publications by reference, as necessary, through administrative rule to create the state building code. When a matter is included in a specialty code or referenced publication that is in conflict with Oregon Revised Statutes or Oregon Administrative Rules, the statute or rule applies and the code or standard provision does not. All remaining parts or application of the code or standard remain in effect.

(2) Unless required by law, matters generally not authorized for inclusion in a specialty code or referenced standard include, but are not limited to: licensing or certification requirements, or other qualifications and standards for businesses or workers; structures or equipment maintenance requirements; matters covered by federal or state law; and matters that conflict with other specialty codes or publications adopted by the department.

(3) OAR 918-008-0000 to OAR 918-008-0070 provides the process for adopting and amending the state building code that is consistent across all program areas.

(4) The state building code is derived from the most appropriate version of base model codes, which are updated periodically.

(5) The Oregon specialty code amendment process begins approximately midway into a code cycle.

(6) An appropriate advisory board approves or forwards the adoption of the Oregon specialty code and amendments to the Department for adoption.

(7) Notwithstanding sections (3) through (6) of this rule, the division may adopt supplemental code amendments as authorized by OAR 918-008-0028.

[Publications: Publications referenced are available from the agency.]

Stat. Auth.: ORS 447.020, 455.030 & 479.730

Stats. Implemented: ORS 447.020, 455.030 & 479.730

Hist.: BCD 26-1994, f. & cert. ef. 11-15-94; BCD 6-1997, f. & cert. ef. 4-1-97; BCD 3-2006(Temp), f. & cert. ef. 3-1-06 thru 8-27-06; BCD 9-2006, f. 6-30-06, cert. ef. 7-1-06

ELECTRICAL CODE. *The Oregon Electrical Specialty Code (OESC).*

ENERGY CODE. *The Oregon Energy Efficiency Specialty Code.*

FIRE CODE. *For the purpose of the Oregon Mechanical Specialty Code, fire code shall mean those portions of the Oregon Fire Code, which include construction, reconstruction, alteration, repair or installation of materials and equipment that is covered by the State Building Code.*

FLOOD HAZARD AREA. The area designated as a flood hazard area by the Flood Plain Administrator.

MECHANICAL CODE. The *Oregon Mechanical Specialty Code*.

PLUMBING CODE. The *Oregon Plumbing Specialty Code*.

POINT OF DELIVERY. For natural gas systems, the *point of delivery* is the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where a meter is not provided. Where a valve is provided at the outlet of the service meter assembly, such valve shall be considered to be downstream of the *point of delivery*. For undiluted liquefied petroleum gas systems, the *point of delivery* shall be considered to be the outlet of the first stage pressure regulator that provides utilization pressure, exclusive of line gas regulators, in the system.

RESIDENTIAL CODE. The *Oregon Residential Specialty Code*.

STATE BUILDING CODE. The combined specialty codes adopted pursuant to ORS 455 and any code regulation or requirement in effect at the time of construction – regardless of when the building or structure was built.

~~**THIRD PARTY CERTIFICATION AGENCY.** An approved agency operating a product or material certification system that incorporates initial product testing, assessment and surveillance of a manufacturer's quality control system.~~

~~**THIRD PARTY CERTIFIED.** Certification obtained by the manufacturer indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an approved third party certification agency. Assertion of certification is in the form of identification in accordance with the requirements of the third party certification agency.~~

~~**THIRD PARTY TESTED.** Procedure by which an approved testing laboratory provides documentation that a product material or system conforms to specified requirements.~~

VESTIBULE. A passage, hall or chamber between the outer door and the interior of a building.

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

WATER HEATER. Appliances which heat potable water are equipped with *approved* safety devices and operate at or below all of the following:

1. Volume of 120 gallons (454 L);
2. Water temperature of 210°F (98.9°C);
3. 150 pounds (1031 kPa) per square inch operating pressure; and
4. 200,000 Btu (58 620 W) input.

ZONE. One *occupiable space* or several *occupiable spaces* with similar *occupancy* classification (see Table 403.3), *occupant density*, *zone air distribution effectiveness* and *zone primary airflow rate per unit area*.

CHAPTER 3 GENERAL

Section 301 General

~~**301.3 Identification.** Each length of pipe and tubing and each pipe fitting utilized in a mechanical system shall bear the identification of the manufacturer.~~

~~**301.4 Plastic pipe, fittings and components.** Plastic pipe, fittings and components shall be *third party certified* as conforming to NSF 14.~~

~~**301.5 Third party testing and certification.** Piping, tubing and fittings shall comply with the applicable referenced standards, specifications and performance criteria of this code and shall be identified in accordance with Section 301.3. Piping, tubing and fittings shall either be tested by an approved third party testing agency or certified by an approved *third party certification agency*.~~

301.9 Label information. A permanent factory-applied nameplate(s) shall be affixed to appliances on which shall appear in legible lettering, the manufacturer's name or trademark, the model number, serial number and the seal or mark of the *approved* agency. A label shall also include the following:

Note: For reference only. Not adopted as part of this code. Solid-fuel-burning devices, as defined by the Oregon Department of Environmental Quality OAR 340-262-0450 shall bear a DEQ certification label.

~~**[BS]301.16 Flood hazard.** For structures located in flood hazard areas, mechanical systems, equipment and appliances shall be located at or above the elevation **established by the Flood Plain Administrator** required by Section 1612 of the *International Building Code* for utilities and attendant equipment.~~

Exception: Mechanical systems, equipment and appliances are permitted to be located below the elevation **established by the Flood Plain Administrator** required by Section 1612 of the *International Building Code* for utilities and attendant equipment provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

[B]301.16.1 High-velocity wave action. In flood hazard areas subject to high-velocity wave action as established by the Flood Plain Administrator, mechanical systems and equipment shall not be mounted on or penetrate walls intended to break away under flood loads.

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918-008-0000 Purpose and Scope

(1) The Department of Consumer and Business Services, Building Codes Division, adopts model building codes, standards and other publications by reference, as necessary, through administrative rule to create the state building code. When a matter is included in a specialty code or referenced publication that is in conflict with Oregon Revised Statutes or Oregon Administrative Rules, the statute or rule applies and the code or standard provision does not. All remaining parts or application of the code or standard remain in effect.

(2) Unless required by law, matters generally not authorized for inclusion in a specialty code or referenced standard include, but are not limited to: licensing or certification requirements, or other qualifications and standards for businesses or workers; structures or equipment maintenance requirements; matters covered by federal or state law; and matters that conflict with other specialty codes or publications adopted by the department.

(3) OAR 918-008-0000 to OAR 918-008-0070 provides the process for adopting and amending the state building code that is consistent across all program areas.

(4) The state building code is derived from the most appropriate version of base model codes, which are updated periodically.

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(6) An appropriate advisory board approves or forwards the adoption of the Oregon specialty code and amendments to the Department for adoption.

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Section 303 Equipment and appliance location

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

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

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

1. *Direct-vent appliances* that obtain all *combustion air* directly from the outdoors.
2. Solid fuel-fired appliances, provided that combustion air is provided in accordance with the manufacturers' instructions.
3. Appliances installed in a dedicated enclosure in which all *combustion air* is taken directly from the outdoors, in accordance with Chapter 7. ~~Access to such enclosure shall be through a solid door, weather-stripped in accordance with the exterior door air leakage requirements of the International Energy Conservation Code~~ and equipped with an *approved* self-closing device.

Section 304 Installation

304.6 Public garages. Appliances located in public garages, motor fueling-dispensing facilities, repair garages or other

areas frequented by motor vehicles, shall be installed a minimum of 8 feet (2438 mm) above the floor. Where motor vehicles are capable of passing under an *appliance*, the *appliance* shall be installed at the clearances required by the *appliance* manufacturer and not less than 1 foot (305 mm) higher than the tallest vehicle garage door opening.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section 304.3 and **NEPA 30A, Figure 304.1**

304.7 Private garages. Appliances located in private garages and carports shall be installed with a minimum clearance of 6 feet (1829 mm) above the floor.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section 304.3 **and Figure 304.1**

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

Exception:

1. Guards are not required where permanent fall arrest/restraint anchorage connector devices that comply with ANSI/ASSE Z 359.1 are affixed for use during the entire lifetime of the roof covering. The devices shall be re-evaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed not more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from roof edges and the open sides of walking surfaces.

2. This section shall not apply to the replacement, repair or maintenance of an existing appliance or piece of equipment lawfully in existence at the time of the adoption of this code.

Section 306 Access and Service Space

306.5 Equipment and appliances on roofs or elevated structures. Where *equipment* requiring access or appliances are located on an elevated structure or the roof of a building such that personnel will have to climb higher than 16 feet (4877 mm) above grade to access such equipment or appliances, an interior or exterior means of access shall be provided. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) in height or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33-percent slope). Such access shall not require the use of portable

ladders. Where access involves climbing over parapet walls, the height shall be measured to the top of the parapet wall.

Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

(Items 1 – 9 unchanged)

10. ~~Access to ladders shall be provided at all times. Access paths to ladders and ladder landings shall remain unobstructed at all times.~~

Exceptions:

1. This section shall not apply to the replacement, repair or maintenance of an existing appliance or piece of equipment lawfully in existence at the time of the adoption of this code.

2. This section shall not apply to Group R-3 occupancies.

306.5.1 Sloped Roofs Where appliances, *equipment*, fans or other components that require service are installed on a roof having a slope of three units vertical in 12 units horizontal (25-percent slope) or greater and having an edge more than 30 inches (762 mm) above grade at such edge, a level platform shall be provided on each side of the *appliance* or *equipment* to which access is required for service, repair or maintenance. The platform shall be not less than 30 inches (762 mm) in any dimension and shall be provided with guards. The guards shall extend not less than 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage of a 21-inch diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*. Access shall not require walking on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Where access involves obstructions greater than 30 inches (762 mm) in height, such obstructions shall be provided with ladders installed in accordance with Section 306.5 or stairways installed in accordance with the requirements specified in the *International Building Code* in the path of travel to and from appliances, fans or *equipment* requiring service.

Exception: This section shall not apply to the replacement, repair or maintenance of an existing appliance or piece of equipment lawfully in existence at the time of the adoption of this code.

Section 307 Condensate Disposal

307.2.1 Condensate disposal. Condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal **as listed in Items 1, 2, and 3 below.** Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope). ~~Condensate shall not discharge into a street, alley or other areas so as to cause a nuisance.~~

1. Units larger than 6 tons (21.1 kW) nominal capacity shall discharge to a sanitary sewer drain or storm sewer drain. Where discharging to a sanitary sewer, such drains shall be indirectly connected in accordance with the Plumbing Code.

2. Units 6 tons (21.1 kW) and smaller nominal capacity shall discharge in accordance with Item 1, or shall discharge to a gutter, roof drain or other approved location.

3. Condensate drains from rooftop units shall discharge in accordance with Item 1 or 2, or shall discharge onto rooftops where the condensate does not discharge into a street, alley or other areas so as to cause a nuisance.

307.2.2 Drain pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper, cross-linked polyethylene, polybutylene, polyethylene, ABS, CPVC, PVC, or polypropylene pipe or tubing. All components shall be selected for the pressure and temperature rating of the installation. ~~Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 of the *International Plumbing Code* relative to the material type.~~ Condensate waste and drain line size shall be not less than ¾ inch (19 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with Table 307.2.2.

