

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

## Appendix C FUEL GAS

SECTION C101 is amended as follows:

### SECTION C101 GENERAL

~~101.1 Title.~~ These regulations shall be known as the ~~Fuel Gas Code~~ of [NAME OF JURISDICTION], hereinafter referred to as “this code.”

**C101.2 Scope.** This ~~code~~ appendix shall apply to the installation of fuel-gas piping systems, fuel-gas utilization equipment, gaseous hydrogen systems and related accessories in accordance with Sections C101.2.1 through C101.2.4.

**Exceptions:**

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

**C101.2.1 Gaseous hydrogen systems.** Gaseous hydrogen systems shall be regulated by Section 701, Chapter 7.

**C101.2.2 Piping systems.** These regulations cover piping systems for natural gas with an operating pressure of 125 pounds per square inch gauge (psig) (862 kPa gauge) or less, and for LP-gas with an operating pressure of 20 psig (140 kPa gauge) or less, except as provided in Section 402.6.1. Coverage shall extend from the point of delivery to the outlet of the equipment shutoff valves. Piping systems requirements shall include design, materials, components, fabrication, assembly, installation, testing and inspection. ~~operation and maintenance.~~

**C101.2.4 Systems and equipment outside the scope.** This code shall not apply to the following:

1. Portable ~~LP-gas~~ fuel gas utilization equipment of all types that is not connected to a fixed fuel piping system.
- ~~2. Installation of farm equipment such as brooders, dehydrators, dryers and irrigation equipment.~~
2. Raw material (feedstock) applications except for piping 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.~~
9. 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-gas~~ fuel gas piping or hoses for buildings under construction or renovation that is not to become part of the permanent piping 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.

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

14. Except as provided in Section C401.1.1, gas piping, 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. Piping 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 piping system nor interconnected to a power grid.

~~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.~~

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

**C101.3 Intent.** The purpose of this code or appendix 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.

**C101.4 Severability.** If a section, subsection, sentence, clause or phrase of this code or appendix is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this code.

**MODEL CODE SECTION 102 HAS BEEN DELETED IN ITS ENTIRETY**

**MODEL CODE SECTION 103 HAS BEEN DELETED IN ITS ENTIRETY**

**MODEL CODE SECTION 104 HAS BEEN DELETED IN ITS ENTIRETY**

**MODEL CODE SECTION 105 HAS BEEN DELETED IN ITS ENTIRETY**

**MODEL CODE SECTION 106 HAS BEEN DELETED IN ITS ENTIRETY**

**SECTION 107 HAS BEEN RE-NUMBERED TO C102 as follows:**

**SECTION ~~107~~ C102  
INSPECTIONS AND TESTING**

~~107.1.1 Approved inspection agencies. The code official shall accept reports of approved agencies, provided that such agencies satisfy the requirements as to qualifications and reliability.~~

~~107.1.2 Evaluation and follow-up inspection services. Prior to the approval of a prefabricated construction assembly having concealed work and the issuance of a permit, the code official shall require the submittal of an evaluation report on each prefabricated construction assembly, indicating the complete details of the installation, including a description of the system and its components, the basis upon which the system is being evaluated, test results and similar information and other data as necessary for the code official to determine conformance to this code.~~

~~107.1.2.1 Evaluation service. The code official shall designate the evaluation service of an approved agency as the evaluation agency, and review such agency's evaluation report for adequacy and conformance to this code.~~

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

~~**107.1.2.2 Follow-up inspection.** Except where ready access is provided to installations, service equipment and accessories for complete inspection at the site without disassembly or dismantling, the code official shall conduct the in-plant inspections as frequently as necessary to ensure conformance to the approved evaluation report or shall designate an independent, approved inspection agency to conduct such inspections. The inspection agency shall furnish the code official with the follow-up inspection manual and a report of inspections upon request, and the installation shall have an identifying label permanently affixed to the system indicating that factory inspections have been performed.~~

~~**107.1.2.3 Test and inspection records.** Required test and inspection records shall be available to the code official at all times during the fabrication of the installation and the erection of the building; or such records as the code official designates shall be filed.~~

**C102.2 Testing.** Installations shall be tested as required in this code and in accordance with Sections ~~107.2.1~~ C102.1 through ~~107.2.3~~ C102.3. Tests shall be made by the permit holder and observed by the code official.