Section 312 Heating and Cooling Load Calculations

312.1 Load calculations. Heating and cooling system design loads for the purpose of sizing systems, appliances and *equipment* shall be determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183 **or the ASHRAE Handbook of Fundamentals.** ~~Alternatively, design loads shall be determined by an *approved* equivalent computation procedure, using the design parameters specified in Chapter 3 of the *International Energy Conservation Code*.~~

CHAPTER 4 VENTILATION

Section 401 General

401.1 Scope. This chapter shall govern the ventilation of spaces within a building intended to be occupied. Mechanical exhaust systems, including exhaust systems serving clothes dryers and cooking appliances; hazardous exhaust systems; dust, stock and refuse conveyor systems; slab soil exhaust systems; smoke control systems; energy recovery ventilation systems and other systems specified in Section 502 shall comply with Chapter 5. **The principles specified in ASHRAE Standard 62.1-2013 may be used as an alternative to this chapter to demonstrate compliance with required ventilation air for occupants.**

401.2 Ventilation required. Every occupied space shall be ventilated by natural means in accordance with **Chapter 12 of the Building Code** ~~Section 402~~ or by mechanical means in accordance with Section 403. Where the air infiltration rate in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2-inch water column (50 Pa) ~~in accordance with Section 402.4.1.2 of the *International*~~

~~Energy Conservation Code~~, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and Group I-2 facilities shall be ventilated by mechanical means in accordance with Section 407.

Exception: Rooms within a private dwelling which contains a bathtub, shower or spa facility shall be provided with mechanical ventilation in accordance with the provisions of Table 403.3.

Note: Heating and air conditioning controls shall conform to Chapter 5 of the *Energy Code*.

401.4 Intake opening location. Air intake openings shall comply with all of the following:

1. Intake openings shall be located a minimum of 10 feet (3048 mm) from lot lines or buildings on the same lot.
2. Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as gas meters, vents, streets, alleys, parking lots and loading docks, except as specified in Item 3 or Section 501.2.1. Outdoor air intake openings shall be permitted to be located less than 10 feet (3048 mm) horizontally from streets, alleys, parking lots and loading docks provided that the openings are located not less than 25 feet (7620 mm) vertically above such locations. Where openings front on a street or public way, the distance shall be measured from the closest edge of the street or public way.
3. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening.
4. Intake openings on structures in flood hazard areas shall be at or above the elevation established by the Flood Plain Administrator ~~local governing authority required by Section 1612 of the *International Building Code*~~ for utilities and attendant equipment.

Section 402 Natural Ventilation

Note: Section 402 is not adopted as part of this code, natural ventilation is regulated under the *Building Code*.

Section 403 Mechanical Ventilation

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

Exceptions:

1. **Where recirculation from such spaces is prohibited by Table 403.3.**
2. **Air transferred from spaces served by other fan systems shall not be used if those systems are required to meet either Section 401.6 of this code or Section 503.2.5.1 or 503.2.6 of the *Energy Code*.**
3. **Where ventilation schedule of HVAC system supplying transfer air is not similar to exhaust system operating schedule.**

403.3 Outdoor air and local exhaust airflow rates. Group R-2, R-3 and R-4 occupancies three stories and less in height above grade plane shall be provided with outdoor air and local exhaust in accordance with Section 403.3.2. All other buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

403.3.1 Other buildings intended to be occupied. The design of local exhaust systems and ventilation systems for outdoor air for occupancies other than Group R-2, R-3 and R-4 three stories and less above grade plane shall comply with Sections 403.3.1.1 through 403.3.1.5.

403.3.1.1 Outdoor airflow rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate determined in accordance with this section. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the ~~be based on expected average occupant load provided the average occupant load is not less than one half the number determined from the~~ estimated maximum occupant load rate indicated in Table 403.3. **The anticipated ventilation occupancy load and occupancy ventilation design methods shall be documented on plans and specifications.** Ventilation rates for occupancies not represented in Table 403.3 shall be those for a listed occupancy classification that is most similar in terms of occupant density, activities and building construction; or 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.

With the exception of smoking lounges, the ventilation rates in Table 403.3 are based on the absence of smoking in occupiable spaces. Where smoking is anticipated in a space other than a smoking lounge, the ventilation system serving the space shall be designed to provide ventilation over and above that required by Table 403.3 in accordance with accepted engineering practice.

Exceptions: The occupant load is not required to be determined based on the estimated maximum occupant load rate indicated in Table 403.3 where *approved* statistical data document the accuracy of an alternate anticipated occupant density. **The occupant load shall not be less than one half the number determined from Table 403.3.**

**TABLE 403.3
MINIMUM VENTILATION RATES**

OCCUPANCY CLASSIFICATION	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _p , CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE R _a , CFM/FT ²	DEFAULT OCCUPANT DENSITY #/1000 FT ²	EXHAUST AIRFLOW RATE CFM/FT ²
Private dwellings, single and multiple Garages, common for multiple units ^b Garages, separate for each dwelling ^b Kitchens^b Living areas	-- -- -- 0.35 ACH but not less than 15 cfm/person	-- -- -- --	-- -- -- Based upon number of bedrooms. First Bedroom, 2 each additional bedroom, 1	0.75 100cfm per car 25/150 ^f --
Toilet rooms and bathrooms^{g,i,j}	--	--	--	20/80 ^f

- h. For nail salons, the required exhaust shall include the use of ventilation tables or other systems that capture the contaminants and odors at their source and are capable of exhausting a minimum of 50 cfm per manicure station.**
- i. All rooms containing bathing or residential spa facilities shall be provided with a mechanical ventilation system controlled by a de-humidistat, timer, or similar means of automatic control.**
- j. Rooms containing bathing or residential spa facilities: Continuous ventilation fans shall be rated for sound at a maximum of 1.0 sone. Intermittent fans shall be rated for sound at a maximum of 3 sone, unless their maximum rated airflow exceeds 400 cfm (200 L/s). Remotely installed fans located at least 4 feet (1220 mm) away from the inlet grill are exempt from the sone rating requirements.**

Section 404 Enclosed Parking Garages

404.1 Enclosed parking garages. Mechanical ventilation systems for enclosed parking garages shall be permitted to operate intermittently ~~per the Energy Code, in accordance with Item 1, Item 2 or both.~~

- ~~1. The system shall be arranged to operate automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices.~~
- 2. The system shall be arranged to operate automatically by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Such detectors shall be installed in accordance with their manufacturers' recommendations.

Section 405 System Control

405.1.1 Ventilation controls for high occupancy areas. See Section 503.2.5 of the Energy Code.

**CHAPTER 5
EXHAUST SYSTEMS**

Section 501 General

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

(Note: 1 thru 3 unchanged)

- 4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation ~~established by the Flood Plain Administrator local governing authority required by Section 1612 of the International Building Code~~ for utilities and attendant equipment.

Section 502 Required Systems

[F]502.4 Stationary storage battery systems. Stationary storage battery systems, as regulated by Section 608 of the *International Fire Code*, shall be provided with ventilation in accordance with this chapter and Section 502.4.1 or 502.4.2. **Flooded lead acid, flooded nickel cadmium and VRLA battery stationary storage systems of greater than 7 batteries or over 600 amp-hour total capacity shall meet the ventilation requirements of Section 502.4.2. Stationary storage battery systems shall not be located in a space with an open combustion source.**

502.4.3 Supervision. Mechanical ventilation systems required by Section 502.4, **as regulated by Section 608.6.3 of the Fire Code,** shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

[F]502.5 Valve-regulated lead-acid batteries in cabinets. Valve-regulated lead-acid (VRLA) batteries installed in cabinets, **consisting of greater than 7 batteries, or over 600 amp-hour capacity total capacity, or systems** as regulated by Section 608.6.2 of the *International Fire Code*, shall be provided with ventilation in accordance with Section 502.5.1 or 502.5.2.

502.5.3 Supervision. Mechanical ventilation systems required by Section 502.5, **for systems regulated by Section 608.6.3 of the Fire Code,** shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

[F]502.6 Dry cleaning plants. Ventilation in dry cleaning plants shall be adequate to protect employees and the public in accordance with this section ~~and DOL 29 CFR Part 1910.1000,~~ where applicable.

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

~~**[F]502.7.1 During construction.** Ventilation shall be provided for operations involving the application of materials containing flammable solvents in the course of construction, alteration or demolition of a structure.~~

~~**[F]502.7.7 Floor resurfacing operations.** To prevent the accumulation of flammable vapors during floor resurfacing operations, mechanical ventilation at a minimum rate of 1 cfm/ft² [0.00508 m³/(s • m²)] of area being finished shall be provided. Such exhaust shall be by approved temporary or portable means. Vapors shall be exhausted to the exterior of the building.~~

502.19 Indoor firing ranges. Ventilation shall be provided in an approved manner in areas utilized as indoor firing ranges. Ventilation shall be designed to protect employees and the public in accordance with DOL 29 CFR 1910.1025 where applicable.

Section 504 Clothes Dryer Exhaust

504.8.3 Transition ducts. Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is listed and labeled in accordance with UL 2158A. Transition ducts shall be a maximum of 8 feet (2438 mm) in length and shall not be concealed within construction.

Section 505 Domestic Kitchen Exhaust Equipment

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

Exceptions:

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

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

1. The duct shall be installed under a concrete slab poured on grade.
2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
4. The PVC duct shall extend not more than 1 inch (25

mm) above grade outside of the building.

5. The PVC ducts shall be solvent cemented.

Section 506 Commercial Kitchen Hood Ventilation system Ducts and Exhaust Equipment

506.3.2.5 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 ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test. A light test **or approved equivalent pressure test** shall be performed to determine that all welded and brazed joints are liquid tight.

Section 507 Commercial Kitchen Hoods

507.1.2 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliances and processes in accordance with Sections 507.2 and 507.3. Domestic cooking appliances utilized for domestic purposes shall comply with Section 505.

Exception: A single domestic cooking appliance installed where domestic cooking operations occur, such as in a church, day-care center, fire station, employee lunchroom, or similar types of commercial occupancies shall meet the requirements of Section 505.1.

507.2.6 Clearances for Type I hood. A Type I hood shall be installed with a clearance to combustibles of not less than 18 inches (457 mm). **This clearance may be reduced to 3 inches (76 mm), provided the combustible material is protected with materials as specified for 1-hour fire-resistive construction on the hood side. Hoods less than 12 inches (305 mm) from the ceiling or wall shall be flashed solidly with materials of the thickness specified in Section 507.4 or materials conforming to one-hour fire-resistive construction.**

Section 509 Fire Suppression Systems

509.1 Where required. Commercial cooking appliances required by Section 507.2.1 to have a Type I hood shall be provided with an approved automatic fire suppression system complying with the International Building Code and the International Fire Code **Sections 509.2 through 509.5.**

509.2 Type of system. **The automatic fire-extinguishing system for commercial cooking systems shall be of a type recognized for protection of commercial cooking equipment and exhaust systems of the type and arrangement protected. Pre-engineered automatic dry- and wet-chemical extinguishing system shall be tested in accordance with UL 300 and listed and labeled for the intended application. Other types of automatic fire-extinguishing shall be listed**

and labeled for specific use as protection for commercial cooking operations. The system shall be installed in accordance with this code, its listing and the manufacturer's installation instructions. Automatic fire-extinguishing systems of the following types shall be installed in accordance with the referenced standard indicated as follows:

1. Carbon-dioxide extinguishing system, NFPA 12.
2. Automatic sprinkler system, NFPA 13.
3. Foam-water sprinkler system or foam-water spray systems, NFPA 16.
4. Dry-chemical extinguishing systems, NFPA 17. 5. Wet-chemical extinguishing systems, NFPA 17A.
5. Wet-chemical extinguishing systems, NFPA 17A.