**C102.3 Approval.** After the prescribed tests and inspections indicate that the work complies in all respects with this ~~appendix code~~, a notice of approval shall be issued by the code official.

**MODEL CODE SECTION 108 HAS BEEN DELETED IN ITS ENTIRETY**

**MODEL CODE SECTION 109 HAS BEEN DELETED IN ITS ENTIRETY**

**SECTION C201** is amended as follows:

**SECTION C201  
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. Except as defined in this chapter or elsewhere in this code, the interpretation of words used in this code shall be in accordance with the meanings defined in the Webster's Third New International Dictionary of the English Language, Unabridged, copyright 1986.~~

**SECTION 202** is amended as follows:

**SECTION C202  
GENERAL DEFINITIONS**

~~**AIR, EXHAUST.** Air being removed from any space or piece of equipment and conveyed directly to the atmosphere by means of openings or ducts.~~

~~**ALTERATION.** A change in a system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.~~

~~**APPROVED.** Acceptable to the code official or other authority having jurisdiction.~~

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

~~**APPROVED AGENCY.** An established and recognized agency that is approved by the code official and regularly engaged in conducting tests or furnishing inspection services.~~

~~**BOILER, LOW-PRESSURE.** A self-contained appliance for supplying steam or hot water.~~

~~**Hot water heating boiler.** A boiler in which no steam is generated, from which hot water is circulated for heating purposes and then returned to the boiler, and that operates at water pressures not exceeding 160 pounds per square inch gauge (psig) (1100 kPa gauge) and at water temperatures not exceeding 250°F (121°C) at or near the boiler outlet.~~

~~**Hot water supply boiler.** A boiler, completely filled with water, which furnishes hot water to be used externally to itself, and that operates at water pressures not exceeding 160 psig (1100 kPa gauge) and at water temperatures not exceeding 250°F (121°C) at or near the boiler outlet.~~

~~**Steam heating boiler.** A boiler in which steam is generated and that operates at a steam pressure not exceeding 15 psig (100 kPa gauge).~~

~~**CLOTHES DRYER.** An appliance used to dry wet laundry by means of heated air. Dryer classifications are as follows:~~

~~**Type 1.** Factory built package, multiple production. Primarily used in family living environment. Usually the smallest unit physically and in function output.~~

~~**Type 2.** Factory built package, multiple production. Used in business with direct intercourse of the function with the public. Not designed for use in individual family living environment.~~

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

~~**CODE OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.~~

~~**CONSTRUCTION DOCUMENTS.** All of the written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of the project necessary for obtaining a mechanical permit.~~

~~**DWELLING UNIT.** A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.~~

~~**FIREPLACE.** A fire chamber and hearth constructed of noncombustible material for use with solid fuels and provided with a chimney.~~

~~**Masonry fireplace.** A hearth and fire chamber of solid masonry units such as bricks, stones, listed masonry units or reinforced concrete, provided with a suitable chimney.~~

~~**Factory-built fireplace.** A fireplace composed of listed factory built components assembled in accordance with the terms of listing to form the completed fireplace.~~

~~**LIVING SPACE.** Space within a dwelling unit utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes.~~

~~**OCCUPANCY.** The purpose for which a building, or portion thereof, is utilized or occupied.~~

~~**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 the outlet of the first-stage pressure regulator that reduces~~

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

~~pressure to 2 psig (13.8 kPag) or less. provides utilization pressure, exclusive of line gas regulators, in the system.~~

~~**REGISTERED DESIGN PROFESSIONAL.** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.~~

~~**RELIEF VALVE (DEVICE).** A safety valve designed to forestall the development of a dangerous condition by relieving either pressure, temperature or vacuum in the hot water supply system.~~

~~**RELIEF VALVE, PRESSURE.** An automatic valve that opens and closes a relief vent, depending on whether the pressure is above or below a predetermined value.~~

~~**RELIEF VALVE, TEMPERATURE.**~~

~~**Rescating or self-closing type.** An automatic valve that opens and closes a relief vent, depending on whether the temperature is above or below a predetermined value.~~

~~**Manual reset type.** A valve that automatically opens a relief vent at a predetermined temperature and that must be manually returned to the closed position.~~

~~**RELIEF VALVE, VACUUM.** A valve that automatically opens and closes a vent for relieving a vacuum within the hot water supply system, depending on whether the vacuum is above or below a predetermined value.~~

~~**SLEEPING UNIT.** A room or space in which people sleep, which can also include permanent provisions for living, eating and either sanitation or kitchen facilities, but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.~~

~~**UNLISTED BOILER.** A boiler not listed by a nationally recognized testing agency.~~

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

SECTION C301 is amended as follows:

## SECTION C301 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.

Equipment and appliances shall not be installed, altered or used in violation of this code. The fuel input rate to equipment shall not be increased in excess of the approved Btu/h (W) rating at the altitude where it is being used.

**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 ~~the *International Mechanical Code*, Chapter 7.~~

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**C301.2 Energy utilization.** Heating, ventilating and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with ~~the *International Energy Conservation Code*~~. Chapter 13 in the *Oregon Structural Specialty Code*.

**C301.3 Listed and labeled.** Appliances regulated by this code shall be listed and labeled for the application in which they are used unless otherwise approved in accordance with Section 105. ~~The approval of unlisted appliances in accordance with Section 105 shall be based upon approved engineering evaluation.~~

**Sections 301.4 through 301.6 have been deleted in their entirety.  
The remaining sections have been re-numbered.**

**Sections 301.8 through 301.15 have been deleted in their entirety.**

**SECTION C302** is amended as follows:

**SECTION C302  
STRUCTURAL SAFETY**

**C302.1 Structural safety.** ~~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*. See Chapter 3, Section 302.~~

**Sections 302.2 through 302.7 have been deleted in their entirety.**

**SECTION C303** is amended as follows:

**SECTION C303  
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 physical damage.** Appliances shall not be installed in a location subject to vehicle impact damage except where protected by an approved means. See Figure C304.1.

**C303.6 Outdoor locations.** Equipment 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 equipment.~~

**SECTION 304** is amended as follows:

**SECTION C304  
COMBUSTION, VENTILATION AND DILUTION AIR**

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**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 ~~614.5~~ 504.5.

**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), make-up air of sufficient quantity to equal that being exhausted shall be supplied to the area being ventilated. In such cases, the minimum size make-up air duct shall be 6 inches (152 mm) in diameter or equivalent area.

SECTION C305 is amended as follows:

## SECTION C305 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. Heating and/or cooling equipment and water heaters covered by this code, located in a garage and which generate a glow, spark or flame capable of igniting flammable vapors shall be installed with sources of ignition at least 18 inches (457 mm) above the floor level.~~

**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 exceed 6 feet (1829 mm) in height and are capable of passing under an appliance, appliances shall be installed a minimum of 2 feet (610 mm) higher above the floor than the height of the tallest vehicle.

**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.



Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**C306.5.1 Sloped roofs.** Where appliances 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 to which access is required for service, repair or maintenance. The platform shall not be 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 *Building Code*.

**Exception:**

1. The 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.

**C306.6 Guards.** Guards shall be provided where appliances or other components that require service ~~and roof hatch openings~~ are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such appliances components ~~and roof hatch openings~~ and the top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *Building Code*.