Exception: Factory-built commercial cooking recirculating systems that are tested in accordance with UL 710B and listed, labeled and installed in accordance with Section 304.1.

509.3 Manual system operation. A manual actuation device shall be located at or near a means of egress from the cooking area, a minimum of 10 feet (3048 mm) and a maximum of 20 feet (6096 mm) from the kitchen exhaust system. The manual actuation device shall be installed not more than 48 inches (1200 mm) nor less than 42 inches (1067 mm) above the floor and shall clearly identify the hazard protected. The manual actuation shall require a maximum force of 40 pounds (178 N) and a maximum movement of 14 inches (356 mm) to actuate the fire suppression system.

Exception: Automatic sprinkler systems shall not be required to be equipped with manual actuation means.

509.4 System interconnection. The actuation of the fire extinguishing system shall automatically shut down the fuel or electrical power supply to the cooking equipment. The fuel and electrical power supply reset shall be manual.

509.5 System test and inspection. The automatic fire suppression system shall be acceptance-tested in accordance with the fire prevention code and installation standard listed in Section 509.2, and with the manufacturer's instructions.

Section 510 Hazardous Exhaust Systems

510.6.8 Motors and fans. Motors and fans used in conjunction with hazardous exhaust systems shall meet the requirements of Section 503.

Section 511 Dust, Stock and Refuse Conveying Systems

511.1.1 Collectors and separators. Collectors and separators involving such systems as centrifugal separators, bag filter systems and similar devices, and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is

provided with a metal vent pipe that extends above the highest part of any roof with a distance of 30 feet (9144 mm).

Exceptions:

1. Collectors such as "Point of Use" collectors, close extraction weld fume collectors, spray finishing booths, stationary grinding tables, sanding booths, and integrated or machine-mounted collectors shall be permitted to be installed indoors provided the installation is in accordance with Table 2204.1 of the International Fire Code and NFPA 654 and 664, the Electric Code and approved by the code official. ~~NFPA 70.~~

2. Collectors in independent exhaust systems handling combustible dusts in a facility shall be permitted to be installed indoors provided that there are not more than three independent collectors servicing not more than five dust producing appliances and, such collectors are installed in compliance with Table 2204.1 of the International Fire Code and NFPA 654 and 664, the Electric Code and approved by the code official. ~~NFPA 70~~

Section 513 Smoke Control Systems

***Section 513.5.3 Opening protection is deleted.**

CHAPTER 6 DUCT SYSTEMS

Section 602 Plenums

[B]602.4 Flood hazard. For structures located in flood hazard areas, plenum spaces shall be located above the elevation established by the Flood Plain Administrator ~~local governing authority required by Section 1612 of the International Building Code~~ for utilities and attendant equipment or shall be designed and constructed to prevent water from entering or accumulating within the plenum spaces during floods up to such elevation. If the plenum spaces are located below the elevation established by the Flood Plain Administrator ~~local governing authority required by Section 1612 of the International Building Code~~ for utilities and attendant equipment, they shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

Section 603 Duct Construction and Installation

603.9 Joints, seams and connections. All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards—Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards. All joints, longitudinal and transverse seams and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Closure

systems used to seal ductwork listed and labeled in accordance with UL 181A shall be marked “181A-P” for pressure-sensitive tape, “181 A-M” for mastic or “181 A-H” for heat-sensitive tape. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181B-FX” for pressure-sensitive tape or “181B-M” for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked “181B-C.” Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturer’s installation instructions. Unlisted duct tape is not permitted as a sealant on any duct.

Exceptions:

1. Continuously welded locking-type longitudinal joints and seams in ducts operating at static pressures of less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

2. Adjustable metal elbow gore, longitudinal pipe joints, integral seams within a boot fitting or similar fitting and integral seams within a “Y” fitting.

603.9.1 Fastening. Duct connections to flanges of air distribution system equipment or sheet metal fittings shall be mechanically fastened. Crimp joints for round ducts shall have a contact lap of at least 1.5 inches (38 mm). Connections of metal ducts and the inner core of flexible ducts shall be mechanically fastened per the manufacturer’s installation instructions. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked 181B-C.

603.13 Flood hazard areas. For structures in flood hazard areas, ducts shall be located above the elevation **established by the Flood Plain Administrator** ~~local governing authority required by Section 1612 of the International Building Code~~ for utilities and attendant equipment or shall be designed and constructed to prevent water from entering or accumulating within the ducts during floods up to such elevation. If the ducts are located below the elevation **established by the Flood Plain Administrator** ~~local governing authority required by Section 1612 of the International Building Code~~ for utilities and attendant equipment, the ducts shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

Section 604 Insulation

***Section 604.11 Vapor Retarders is deleted**

**CHAPTER 7
COMBUSTION AIR**

Section 701 General

701.1 Scope. Solid fuel-burning *appliances* shall be provided with *combustion* air in accordance with the appliance

manufacturer’s installation instructions. Oil-fired *appliances* shall be provided with *combustion* air in accordance with NFPA 31. The methods of providing *combustion air* in this chapter do not apply to fireplaces, fireplace stoves and direct-vent *appliances*. The requirements for combustion and dilution air for gas-fired *appliances* shall be in accordance with Appendix C.

**CHAPTER 8
CHIMNEYS AND VENTS**

Section 805 Factory Built Chimneys

805.4 Factory-built fireplaces. Chimneys for use with factory-built fireplaces shall comply with the requirements of UL 127.

**CHAPTER 9
SPECIFIC APPLIANCES, FIREPLACES AND
SOLID FUEL-BURNING EQUIPMENT**

Section 901 General

901.1 Scope. This chapter shall govern the approval, design, installation, construction, ~~maintenance, alteration~~ and repair of the appliances and *equipment* specifically identified herein and factory-built fireplaces. The approval, design, installation, construction, ~~maintenance, alteration~~ and repair of gas-fired appliances shall be regulated by Appendix C ~~the International Fuel Gas Code~~.

Section 906 Factory-Built Barbecue Appliances

906.1 General. Factory-built barbecue appliances shall be of an *approved* type and shall be installed in accordance with the manufacturer’s installation instructions, this chapter and Chapters 3, 5, 7, 8 and Appendix C. ~~the International Fuel Gas Code.~~

Section 918 Forced-Air Warm-Air Furnaces

918.7 Prohibited sources. Outdoor or return air for forced-air heating and cooling systems shall not be taken from the following locations:

1. Less than 10 feet (3048 mm) from an appliance vent outlet, a vent opening from a plumbing drainage system or the discharge outlet of an exhaust fan, unless the outlet is 3 feet (914 mm) above the outdoor air inlet.

Exception: Listed outdoor appliances which provide both circulating air inlet and vent discharge.

2. Where there is the presence of objectionable odors, fumes or flammable vapors; or where located less than 10 feet (3048 mm) above surface of any abutting public way

or driveway; or where located at grade level by a sidewalk; street, alley or driveway.

3. A hazardous or insanitary location or a refrigeration machinery room as defined in this code.

4. A room or space, the column of which is less than 25 percent of the entire volume served by such system. Where connected by a permanent opening having an area sized in accordance with Sections 918.2 and 918.3, adjoining rooms or spaces shall be considered as a single room or space for the purpose of determining the volume of such rooms or spaces.

Exception: The minimum volume requirement shall not apply where the amount of return air taken from a room or space is less than or equal to the amount of supply air delivered to such room or space.

5. A closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Where return air intakes are located not less than 10 feet (3048 mm) from cooking appliances, and serve the kitchen area only, taking return air from a kitchen shall not be prohibited.

2. Dedicated forced-air systems serving only a garage shall not be prohibited from obtaining return air from the garage.

6. An unconditioned crawl space by means of direct connection to the return side of a forced air system.

7. A room or space containing a fuel-burning appliance where such room or space serves as the sole source of return air.

Exceptions:

7.1. This shall not apply where the fuel-burning appliance is a direct-vent appliance.

7.2. This shall not apply where the room or space complies with the following requirements:

7.2.1. The return air shall be taken from a room or space having a volume exceeding 1 cubic foot for each 10 Btu/h (9.6 L/W) of combined input rating of all fuel-burning appliances therein.

7.2.2. The volume of supply air discharged back into the same space shall be approximately equal to the volume of return air taken from the space.

7.2.3. Return-air inlets shall not be located within 10 feet (3048 mm) of any appliance firebox or draft hood in the same room or space.

7.3. This shall not apply to rooms or spaces containing solid-fuel-burning appliances, provided that return-air inlets are located not less than 10 feet (3048 mm) from the firebox of the appliances.

listed and unlisted kilns that are used for ceramics, have a maximum interior volume of 20 cubic feet (0.566 m³) and are used for hobby and noncommercial purposes.

923.1.1 Installation. Kilns shall be installed in accordance with the manufacturer's installation instructions and the provisions of this code. Electric kilns shall comply with UL 499.

923.2 Unlisted outdoor kiln installation. Unlisted kilns shall be installed only outdoors and in accordance with the manufacturer's installation instructions and the provisions of Section 932.2.

923.2.1 Installations under structures. Kilns shall be installed with minimum clearances as specified in Section 923.2.1.1. Kilns located under a roof and enclosed by two or more vertical wall surfaces shall have a hood and gravity ventilation duct installed to comply with Sections 923.2.1.3 and 923.2.1.4.

923.2.1.1 Clearances for interior installation. The sides and tops of kilns shall be located a minimum of 18 inches (457 mm) from any noncombustible surface and 3 feet (914 mm) from any combustible wall surface. Kilns shall be installed on noncombustible flooring, consisting of at least 2 inches (51 mm) of solid masonry or concrete extending at least 12 inches (305 mm) beyond the base or supporting members of the kiln.

Exception: These clearances may be reduced, provided independent testing is provided to and approved by the building official.

923.2.1.2 Control side clearance. The clearance on the control side of a kiln shall not be reduced to less than 30 inches (762 mm).

923.2.1.3 Hoods. Where required, a canopy type hood shall be installed directly above each kiln. The face opening area of the hood shall be equal to or greater than the top horizontal surface area of the kiln. The hood shall be constructed of not less than 0.030-inch (0.76 mm) (No. 22 U.S. gage) galvanized steel or equivalent, and be supported at a height of between 12 inches and 30 inches (305 mm and 762 mm) above the kiln by noncombustible supports.

Exception: Electric kilns installed with listed exhaust blowers may be used when marked as being suitable for the kiln and installed in accordance with manufacturer's instructions.

923.2.1.4 Gravity ventilation ducts. Each kiln hood shall be connected to a gravity ventilation duct extending in a vertical direction to outside the building. This duct shall be of the same construction as the hood and shall have a cross-sectional area of not less than one-fifteenth of the face opening of the hood. The duct shall terminate a minimum of 12 inches (305 mm) above any portion of a building within 4 feet (1219 mm) and terminate no less than 4 feet (1219 mm) from any openable windows or other opening into the building or adjacent property line. The duct to the outside shall be shielded, without reduction of duct area, to prevent entrance of rain into the duct. The

Section 923 Small Ceramic Kilns

***Replace Section 923 with the following:**

923.1 General. The provisions of this section shall apply to

duct shall be supported at each section by noncombustible supports.