**Exception:**

1. The 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** is amended as follows:

**SECTION C307  
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 Section 307. ~~the *International Mechanical Code*.~~

**C307.5 Auxiliary drain pan.** Category IV condensing appliances shall be provided with an auxiliary drain pan where damage to any building component will occur as a result of stoppage in the condensate drainage system. Such pan shall be installed in accordance with the applicable provisions of Section 307. ~~of the *International Mechanical Code*.~~

**Exception:** An auxiliary drain pan shall not be required for appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.

**SECTION C308** is amended as follows:

**SECTION C308  
CLEARANCE REDUCTION**

**C308.1 Scope.** This section shall govern the reduction in required clearances to combustible materials and combustible assemblies for chimneys, vents, appliances, devices and equipment. Clearance

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

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 C401** is amended as follows:

#### **SECTION C401**

##### **GENERAL**

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

**C401.2.1 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 piping up to the first stage regulator, see Chapter 38 of the *Fire Code*.

**SECTION C402** is amended as follows:

#### **SECTION C402**

##### **PIPE SIZING**

**C402.3 Sizing.** Gas piping 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 piping system's manufacturer's installation instructions.
3. Other approved ~~engineering~~ methods.

**C402.6.2 License requirements.** LP-gas installers must be licensed by the State Fire Marshal in accordance with ORS 480.432 through 480.436.

**SECTION 403** is amended as follows:

#### **SECTION C403**

##### **PIPING MATERIALS**

~~**403.3 Other materials.** Material not covered by the standards specifications listed herein shall be investigated and tested to determine that it is safe and suitable for the proposed service, and, in addition, shall be recommended for that service by the manufacturer and shall be approved by the code official.~~

(Model code Sections 403.4 through 403.13 have been re-numbered only.)

**SECTION C404** is amended as follows:

#### **SECTION C404**

##### **PIPING SYSTEM INSTALLATION**

**C404.5 Protection against physical damage.** In concealed locations, where piping other than black or galvanized steel is installed through holes or notches in wood studs, joists, rafters or similar members

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

less than 1.5 inch (38 mm) from the nearest edge of the member, the pipe shall be protected by shield plates. Shield plates shall be a minimum of  $\frac{1}{16}$ -inch-thick (1.6 mm) steel, shall cover the area of the pipe where the member is notched or bored, and shall extend a minimum of ~~4~~ 2 inches (102 mm) above sole plates, below top plates and to each side of a stud, joist or rafter.

~~**404.8 Protection against corrosion.** Metallic pipe or tubing exposed to corrosive action, such as soil condition or moisture, shall be protected in an approved manner. Zinc coatings (galvanizing) shall not be deemed adequate protection for gas piping underground. Ferrous metal exposed in exterior locations shall be protected from corrosion in a manner satisfactory to the code official. Where dissimilar metals are joined underground, an insulating coupling or fitting shall be used. Piping shall not be laid in contact with einders.~~

~~**404.8.1 Prohibited use.** Uncoated threaded or socket welded joints shall not be used in piping in contact with soil or where internal or external crevice corrosion is known to occur.~~

~~**404.8.2 Protective coatings and wrapping.** Pipe protective coatings and wrappings shall be approved for the application and shall be factory applied.~~

~~**Exception:** Where installed in accordance with the manufacturer's installation instructions, field application of coatings and wrappings shall be permitted for pipe nipples, fittings and locations where the factory coating or wrapping has been damaged or necessarily removed at joints.~~

**C404.8 Corrosion and covering protection.** Nonmetallic gas piping and coated and cathodically protected piping shall have a minimum of 18 inches (457 mm) of earth cover or other equivalent protection. Risers, including prefabricated risers inserted with plastic pipe, shall be metallic and shall be protected in an approved manner to a point at least 6 inches (153 mm) above grade. When a riser connects to plastic pipe underground, the horizontal metallic portion underground shall be at least 30 inches (762 mm) in length before connecting to the plastic service pipe. An approved transition fitting or adapter shall be used where the plastic joins the metallic riser.

Ferrous metals in exposed exterior locations shall be protected from corrosion in a manner approved by the building official after consulting with the gas supplier.

Ferrous pipes installed underground shall not be placed in contact with other metallic objects such as pipes or wires.

Zinc coatings (galvanizing) shall not be deemed adequate protection for piping below grade. Ferrous gas piping installed underground in exterior locations shall be protected from corrosion by either:

**C404.8.1 Coated and cathodically protected pipe.** All gas pipe protective coatings shall be approved types, machine applied and conform to recognized standards. Field wrapping shall provide equivalent protection and is restricted to those short sections and fittings necessarily stripped for threading or welding. Underground coated and wrapped gas piping shall be cathodically protected with galvanic anodes or rectifiers and electrically isolated from the rest of the system by insulating unions 6 inches (153 mm) above grade.

**C404.8.2 Unwrapped (bare) pipe and special covering.** Unwrapped ferrous gas piping being installed underground in exterior locations shall be protected from corrosion by being installed within a minimum 6-inch (153 mm) protective bed of sand around the gas piping, the pipe being centrally located within the sand backfill, and all such horizontal piping shall have a minimum of 18 inches (457 mm) of earth cover or other equivalent protection. Underground piping shall be electrically isolated from the rest of the system by insulating unions placed a minimum of 6 inches (153 mm) above grade.

**C404.8.3 Electrical isolation of fuel gas piping.** Underground ferrous gas piping shall be electrically isolated from the rest of the gas system with listed or approved isolation fittings installed a minimum of 6 inches (153 mm) above grade.

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**C404.9 Minimum burial depth.** Underground piping systems shall be installed a minimum depth of ~~±~~ 18 inches (305 mm) below grade, except as provided for in Section C404.9.1.

**C404.10.1 Underground gas pipe separation.** Underground gas piping shall be separated vertically or horizontally from other underground piping as follows:

1. Sewer pipe – not less than 18 inches (457 mm) from any underground sewer line.
2. Water pipe – not less than 12 inches (305 mm) from any underground water line.
3. Drainage pipe – not less than 12 inches (305 mm) from any underground drainage line.

**Exceptions:**

1. Plastic pipe shall be permitted to terminate above ground outside of buildings where installed in pre-manufactured anode-less risers or service head adapter risers that are installed in accordance with the manufacturer's installation instructions.
2. Plastic pipe shall be permitted to terminate with a wall head adapter within buildings where the plastic pipe is inserted in a piping material for fuel gas use in buildings.
3. Plastic pipe shall be permitted to be installed under outdoor patios, walkways and driveways.

SECTION C406 is amended as follows:

**SECTION C406  
INSPECTION, TESTING AND PURGING**

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

**C406.1.1.2 Final piping inspection.** This inspection shall be made after piping 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.

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

**~~C406.4.1 Test pressure.~~** ~~The test pressure to be used shall be no less than 1½ times the proposed maximum working pressure, but not less than 3 psig (20 kPa gauge), irrespective of design pressure. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe. 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) gage. Test pressures shall be held for not less than 15 minutes with no perceptible drop in pressure. For welded piping, and for 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.

(Sections 406.4.2 through 406.7.4 have been deleted in their entirety.)