923.2.1.5 Hood and duct clearances. Every hood and duct serving a fuel-burning kiln shall have a clearance from combustible construction of at least 18 inches (457 mm). This clearance may be reduced in accordance with Table 308.6.

923.2.1.5.1 Makeup air. Provisions shall be made for makeup air to enter the enclosure in which a kiln is installed at a rate at least equal to the air being removed through the kiln hood.

***Section 927 Radiant Heating Systems is deleted.**

Section 929 Solid Fuel-Burning Devices

929.1 Used solid fuel-burning stoves.

Note: For reference only. Not adopted as part of this code. The Oregon Department of Environmental Quality regulates the sale and use of residential and commercial solid fuel burning devices. See Oregon Administrative Rule (OAR) Chapter 340, Division 262. DEQ prohibits the installation of "used solid fuel burning devices."

Exceptions:

1. Solid fuel-burning device certified as new on or after July 1, 1986, under rules adopted pursuant to OAR 340-262-0500.
2. Antique wood stoves pursuant to OAR 340-262-0700
3. Pellet stoves under rules adopted pursuant to OAR 340-262-0450.

929.2 Labeling for identification.

Note: For reference only. Not adopted as part of this code. Solid fuel-burning device, as defined by the Oregon Department of Environmental Quality, OAR 340-262-0500 are required by

CHAPTER 10 BOILERS, WATER HEATERS AND PRESSURE VESSELS

***Chapter 10 is rewritten as follows:**

Section 1001 General

1001.1 Scope. The purpose of this chapter is to establish and provide minimum standards for the protection of the public welfare, health, safety, and property by regulating and controlling the installation of steam and hot-water boilers, water heaters, pressure vessels and their related piping that are not regulated by the Oregon Boiler and Pressure Vessel Specialty Code(OBPVSC) or the Oregon Plumbing Specialty Code(OPSC).

480.515 Definitions for ORS 480.510 to 480.670. As used in ORS 480.510 to 480.670, unless the context requires otherwise:

- (1) "Alteration" means a change or addition to equipment, other than the ordinary repair or replacement of an existing part of the equipment.
- (2) "Board" means the Board of Boiler Rules created under ORS 480.535.
- (3) "Boiler" or "boilers" means:
 - (a) A closed vessel or vessels intended for the heating or vaporizing of liquids to be used externally to such vessel or vessels by the application of heat from combustible fuels, electricity or nuclear energy;
 - (b) Related appurtenances including but not limited to pressure piping directly connected and related to the safe operation of a boiler; and
 - (c) Pressure piping consisting of boiler or nonboiler external piping connected to a boiler, but not potable water nonboiler external piping.
- (4) "Boiler external piping" has the meaning given the term in the 1986 Pressure Piping Code B 31.1, adopted by the American Society of Mechanical Engineers.
- (5) "Certificate of competency" means a certificate issued under the provisions of ORS 480.565 (3).
- (6) "Department" means the Department of Consumer and Business Services.
- (7) "Director" means the Director of the Department of Consumer and Business Services.
- (8) "Installation permit" means a permit issued by the department for the installation, alteration or repair of a boiler or pressure vessel.
- (9) "Minimum safety standards" means the rules, regulations, formulae, definitions and interpretations for the safe construction, installation, operation and repair of boilers and pressure vessels either adopted by ORS 480.510 to 480.670 or adopted by the board, under ORS 480.510 to 480.670.
- (10) "Nonboiler external piping" has the meaning given the term in the 1986 Pressure Piping Code B 31.1, adopted by the American Society of Mechanical Engineers.
- (11) "Operating permit" means a permit issued by the department authorizing the operation of a boiler or pressure vessel.
- (12) "Pressure vessel" means containers for the containment of pressure, either internal or external. This pressure may be obtained from an external source or by the application of heat from a direct or indirect source, or any combination thereof.
- (13) "Related appurtenances" means any equipment instrumental to the safe operation of a boiler or pressure vessel.
- (14) "Shop inspection" means an inspection at a boiler or pressure vessel manufacturing, construction or repair facility.
- (15) "Temporary operation authorization" means an authorization issued by the department to operate a boiler or pressure vessel for a specified period pending the issuance of an operating permit. [1961 c.485 §3; 1969 c.582 §2; 1971 c.753 §58; 1973 c.830 §1; 1983 c.676 §3; 1987 c.414 §35; 1991 c.518 §2; 1993 c.744 §142; 2007 c.487 §3; 2009 c.696 §11]

Section 1002 Definitions

1002.1 Definitions. Certain words and terms used in this chapter, unless clearly inconsistent with their context, shall mean as follows:

BOILER. As defined in ORS 480.515(3).

ORS 480.515(3) is not a part of this code but is reproduced here for the reader's convenience:

480.515 Definitions for ORS 480.510 to 480.670.

- (3) "Boiler" or "boilers" means:
 - (a) A closed vessel or vessels intended for the heating or vaporizing of liquids to be used externally to such vessel or vessels by the application of heat from combustible fuels, electricity or nuclear energy;
 - (b) Related appurtenances including but not limited to pressure piping directly connected and related to the safe operation of a boiler; and
 - (c) Pressure piping consisting of boiler or nonboiler external piping connected to a boiler, but not potable water nonboiler external piping.[1961 c.485 §3; 1969 c.582 §2; 1971 c.753 §58; 1973 c.830 §1; 1983 c.676 §3; 1987 c.414 §35; 1991 c.518 §2; 1993 c.744 §142; 2007 c.487 §3; 2009 c.696 §11]

DOMESTIC WATER HEATER. As defined in ORS 480.525(1)(b).

ORS 480.525(1)(b) is not a part of this code but is reproduced here for the reader's convenience:

480.525 Exempt vessels.

(1)(b) Domestic water heaters designed for heating potable water, equipped with an approved pressure-relieving device, containing only water and that do not exceed a:

- (A) Capacity of 120 gallons;
- (B) Water temperature of 210 degrees Fahrenheit;
- (C) Pressure of 150 pounds per square inch gauge pressure; or
- (D) Heat input of 200,000 BTU per hour.

[1961 c.485 §11; 1967 c.447 §1; 1969 c.582 §4; 1973 c.830 §2; 1983 c.676 §5; 1985 c.398 §1; 1987 c.847 §1; 1991 c.518 §6; 1999 c.713 §1; 2007 c.386 §1; 2007 c.487 §5; 2009 c.696 §13]

Section 1003 Water Heaters

1003.1 General. Potable water heaters and hot water storage tanks shall be listed and labeled and installed in accordance with the manufacturer's installation instructions, the *Plumbing Code* and where applicable this code. All water heaters shall be capable of being removed without first removing a permanent portion of the building structure. The potable water connections and relief valves for all water heaters shall conform to the requirements of the *Plumbing Code*.

Section 1004 Boilers and Pressure Vessels

1004.1 General The requirements of this section shall apply to the boiler rooms, combustion air, chimneys, and vents, and fuel *pipng* related to the construction, installation, repair and alteration of rooms for the installation of boilers and pressure vessels.

1004.2 Standards. Boilers and pressure vessels that are not regulated under the *Oregon Boiler and Pressure Vessel Specialty Code* shall be designed and constructed in accordance with the requirements of their listing and labeling or the applicable standards for their use.

1004.3 Installation. In addition to the requirements of this code, the installation of boilers and pressure vessels that are not regulated under the *Oregon Boiler and Pressure Vessel Specialty Code* shall conform to the manufacturer's instructions. Operating instructions of a permanent type shall be attached to the boiler. Boilers shall have all controls set, adjusted and tested by the installer. The manufacturer's rating data and the nameplate shall be attached to the boiler.

1004.4 Workmanship. All *equipment*, appurtenances, devices and *pipng* shall be installed in a workman like manner conforming to provisions and intent of this chapter.

Section 1005 Permits Required

1005.1 Permits. It shall be unlawful to install any boiler or pressure vessel regulated by this code or the *Oregon Boiler and Pressure Vessel Specialty Code* without first obtaining a permit from the local building jurisdiction and an installation permit from the Oregon Building Codes Division, Boiler and Pressure Vessel Program. Permits

obtained from the local jurisdiction shall apply to the boiler rooms, combustion air, chimneys, vents, and fuel and hydronic *pipng* related to the construction, repair and alteration of rooms for the installation of boilers and pressure vessels and the installation of any boiler or pressure vessel regulated by this code.

Section 1006 Detailed Requirements

1006.1 Safety requirements. The installation of all boilers and pressure vessels not regulated under the *Oregon Boiler and Pressure Vessel Specialty Code* shall conform to the minimum requirements for safety established by this code.

1006.1.1 Safety relief valves for hot water boilers. Hot water boilers shall be protected with a safety relief valve.

1006.1.2 Pressure relief for pressure vessels. All pressure vessels shall be protected with a pressure relief valve or pressure-limiting device as required by the manufacturer's installation instructions for the pressure vessel.

1006.2 Stack dampers. Stack dampers on boilers not regulated under the *Oregon Boiler and Pressure Vessel Specialty Code* fired with oil or solid fuel shall not close more than 80 percent of the stack area when closed, except on automatic boilers with prepurge, automatic draft control and interlock. Operative dampers shall not be placed within any stack, flue or vent of a gas-fired boiler, except on an automatic boiler with prepurge, automatic draft control and interlock.

Section 1007 Expansion Tanks

1007.1 Expansion tanks. Expansion tanks shall be securely fastened to the structure; supports shall be adequate to carry twice the weight of the tank filled with water without placing any strain on connecting *pipng*.

All water heating systems incorporating hot water tanks or fluid relief columns shall be installed to prevent freezing under normal operating conditions.

An expansion tank shall be installed in every hot water system. For multiple boiler installations, a minimum of one expansion tank is required. Expansion tanks shall be of the closed or open type. Tanks shall be rated for the pressure of the hot water system

Section 1008 Safety or Relief Valve Discharge

1008.1 General. The discharge from relief valves for water heaters and boilers not regulated under the *Oregon Boiler and Pressure Vessel Specialty Code* shall be piped to within 18 inches (457 mm) of the floor or to an open receptacle, and when the operating temperature is in excess of 212°F (100°C), shall be equipped with a splash shield or centrifugal separator. When the discharge from safety valves would result in a hazardous discharge of steam inside the boiler room, such discharge shall be extended outside the boiler room. Valves are prohibited between the safety valve and the atmosphere.

Section 1009 Gas Pressure Regulators

1009.1 General. An approved gas pressure regulator shall be installed on gas-fired boilers not regulated under the Oregon Boiler and Pressure Vessel Specialty Code where the gas supply pressure is higher than that at which the main burner is designed to operate. A separate approved gas pressure regulator shall be installed to regulate the gas pressure to the pilot or pilots. A separate regulator shall not be required for the pilot or pilots on manufacturer-assembled boiler-burner units which have been approved by the building official and on gas-fired boilers in Group R occupancies of less than six units and in Group U occupancies.

Section 1010 Clearance for Access

1009.1 Access. When boilers not regulated under the Oregon Boiler and Pressure Vessel Specialty Code are installed or replaced, clearance shall be provided to allow access for inspection, maintenance and repair, and passageways shall have an unobstructed width of not less than 18 inches (457 mm). Clearance for repair and cleaning may be provided through a door or access panel into another area, provided the opening is of sufficient size. Package boilers, miniature boilers, low-pressure boilers and hot water supply boilers with no manhole on top of shell shall have a minimum clearance of 2 feet (610 mm) from the ceiling.

Section 1011 Boiler Room Enclosures

1011.1 Boiler rooms. Boiler rooms and enclosures and access thereto shall comply with Chapter 3 of this code and the Building Code.

Section 1012 Floors

1012.1 General. Boilers shall be mounted on floors of noncombustible construction unless listed for mounting on combustibles floors. The floor and related structural supports shall be designed as required in the Building Code to carry the loads imposed by the boiler and appurtenances.

Section 1013 Chimneys or Vents

1013.1 General. When required, boilers shall be connected to a chimney or vent in accordance with Chapter 8 for oil or wood and Appendix C for fuel gas installations.

Section 1014 Drainage

1014.1 Drains. The boiler room shall have an approved floor drain or equivalent means for disposing of accumulation of liquid wastes incidental to cleaning or recharging.

Section 1015 Fuel Supply Piping

1015.1 Piping. Fuel supply piping shall conform to Chapter 13, Appendix C or the standards cited in Chapter 15, Referenced Standards.

Section 1016 Air for Combustion And Ventilation

1016.1 General. Air for combustion and ventilation shall be installed in accordance with Chapter 7 or Appendix C of this code.

Section 1017 Steam and Hot Water Piping

Note: Boilers and pressure vessels and related piping are regulated by the state of Oregon Boiler and Pressure Vessel Law (ORS 480.510 to 480.670).

1017.1 General. Steam piping is regulated under the jurisdiction of the Oregon Boiler and Pressure Vessel Law and related administrative rules and is under the jurisdiction of the Building Codes Division, Boiler and Pressure Vessel Program.

1017.1.1 Hot water piping systems. Water piping used for hot-water heating systems and hydronics shall be installed in accordance with the Chapter 12 of this code.

CHAPTER 11 REFRIGERATION

Note: Brazing certifications required. A person qualified for inspection of brazing or welding of refrigeration piping shall have a valid certification meeting the requirements in OAR 918-098-1020. A person engaged in the brazing or welding of refrigeration piping shall have a valid certification meeting the requirements in OAR 918-440-0015. For refrigeration piping regulated by the State of Oregon Boiler and Pressure Vessel Program, see requirements listed in OAR 918-225-0310. All three of these administrative rules were effective July 1, 2001.

918-098-1020 Expanded Scope of Work for Oregon A- or B-Level or Commercial Mechanical Inspectors

Unless stated otherwise within this rule, this rule is applied retroactively from July 1, 2010.

(1) Persons may conduct inspections of brazing or welding work related to the installation, alteration, or repair of refrigeration piping systems, except as regulated by the Oregon Boiler and Pressure Vessel Program under OAR chapter 918, division 225.

(2) To perform work under section (1) of this rule, these persons must successfully complete a training program in accordance with either Section IX, "Welding and Brazing Qualification" of the ASME Boiler and Pressure Vessel Code, or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification" administered by a division-approved organization.

(3) Inspector certification for refrigeration piping in residential structures is not required.

Hist.: BCD 2-2001, f. 2-2-01, cert. ef. 7-1-01; BCD 16-2005(Temp), f. & cert. ef. 7-7-05 thru 12-31-05, Renumbered from 918-098-0900; BCD 24-2005, f. 9-30-05, cert. ef. 10-1-05, Renumbered from 918-098-0900; Renumbered from 918-098-1080, BCD 19-2006, f. 12-29-06, cert. ef. 1-1-07; BCD 6-2010, f. 5-14-10, cert. ef. 7-1-10; BCD 7-2011, f. & cert. ef. 3-11-11; BCD 24-2011, f. 7-26-11, cert. ef. 10-1-11

918-440-0015 Refrigeration Installer Certification

All persons engaged in brazing or welding related to the installation, alteration or repair of refrigeration piping systems not regulated by the

Oregon Boiler and Pressure Vessel Program under OAR chapter 918, division 225, shall be certified in accordance with the requirements of this rule.

(1) The minimum requirement for persons engaged in brazing or welding of refrigeration piping systems is a current and valid certification issued upon completion of a class by a division-approved certifying organization in brazing or welding in accordance with either:

(a) Section IX, Welding and Brazing Qualifications of the American Society of Mechanical Engineers publication, 2001 ASME Boiler and Pressure Vessel Code; or

(b) American Welding Society publication AWS B2.2-91, Standard for Brazing Procedure and Performance Qualification.

(2) Refrigeration systems installed in dwelling units regulated under the Oregon Residential Specialty Code are exempt from this rule.

(3) All refrigeration piping system requirements not regulated by OAR 918-225-0310, are subject to the Oregon Mechanical Specialty Code. Hist.: BCD 34-2000, f. 12-27-00, cert. ef. 7-1-01; BCD 19-2003, f. 12-15-03, cert. ef. 1-1-04; BCD 3-2010, f. 5-14-10, cert. ef. 7-1-10; BCD 5-2011, f. & cert. ef. 3-11-11; BCD 22-2011, f. 7-26-11, cert. ef. 10-1-11

918-225-0310 Refrigerant Piping Systems; Components

(1) The requirements of OAR 918-225-0430(5) shall be enforced under this rule for all refrigerant piping systems consisting of welded, brazed or mechanically assembled piping and piping fittings exceeding 2 inches NPS, and containing any refrigerant chemical rated as other than A-1 or B-1 by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE 34) as adopted by the Oregon Mechanical Specialty Code.

(2) One and two-family dwelling units and air conditioning refrigeration systems used solely for human comfort are exempt from this rule.

(3) All refrigeration piping system requirements other than those regulated by this rule are subject to the Oregon Mechanical Specialty Code. Hist.: BCD 35-2000, f. 12-29-00, cert. ef. 7-1-01

~~1101.7 Maintenance~~ Mechanical refrigeration systems shall be maintained in proper operating condition, free from accumulations of oil, dirt, waste, excessive corrosion, other debris and leaks.

~~1101.8 Change in refrigerant type.~~ The type of refrigerant in refrigeration systems having a refrigerant circuit containing more than 220 pounds (99.8 kg) of Group A1 or 30 pounds (13.6 kg) of any other group refrigerant shall not be changed without prior notification to the code official and compliance with the applicable code provisions for the new refrigerant type.

~~[F]1101.9 Refrigerant discharge.~~ Notification of refrigerant discharge shall be provided in accordance with the *International Fire Code*.

~~1101.10 Locking access port caps.~~ Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

~~Exception:~~ This Section shall not apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

Section 1102 System Requirements

~~*Section 1102.3 Access port protection is deleted.~~

Section 1105 Machinery Room, General Requirements

~~[B]1105.1 Design and construction.~~ (NOTE: 2010 OMSC and earlier deleted this section) Machinery rooms shall be designed

and constructed in accordance with the *International Building Code* and this section. **A machinery room shall be dimensioned so as to provide clearances required by Chapter 3. Passageways shall maintain a clear head room of not less than 87 inches (2210 mm) below equipment and appliances located over passageways.**

Access to machinery rooms shall be restricted to authorized personnel. A sign shall be posted on the machinery room door prohibiting access by others.

1105.2 Openings. Ducts and air handlers in the *machinery room* that operate at a lower pressure than the room shall be sealed to prevent any refrigerant leakage from entering the airstream. **Openings to other parts of the building that permit passage of escaping refrigerant to other parts of the building are prohibited.**

Exceptions:

- 1. Egress doors serving the machinery room.**
- 2. Access doors and panels in air ducts and air-handling units, provided that such openings are gasketed and tight fitting.**

~~1105.3 Refrigerant detector.~~ Refrigerant detectors in machinery rooms shall be provided as required by Section 606.8 of the *International Fire Code*. **Machinery rooms shall contain a refrigerant detector with an audible and visual alarm. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values shown in Table 1103.1. Detectors and alarms shall be placed in approved locations.**

Exception: Detectors are not required for ammonia systems complying with Section 1106.3.

Section 1106 Machinery Room, Special Requirements

1106.5.1 Refrigeration system emergency shutoff. A clearly identified switch of the break-glass type or with an approved tamper-resistant cover shall provide off-only control of refrigerant compressors, refrigerant pumps, and normally closed, automatic refrigerant valves located ~~in the machinery room~~ **at an approved location immediately outside the machinery room and adjacent to its primary entrance.** Additionally, this equipment shall be automatically shut off whenever the refrigerant vapor concentration in the machinery room exceeds the vapor detector's upper detection limit or 25 percent of the LEL, whichever is lower.

~~*Section 1109 Periodic Testing is deleted.~~

CHAPTER 12 HYDRONIC PIPING

Section 1205 Valves

1205.1 Where required. Shutoff valves shall be installed in hydronic piping systems in the locations indicated in Sections 1205.1.1 through 1205.1.6.

1205.1.1 Heat exchangers. Shutoff valves shall be installed on the supply and return side of a heat exchanger.

Exception: Shutoff valves shall not be required when heat exchangers are integral with a boiler; or are a component of a manufacturer's boiler and heat exchanger packaged unit and are capable of being isolated from the hydronic system by the supply and return valves. ~~required by Section 1005.1.~~

Section 1206 Piping Installation

1206.9.1 Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation* as established by the Flood Plain Administrator ~~local governing authority.~~

Section 1208 Tests

1208.1 General. Hydronic piping systems other than ground-source heat pump loop systems shall be tested hydrostatically at one and one half times the maximum system design pressure, but not less than 100 psi (689 kPa). The duration of each test shall be not less than 15 minutes. Ground-source heat pump loop systems and cross-linked polyethylene (PEX) tubing systems shall be tested in accordance with Sections 1208.1.1 and 1208.1.2.

1208.1.1 Ground source heat pump loop systems. Before connection (header) trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 30 minutes with no observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the problem shall be identified and corrected.

1208.1.2 Cross-linked polyethylene (PEX) tubing systems. Before a continuous looped systems using PEX tubing is embedded or concealed the assembled system shall be pressure tested at 100 psi (689 kPa) for 30 minutes with no observed leaks.

Section 1209 Embedded Piping

1209.1 Materials. Piping for heating panels shall be standard-weight steel pipe, Type L copper tubing, cross-linked polyethylene (PEX) tubing, cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe, polybutylene or other approved plastic pipe or tubing rated at 100 psi (689 kPa) at 180°F (82°C).

CHAPTER 13 FUEL OIL PIPING AND STORAGE

Section 1301 General

1301.1 Scope. This chapter shall govern the design, installation, construction and repair of fuel-oil storage and piping systems. ~~The storage of fuel oil and flammable and combustible liquids shall be in accordance with Chapters 6 and 57 of the International Fire Code.~~

1301.2 Storage and piping systems. Fuel-oil storage systems shall comply with Section 603.3 of the *International Fire Code*. Fuel-oil piping systems shall comply with the requirements of this code and the Oregon Department of Environmental Quality.

Section 1305 Fuel Oil System Installation

1305.2.1 Flood hazard. All fuel oil pipe, equipment and appliances located in flood hazard areas shall be located above the elevation established by the Flood Plain Administrator ~~local governing authority required by Section 1612 of the International Building Code~~ for utilities and attendant equipment or shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

CHAPTER 14 SOLAR SYSTEMS

Section 1401 General

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

Section 1402 Installation

1402.5.1 Pressure and temperature. Solar energy system components containing pressurized fluids shall be protected against pressures and temperatures exceeding design limitations with a pressure and temperature relief valve. Each section of the system in which excessive pressures are capable of developing shall have a relief device located so that a section cannot be valved off or otherwise isolated from a relief device. Listed and labeled R-relief valves shall have a minimum rated capacity for the equipment or appliances served ~~comply with the requirements of Section 1006.4 and discharge in accordance with Section 1006.6 1008.~~

1402.5.4 Expansion tanks. Liquid single-phase solar energy systems shall be equipped with expansion tanks sized in accordance with Section ~~1009~~ 1007.

CHAPTER 15 REFERENCED STANDARDS

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.8.

<u>12—11</u>	National Fire Protection Association, 1 Battery March Park, Quincy, MA 02169-7471	<u>509.2</u>
<u>13—13</u>	<u>Carbon Dioxide Extinguishing systems</u>	<u>509.2</u>
<u>16—11</u>	<u>Installation of Sprinkler Systems</u>	<u>509.2</u>
<u>17—13</u>	<u>Installation of Foam-water Sprinkle and Foam-water Spray Systems</u>	<u>509.2</u>
<u>17A—13</u>	<u>Dry Chemical Extinguishing Systems</u>	<u>509.2</u>
<u>211—13+0</u>	<u>Wet Chemical Extinguishing Systems</u>	<u>509.2</u>
<u>654—13</u>	Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances	806.1
<u>664—12</u>	<u>Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids</u>	<u>511.1.1</u>
<u>UL</u>	<u>Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities</u>	<u>511.1.1</u>
Standard Reference Number	Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096	Referenced in code section number
<u>300-05</u>	<u>Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment</u>	<u>509.2</u>

APPENDIX C FUEL GAS

(NOTE: Appendix C is the 2015 IFGC with the following Oregon amendments. All section numbering is renumbered as Appendix C, whether included in amendments or not)

Section C101 (IFGC) General

~~[A]C101.1 Title.~~ These regulations shall be known as the *Fuel Gas Code* of [NAME OF JURISDICTION], hereinafter referred to as “this code.”

~~[A]C101.2 Scope.~~ This ~~code~~ **appendix** shall apply to the installation of fuel-gas *pip*ing systems, fuel gas appliances, gaseous hydrogen systems and related accessories in accordance with Sections C101.2.1 through C101.2.5.

Exception: 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 Oregon Residential Specialty Code*.

~~[A]C101.2.4 Systems, appliances and equipment outside the scope.~~ This code shall not apply to the following:

1. Portable ~~LP-fuel~~-gas appliances and *equipment* of all types that is not connected to a fixed fuel *pip*ing system.
- ~~2. Installation of farm appliances and equipment such as brooders, dehydrators, dryers and irrigation equipment.~~
2. Raw material (feedstock) applications except for *pip*ing to special atmosphere generators.
3. Oxygen-fuel gas cutting and welding systems.
4. Industrial gas applications using gases such as acetylene and acetylenic compounds, hydrogen, ammonia, carbon monoxide, oxygen and nitrogen.
5. Petroleum refineries, pipeline compressor or pumping stations, loading terminals, compounding plants, refinery tank farms and natural gas processing plants.
6. Integrated chemical plants or portions of such plants where flammable or combustible liquids or gases are produced by, or used in, chemical reactions.
7. LP-gas installations at utility gas plants.
- ~~8. Liquefied natural gas (LNG) installations.~~
- ~~10. Fuel gas piping in power and atomic energy plants.~~
2. Proprietary items of *equipment*, apparatus or instruments such as gas-generating sets, compressors and calorimeters.
10. LP-gas *equipment* for vaporization, gas mixing and gas manufacturing.
11. Temporary ~~LP-fuel~~-gas *pip*ing for buildings under construction or renovation that is not to become part of the permanent *pip*ing system.
12. Installation of LP-gas systems for railroad switch heating.
13. Installation of hydrogen gas, LP-gas and compressed natural gas (CNG) systems on vehicles.
14. Except as provided in Section C401.1.1, gas *pip*ing, meters, gas pressure regulators and other appurtenances

used by the serving gas supplier in the distribution of gas, other than undiluted LP-gas.

15. Building design and construction, except as specified herein.
16. *Pip*ing systems for mixtures of gas and air within the flammable range with an operating pressure greater than 10 psig (69 kPa gauge).
17. Portable fuel cell appliances that are neither connected to a fixed *pip*ing system nor interconnected to a power grid.

~~[A]101.2.5 Other fuels.~~ The requirements for the design, installation, maintenance, *alteration* and inspection of mechanical systems operating with fuels other than fuel gas shall be regulated by the *International Mechanical Code*.

~~[A]101.3 Appendices.~~ Provisions in the appendices shall not apply unless specifically adopted.

~~[A]C101.4 Intent.~~ The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, **and** location, ~~operation and maintenance or use~~ of fuel gas systems.

***Section 102 (IFGC) Applicability is deleted.**

***Section 103 (IFGC) Department of Inspection. is deleted.**

***Section 104 (IFGC) Duties and Powers of the Code Official is deleted.**

***Section 105 (IFGC) Approval is deleted.**

***Section 106 (IFGC) Permits is deleted.**

***Section C1027 (IFGC) Inspections and Testing is deleted.**

***Section 108 (IFGC) Violations is deleted.**

***Section 109 (IFGC) Means of Appeal is deleted.**

Section C201 (IFGC) General

C201.4 **Terms not defined.** Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

Words of common usage are given their plain, natural and ordinary meanings. Words that have well-defined legal meanings are given those meanings.

Section C202 (IFGC) General Definitions

***The Following Definitions are deleted:**

~~[M]AIR, EXHAUST.~~

~~{A} ALTERATION.~~
~~{M} APPLIANCE.~~
~~{A} APPROVED.~~
~~{A} APPROVED AGENCY.~~
~~BOILER, LOW PRESSURE.~~
~~Hot water heating boiler.~~
~~Hot water supply boiler.~~
~~Steam heating boiler.~~
~~CLOTHES DRYER.~~
~~Type 1.~~
~~Type 2.~~
~~{A} CODE.~~
~~{A} CODE OFFICIAL.~~
~~{M} COMBUSTIBLE ASSEMBLY.~~
~~COMBUSTIBLE MATERIAL.~~
~~{A} CONSTRUCTION DOCUMENTS.~~
~~{B} DESIGN FLOOD ELEVATION.~~
~~{A} DWELLING UNIT.~~
~~EXCESS FLOW VALVE (EFV).~~
~~FIREPLACE.~~
~~Factory built fireplace.~~
~~Masonry fireplace.~~
~~FLASHBACK ARRESTOR CHECK VALVE.~~
~~{B} FLOOD HAZARD AREA.~~
~~LIVING SPACE.~~
~~{A} OCCUPANCY.~~
~~POINT OF DELIVERY.~~
~~RELIEF VALVE (DEVICE).~~
~~RELIEF VALVE, PRESSURE.~~
~~RELIEF VALVE, TEMPERATURE.~~
~~Manual reset type.~~
~~Reseating or self-closing type.~~
~~RELIEF VALVE, VACUUM.~~
~~{B} SLEEPING UNIT.~~
~~{P} THIRD PARTY CERTIFICATION AGENCY.~~
~~{P} THIRD PARTY CERTIFIED.~~
~~{P} THIRD PARTY TESTED.~~
~~UNLISTED BOILER.~~
~~WATER HEATER.~~

Section C301 (IFGC) General

C301.1 Scope. This chapter shall govern the approval and installation of all *equipment* and appliances that comprise parts of the installations regulated by this code in accordance with Section 101.2.

C301.1.1 Other fuels. The requirements for combustion and dilution air for gas-fired appliances shall be governed by Section C304. The requirements for combustion and dilution air for appliances operating with fuels other than fuel gas shall be regulated by **Chapter 7** the ~~International Mechanical Code~~.

***Sections 301.4 through 301.10 are deleted.**

[B]301.11 Flood hazard. For structures located in flood hazard areas, the appliance, equipment and system installations regulated by this code shall be located at or above the elevation **established by the Flood Plain Administrator** required by ~~Section 1612 of the International Building Code~~ for utilities and attendant equipment.

Exception: The appliance, equipment and system installations regulated by this code are permitted to be located below the elevation **established by the Flood Plain Administrator** required by ~~Section 1612 of the International Building Code~~ for utilities and attendant equipment provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to such elevation.

***Sections 301.12 through 301.15 are deleted.**

Section ~~C302 (IFGC)~~ Structural Safety

[B]C302.1 Structural safety. ~~See Chapter 3, Section 302 of Mechanical Code.~~ The building shall not be weakened by the installation of any gas *piping*. In the process of installing or repairing any gas *piping*, the finished floors, walls, ceilings, tile work or any other part of the building or premises which is required to be changed or replaced shall be left in a safe structural condition in accordance with the requirements of the ~~International Building Code~~.

***Note: remainder of this section is deleted in its entirety.**

Section ~~C303 (IFGC)~~ Appliance Location

C303.1 General. Appliances shall be located as required by this section, specific requirements elsewhere in this **appendix** ~~code~~ and the conditions of the *equipment* and *appliance* listing.

C303.4 Protection from vehicle impact damage. Appliances shall not be installed in a location subject to vehicle impact damage except where protected by an *approved* means. **See Figure C303.1**.

C303.6 Outdoor locations. Appliances installed in outdoor locations shall be ~~either listed for outdoor installation, or provided with protection from outdoor environmental factors that influence the operability, durability and safety of the appliances.~~

Section **C304 (IFGS) Combustion, Ventilation and Dilution Air**

C304.1 General. Air for combustion, ventilation and dilution of flue gases for appliances installed in buildings shall be provided by application of one of the methods prescribed in Sections C304.5 through C304.9. Where the requirements of Section C304.5 are not met, outdoor air shall be introduced in accordance with one of the methods prescribed in Sections C304.6 through C304.9. *Direct-vent appliances*, gas appliances of other than natural draft design and vented gas appliances other than Category I shall be provided with combustion, ventilation and dilution air in accordance with the *appliance manufacturer's instructions*.

Exception: Type 1 clothes dryers that are provided with makeup air in accordance with Section ~~504.5~~ 614.5.

C304.4 Makeup air provisions. Where exhaust fans, clothes dryers and kitchen ventilation systems interfere with the operation of appliances, makeup air shall be provided.

C304.4.1 Special Conditions. In buildings containing combustion appliances, equipment or fireplaces not equipped with forced or induced draft or separated from the habitable area where an individual exhaust appliance exceeds 350 cfm (165.2L/s), makeup air of sufficient quantity to equal that being exhausted shall be supplied to the area being ventilated. In such cases, the minimum size makeup air duct shall be 6 inches (152 mm) in diameter or equivalent in area.

Section **C305 (IFGC) Installation**

C305.3 Elevation of ignition source. *Equipment* and appliances having an *ignition source* shall be elevated such that the source of ignition is not less than 18 inches (457 mm) above the floor in hazardous locations, ~~and~~ public garages, private garages, repair garages, motor fuel-dispensing facilities and parking garages. For the purpose of this section, rooms or spaces that are not part of the *living space* of a *dwelling unit* and that communicate directly with a private garage through openings shall be considered to be part of the private garage.

Exception: Elevation of the *ignition source* is not required for appliances that are *listed* as flammable vapor ignition resistant.

C305.4 Public garages. Appliances located in public garages, motor fuel-dispensing facilities, repair garages or other areas frequented by motor vehicles shall be installed a minimum of 8 feet (2438 mm) above the floor. Where motor vehicles are capable of passing under an appliance, the appliance shall be installed at the clearances required by the appliance

manufacturer and not less than 1 foot (305 mm) higher than the tallest vehicle garage door opening.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section C305.3 ~~and NFPA 30A.~~

C305.5 Private garages. Appliances located in private garages shall be installed with a minimum *clearance* of 6 feet (1829 mm) above the floor.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section C305.3 (See Figure C304.1).

Section **C306 (IFGC) Access and Service Space**

***Section 306.5 Equipment and Appliances on Roofs or Elevated Structures is deleted and replaced with the following:**

C306.5 Equipment and appliances on roofs or elevated structures. Install per Section 306.5 of Chapter 3.

Exception: This section shall not apply to the replacement, repair or maintenance of an existing appliance or piece of equipment lawfully in existence at the time of the adoption of this code.

***Section 306.6 Guards is deleted and replaced with the following:**

C306.6 Guards. Install per Section 306.6 of Chapter 3.

Exception: This section shall not apply to the replacement, repair or maintenance of an existing appliance or piece of equipment lawfully in existence at the time of the adoption of this code.

Section **C307 (IFGC) Condensate Disposal**

***Note: For additional information on condensate disposal see Chapter 3, Section 307.**

C307.1 Evaporators and cooling coils. Condensate drainage systems shall be provided for *equipment* and appliances containing evaporators and cooling coils in accordance with this section and Section 307 of Chapter 3 ~~the International Mechanical Code.~~

IMC307.3 Drain pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper, cross-linked polyethylene, polybutylene, polyethylene, ABS, CPVC or PVC pipe or tubing. All components shall be selected for the pressure and temperature rating of the installation. ~~Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 of the International Plumbing Code relative to the material type.~~ Condensate waste and drain line size shall be not less than ¾-inch (19 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are

manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an *approved* method.

Section C308 (IFGC) Clearance Reduction

C308.1 Scope. This section shall govern the reduction in required clearances to *combustible materials*, including gypsum board, and *combustible assemblies* for chimneys, vents, appliances, devices and equipment. Clearance requirements for **gas-fired** air-conditioning equipment and **gas-fired** central heating boilers and furnaces shall comply with Sections C308.3 and C308.4.

Section C310 (IFGC) Electrical Bonding

C310.1 Pipe and tubing other than CSST. Each above-ground portion of a gas *pipng* system ~~other than corrugated stainless steel tubing (CSST)~~ that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas *pipng* ~~other than CSST~~ shall be considered to be bonded where it is connected to appliances that are connected to the *equipment* grounding conductor of the circuit supplying that *appliance*.

Section C401 (IFGC) General

C401.1 Scope. This chapter shall govern the design, installation and modification ~~and maintenance~~ of *pipng* systems. The applicability of this code to *pipng* systems extends from the *point of delivery* to the connections with the *appliances* and includes the design, materials, components, fabrication, assembly, installation, testing, inspection and operation ~~and maintenance~~ of such *pipng* systems.

C401.1.1 Utility piping systems located within buildings. Utility service *pipng* located within buildings shall be installed in accordance with the structural safety and fire protection provisions of the *International Building Code*.

Notice of installation. A "Notice of Installation" is required by the State Fire Marshal for all LP-gas tank installations. For installation requirements of LP-gas tanks and tubing or *pipng* up to the first stage regulator, see Article 82 of the *Fire Code*.

Section C402 (IFGS) Pipe Sizing

C402.3 Sizing. Gas *pipng* shall be sized in accordance with one of the following:

1. Pipe sizing tables or sizing equations in accordance with Section C402.4.
2. The sizing tables included in a *listed pipng* system's manufacturer's installation instructions.
3. Other *approved engineering* methods.

Section C406 (IFGS) Inspection, Testing and Purging

C406.1.1 Inspections. Inspection shall consist of visual examination, during or after manufacture, fabrication, assembly or pressure tests.

C406.1.1.1 Rough piping inspection. This inspection shall be made after *pipng* authorized by the permit has been installed and before such *pipng* has been covered or concealed or a fixture or appliance has been attached thereto. This inspection shall include a determination that the gas *pipng* size, material and installation meet the requirements of this appendix.

C406.1.1.2 Final piping inspection. This inspection shall be made after *pipng* authorized by the permit has been installed and after all portions thereof which are to be covered or concealed are so concealed and after fixtures, *appliances* or shutoff valves have been attached thereto.

C406.3 Test preparation. Pipe joints, including welds, shall be left exposed for examination during the test.

Exception: Covered or concealed pipe end joints that have been previously tested in accordance with this ~~code~~ appendix.

C406.4 Test pressure measurement. Test pressure shall be measured with a manometer or with a pressure-measuring device designed and calibrated to read, record or indicate a pressure loss caused by leakage during the pressure test period. The source of pressure shall be isolated before the pressure tests are made. Mechanical gauges used to measure test pressures shall have a range such that the highest end of the scale is not greater than five times the test pressure.

C406.4.1 Test pressure. Gas-piping systems under 14 inches (3.5 kPa) water column pressure shall be tested at a pressure of not less than 10 pounds per square inch (69 kPa) gauge. Test pressures shall be held for not less than 15 minutes with no perceptible drop in pressure. For welded piping and piping carrying gas at pressures exceeding 14 inches water column (3484 Pa) pressure, the test pressure shall be at least 60 pounds per square inch (0.0422 kg/mm²) for not less than 30 minutes.

Exception: Testing, inspection and purging of gas-piping systems performed by using NFPA 54 shall be permitted.

***Note: Remainder of Section C406 is deleted.**

Section C407 (IFGC) Piping Support

C407.2 Design and installation. *Pipng* shall be supported with ~~metal~~ pipe hooks, metal pipe straps, ~~metal~~ bands, ~~metal~~ brackets, ~~metal~~ hangers or building structural components, suitable for the size of *pipng*, of adequate strength and quality, and located at intervals so as to prevent or damp out excessive vibration. *Pipng* shall be anchored to prevent undue strains on connected *appliances* and shall not be supported by other *pipng*. Pipe hangers and supports shall conform to the requirements of MSS SP-58 and shall be spaced in accordance with Section C415. Supports, hangers and anchors shall be

installed so as not to interfere with the free expansion and contraction of the *pipng* between anchors. All parts of the supporting *equipment* shall be designed and installed so they will not be disengaged by movement of the supported *pipng*.

Section C410 (IFGC) Flow Controls

C410.3 Liquefied petroleum gas regulators. LP-gas second stage and 2 psi regulators, as defined by NFPA 58, shall be installed in accordance with the following:

1. **Regulators installed outdoors shall be protected from motor vehicle impact. For examples of approved types of protection, see Figure C304.1.**
2. **Regulator vent discharge shall be located not less than 3 feet (915 mm) horizontally from openings below the point of discharge and not less than 5 feet (1525 mm) in any direction from exterior sources of ignition, openings into direct-vent appliances or mechanical ventilation air intakes.**
3. **Venting of regulators shall comply with Sections C410.4 and C410.4.1.**

C410.4.1 Vent piping. Vent *pipng* for relief vents and breather vents shall be constructed of materials allowed for gas *pipng* in accordance with Section 403. Vent *pipng* shall be not smaller than the vent connection on the pressure regulating device. Vent *pipng* serving relief vents and combination relief and breather vents shall be run independently to the outdoors and shall serve only a single device vent. ~~Vent piping serving only breather vents is permitted to be connected in a manifold arrangement where sized in accordance with an approved design that minimizes back pressure in the event of diaphragm rupture.~~ Regulator vent *pipng* shall not exceed the length specified in the regulator manufacturer’s instructions.

Section C411 (IFGC) Appliance and Manufactured Home Connections

***Section C411.2 Manufactured home connections is deleted.**

Section C412 (IFGC)-Liquefied Petroleum Gas Motorvehicle Fuel-Dispensing Facilities

~~**C412.1 General.**~~ Motor fuel-dispensing facilities for LP-gas fuel shall be in accordance with ~~this section and the International Fire Code.~~ The operation of LP-gas motor fuel-dispensing facilities shall be regulated by the *International Fire Code*.

***Note: Remainder of Section C412 is deleted.**

Section C413 (IFGC)-Compressed Natural Gas Motorvehicle Fuel-Dispensing Facilities

~~**C413.1 General.**~~ Motor fuel-dispensing facilities for CNG fuel shall be in accordance with ~~this section and the International Fire Code.~~ The operation of CNG motor fuel-

dispensing facilities shall be regulated by the *International Fire Code*.

***Note: Remainder of Section C413 is deleted.**

Section C414 (IFGC)-Supplemental and Standby Gas Supply

~~**C414.1 Use of air or oxygen under pressure.**~~ **Special supplementary gas** Where air, or oxygen or **other special supplementary gas** is introduced into the gas *pipng system*, an approved backflow preventer shall be installed. **The backflow preventer shall be on the gas line to the equipment or appliance supplied by the special gas and located between the source of the gas and the gas meter.** ~~under pressure is used in connection with the gas supply, effective means such as a backpressure regulator and relief valve shall be provided to prevent air or oxygen from passing back into the gas piping.~~ Where oxygen is used, installation shall be in accordance with NFPA 51.

Section C416 Fuel-Gas Equipment and Installations in Manufactured Structure (Mobile Home or Recreational Vehicle) Parks

C416.1 Required gas supply. **The minimum hourly volume of gas required at each manufactured structure (mobile home or recreational vehicle) lot outlet or any section of the manufactured structures park gas piping system shall be calculated as shown in Table C416.1. Required gas supply for buildings or other fuel-gas-consuming appliances connected to the manufactured structure park gas piping system shall be calculated as provided in this code.**

**TABLE C416.1
MINIMUM DEMAND FACTORS FOR CALCULATING GAS PIPING SYSTEMS IN MANUFACTURED STRUCTURE PARKS**

<u>NUMBER OF MANUFACTURED STRUCTURE LOTS</u>	<u>DEMAND FACTOR BTU/H MANUFACTURED STRUCTURE LOT x 0.293 071 FOR W</u>
<u>1</u>	<u>250,000</u>
<u>2</u>	<u>234,000</u>
<u>3</u>	<u>208,000</u>
<u>4</u>	<u>198,000</u>
<u>5</u>	<u>184,000</u>
<u>6</u>	<u>174,000</u>
<u>7</u>	<u>166,000</u>
<u>8</u>	<u>162,000</u>
<u>9</u>	<u>158,000</u>
<u>10</u>	<u>154,000</u>
<u>11-20</u>	<u>132,000</u>
<u>21-30</u>	<u>124,000</u>
<u>31-40</u>	<u>118,000</u>
<u>41-60</u>	<u>112,000</u>
<u>Over 60</u>	<u>102,000</u>

C416.2 Mechanical protection. Customer-owned gas outlet risers, regulators, meters, valves or other exposed equipment shall be protected from mechanical damage. Such protection may consist of posts, fencing or other permanent barriers. Atmospherically controlled regulators shall be installed in such a manner that moisture cannot enter the regulator vent and accumulate above the diaphragm. When the regulator vent may be obstructed by snow or ice, shields, hoods or other suitable devices shall be provided to guard against obstruction of the vent opening.

C416.3 Gas meters. Customer-owned meters shall be installed in ventilated and accessible locations, not closer than 3 feet (914 mm) to sources of ignition. When meters are installed, they shall not depend on the gas outlet riser for support, but shall be adequately supported by a post or bracket placed on a firm footing, or other approved means providing equivalent support.

C416.4 Gas piping size. The size of each section of natural gas or LP-gas piping systems shall be determined as specified in this appendix.

Section C417 (IFGS)-Overpressure Protection Devices

~~**416.3 Device maintenance.** The pressure regulating, limiting and relieving devices shall be maintained; and inspection procedures shall be devised or instrumentation installed to detect failures or malfunctions of such devices; and replacements or repairs shall be made.~~

C417.5.4 Unauthorized operation. Where unauthorized operation of any shutoff valve can make a pressure relieving valve or pressure limiting device inoperative, one of the following shall apply:

1. The valve shall be locked in the open position. ~~Authorized personnel shall be instructed in the importance of leaving the shutoff valve open and of being present while the shutoff valve is closed so that it can be locked in the open position before leaving the premises.~~
2. Duplicate relief valves shall be installed, each having adequate capacity to protect the system, and the isolating valves and three-way valves shall be arranged so that only one safety device can be rendered inoperative at a time.

Section C501 (IFGC)-General

C501.1 Scope. This chapter shall govern the installation, ~~maintenance~~, repair and approval of factory-built chimneys, chimney liners, vents and connectors and the utilization of masonry chimneys serving gas-fired appliances. The requirements for the installation, ~~maintenance~~, repair and approval of factory-built chimneys, chimney liners, vents and connectors serving appliances burning fuels other than fuel gas shall be regulated by the ~~International Mechanical Code~~. The construction, repair, ~~maintenance~~ and approval of masonry chimneys shall be regulated by the ~~International Building Code~~.

C501.8 Appliances not required to be vented. The following appliances shall not be required to be vented.

1. Ranges.
2. Built-in domestic cooking units *listed* and marked for optional venting.
3. Hot plates and laundry stoves.
4. Type 1 clothes dryers (Type 1 clothes dryers shall be exhausted in accordance with the requirements of Section **513.6.4**).
5. A single booster-type automatic instantaneous water heater, where designed and used solely for the sanitizing rinse requirements of a dishwashing machine, provided that the heater is installed in a commercial kitchen having a mechanical exhaust system. Where installed in this manner, the draft hood, if required, shall be in place and unaltered and the draft hood *outlet* shall be not less than 36 inches (914 mm) vertically and 6 inches (152 mm) horizontally from any surface other than the heater.
6. Refrigerators.
7. Counter appliances.
8. Room heaters *listed* for unvented use.
9. Direct-fired makeup air heaters.
10. Other appliances *listed* for unvented use and not provided with flue collars.
11. Specialized appliances of limited input such as laboratory burners and gas lights.

C501.11 Masonry chimneys. Masonry chimneys utilized to vent appliances shall be ~~located, constructed and~~ sized as specified in the manufacturer's installation instructions for the appliances being vented and Section 503.

Section C502 (IFGC)-Vents

C502.7 Protection against physical damage. In concealed locations, where a vent is installed through holes or notches in studs, joists, rafters or similar members less than 1 ½ inches (38 mm) from the nearest edge of the member, the vent shall be protected by shield plates **in accordance with Section C614.6.3 or 504.6.7.** ~~Protective steel shield plates having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) shall cover the area of the vent where the member is notched or bored and shall extend a minimum of 4 inches (102 mm) above sole plates, below top plates and to each side of a stud, joist or rafter.~~

Section C503 (IFGS)-Venting Of Appliances

C503.5.3 Masonry chimneys. Masonry chimneys shall be built and installed in accordance with **the Building Code NFPA 211** and shall be lined with *approved* clay flue lining, a *listed* chimney lining system or other *approved* material that will resist corrosion, erosion, softening or cracking from vent gases at temperatures up to 1,800°F (982°C).

C503.5.6 Inspection of chimneys. Before replacing an existing *appliance* or connecting a vent connector to a chimney, the chimney passageway shall be examined to ascertain that it is clear and free of obstructions and it shall

be cleaned if previously used for venting solid or liquid fuel-burning appliances or fireplaces.

C503.5.6.1 Chimney lining. Chimneys shall be lined in accordance with the Building Code NFPA 211.

Exception: Where an existing chimney complies with Sections C503.5.6 through C503.5.6.3 and its sizing is in accordance with Section C503.5.5, its continued use shall be allowed where the *appliance* vented by such chimney is replaced by an *appliance* of similar type, input rating and efficiency.

~~**503.5.6.2 Cleanouts.** Cleanouts shall be examined to determine if they will remain tightly closed when not in use.~~

C503.5.6.2 Unsafe chimneys. Where inspection reveals that an existing chimney is not safe for the intended application, it shall be repaired, rebuilt, lined, relined or replaced with a vent or chimney to conform to the Building Code or this code NFPA 211 and it shall be suitable for the appliances to be vented.

C503.10.2.2 Vent connectors located in unconditioned areas. Where the vent connector used for an *appliance* having a draft hood or a Category I *appliance* is located in or passes through attics, crawl spaces or other unconditioned spaces, that portion of the vent connector shall be *listed* Type B, Type L or *listed* vent material having equivalent insulation properties.

Exception: Single-wall metal pipe located within the exterior walls of the building in areas having a local 99-percent winter design temperature of 5°F (-15°C) or higher shall be permitted to be used in unconditioned spaces other than attics, garages and crawl spaces.

Section C505 (IFGC)-Direct-Vent, Integral Vent, Mechanical Vent and Ventilation/Exhaust Hood Venting

C505.1 General. The installation of direct-vent and integral vent appliances shall be in accordance with Section C503. Mechanical venting systems and exhaust hood venting systems shall be designed and installed in accordance with Section C503. **Exhaust hood venting used in conjunction with commercial cooking operations shall be designed and installed in accordance with Section 507.**

***Section 505.1.1 Commercial Cooking Appliances Vented by Exhaust Hoods is deleted.**

Section C601 (IFGC)-General

C601.1 Scope. This chapter shall govern the approval, design, installation, construction, ~~maintenance~~, *alteration* and repair of the appliances and *equipment* specifically identified herein.

Section C603 (IFGC)-Log Lighters

C603.1 General. Log lighters shall be ~~tested in accordance with CSA 8~~ and installed in accordance with the manufacturer's installation instructions.

Section C613 (IFGC)-Clothes Dryers

C613.1 General. Clothes dryers shall be tested in accordance with ANSI Z21.5.1 or ANSI Z21.5.2 and shall be installed in accordance with the manufacturer's installation instructions **and Chapter 5.**

Section C614 (IFGC)-Clothes Dryer Exhaust

~~**C614.1 Installation.** Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall be independent of all other systems, shall convey the moisture and any products of combustion to the outside of the building. See Chapter 5, Section 504.~~

***Note: Remainder of Section C614 deleted.**

Section C615 (IFGC)-Sauna Heaters

***Section C615 Sauna Heaters is deleted and replaced with the following:**

C615.1 General. Sauna heaters shall be installed in accordance with the manufacturer's installation instructions **and Section 914.**

C615.2 Combustion and dilution air intakes. Sauna heaters of other than the direct-vent type shall be installed with the draft hood and combustion air intake located outside the sauna room. Where the combustion air inlet and the draft hood are in a dressing room adjacent to the sauna room, there shall be provisions to prevent physically blocking the combustion air inlet and the draft hood inlet, and to prevent physical contact with the draft hood and vent assembly, or warning notices shall be posted to avoid such contact. Any warning notice shall be easily readable, shall contrast with its background and the wording shall be in letters not less than 1/4 inch (6.4 mm) high.

C615.3 Combustion and ventilation air. *Combustion air* shall not be taken from inside the sauna room. Combustion and ventilation air for a sauna heater not of the direct-vent type shall be provided to the area in which the *combustion air* inlet and draft hood are located in accordance with Section C304.

Section C618 (IFGC)-Forced-Air Warm-Air Furnaces

C618.4 Prohibited sources. Outdoor or return air for forced-air heating and cooling systems shall not be taken from the following locations:

1. Closer than 10 feet (3048 mm) from an *appliance* vent outlet, a vent opening from a plumbing drainage system or the discharge outlet of an exhaust fan, unless the outlet is 3 feet (914 mm) above the outside air inlet.

Exception: Listed outdoor appliances which provide both circulating air and vent discharge.

6. A closet, bathroom, toilet room, kitchen, garage, ~~mechanical room~~, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Where return air intakes are located not less than 10 feet (3048 mm) from cooking appliances and serve only the kitchen area, taking return air from a kitchen area shall not be prohibited.
2. Dedicated forced air systems serving only a garage shall not be prohibited from obtaining return air from the garage.
7. A crawl space by means of direct connection to the return side of a forced-air system. ~~Transfer openings in the crawl space enclosure shall not be prohibited.~~

Section C623 (IFGC) Cooking Appliances

***Section 623.6 Commercial Cooking Appliance Venting is deleted.**

Section C624 (IFGC) Water Heaters

C624.1 General. Water heaters shall be tested in accordance with ANSI Z21.10.1 and ANSI Z21.10.3 and shall be installed in accordance with the manufacturer’s installation instructions. ~~Water heaters utilizing fuels other than fuel gas shall be regulated by the International Mechanical Code.~~

Section C629 (IFGC) Small Ceramic Kilns

C629.2 Unlisted fuel-gas kiln installation: See Section 923.2 of Chapter 9.

Section C631 (IFGC) Boilers

C631.1 Standards. Boilers shall be *listed* in accordance with ~~Chapter 10, the requirements of ANSI Z21.13 or UL 795. If applicable, the boiler shall be designed and constructed in accordance with the requirements of ASME CSD 1 and as applicable, the ASME Boiler and Pressure Vessel Code, Sections I, II, IV, V and IX and NFPA 85.~~

631.2 Installation. In addition to the requirements of this code, ~~the installation of boilers shall be in accordance with the manufacturer’s instructions and the International Mechanical Code. Operating instructions of a permanent type shall be attached to the boiler. Boilers shall have all controls set, adjusted and tested by the installer. A complete control diagram together with complete boiler operating instructions shall be furnished by the installer. The manufacturer’s rating data and the nameplate shall be attached to the boiler.~~

C631.2 Clearance to combustible materials. Clearances to *combustible materials* shall be in accordance with Section C308.4.

***Section 632 (IFGC) Equipment Installed in Existing unlisted Boilers is deleted.**

Section C-8 IFGC/IFGS CHAPTER 8 Referenced Standards

This ~~section chapter~~ lists the standards that are referenced in various sections of Appendix C this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of Appendix C this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.8.

NFPA National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101

Standard reference number	Title	Referenced in code section number
<u>54—09</u>	<u>National Fuel Gas Code</u>	<u>C406.4.1</u>