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**SECTION C410** is amended as follows:

**SECTION C410  
FLOW CONTROLS**

**C410.3.1 Vent piping.** Vent piping shall be not smaller than the vent connection on the pressure regulating device. Vent piping 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.~~

**SECTION C411** is amended as follows:

**SECTION C411  
APPLIANCE CONNECTIONS**

~~**C411.2 Manufactured home connections.** Manufactured homes shall be connected to the distribution piping system by one of the following materials:~~

- ~~1. Metallic pipe in accordance with Section 403.4.~~
- ~~2. Metallic tubing in accordance with Section 403.5.~~
- ~~3. Listed and labeled connectors in compliance with ANSI Z21.75/CSA 6.27 and installed in accordance with the manufacturer's installation instructions.~~

**SECTION C412** is amended as follows:

**SECTION C412  
LIQUEFIED PETROLEUM GAS MOTOR VEHICLE  
FUEL-DISPENSING STATIONS**

**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*.~~

(Sections 412.2 through 412.8 have been deleted in their entirety.)

**SECTION C413** is amended as follows:

**SECTION C413  
COMPRESSED NATURAL GAS MOTOR VEHICLE  
FUEL-DISPENSING STATIONS**

**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*.~~

(Sections 413.2 through 413.8 have been deleted in their entirety.)

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

SECTION C414 is amended as follows:

**SECTION C414**  
**SUPPLEMENTAL AND STANDBY GAS SUPPLY**

~~414.1 Use of air or oxygen under pressure. Where air or oxygen 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.~~

C414.1 Special supplementary gas. Where air, oxygen or other special supplementary gas is introduced into the gas piping 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 special gas and the gas meter. Where oxygen is used, installation shall be in accordance with NFPA 51.

SECTION C416 is added as follows:

**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.

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.

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

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**SECTION 416 has been re-numbered to C417** and is amended as follows:

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

~~**416.5.4 Unauthorized operation.** Precautions shall be taken to prevent unauthorized operation of any shutoff valve that will make a pressure relieving valve or pressure limiting device inoperative. The following are acceptable methods for complying with this provision:~~

- ~~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** is amended as follows:

### **SECTION C501 GENERAL**

**C501.1 Scope.** This appendix 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 this code ~~the *International Mechanical Code*~~. The construction, repair, ~~maintenance~~ and approval of masonry chimneys shall be regulated by the *International Building Code*.

**C501.3 Masonry chimneys.** Masonry chimneys shall be constructed in accordance with ~~Section 503.5.3~~ and the *Building Code*.

**C501.8 Equipment 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 Chapter 5, Section 513).
- Items 5. through 11. unchanged.

**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 C503.

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**SECTION C502** is amended as follows:

### **SECTION C502 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 1.5 inches (38 mm) from the nearest edge of the member, the vent shall be protected by shield plates in accordance with Section 305.5. ~~Shield plates shall be a minimum of  $\frac{1}{16}$  inch thick (1.6 mm) steel, 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** is amended as follows:

### **SECTION C503 VENTING OF EQUIPMENT**

**C503.3.4 Ventilating hoods and exhaust systems.** Ventilating hoods and exhaust systems shall be permitted to be used to vent appliances installed in commercial applications. Where automatically operated appliance is vented through a ventilating hood or exhaust system equipped with a damper or with a power means of exhaust, provisions shall be made to allow the flow of gas to the main burners only when the damper is open to a position to properly vent the appliance and when the power means of exhaust is in operation.

**Exception:** The interlock between a commercial cooking appliance and its exhaust hood system shall not be required for manually operated appliances that are factory equipped with a standing pilot burner ignition system. Type I and Type II commercial cooking exhaust hoods shall be designed and installed in accordance with Section 507.

**C503.5.3 Masonry chimneys.** Masonry chimneys shall be built and installed in accordance with ~~NFPA 211~~ the building code 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 1800°F (982°C).

~~**C503.5.6.2 Cleanouts.** Cleanouts shall be examined to determine if they will remain tightly closed when not in use.~~

**C503.5.6.3 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 appliances 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 or Type L or listed vent material or listed 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.

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**SECTION C505** is amended as follows:

**SECTION C505  
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.

~~**505.1.1 Commercial cooking appliances vented by exhaust hoods.** Where commercial cooking appliances are vented by means of the Type I or Type II kitchen exhaust hood system that serves such appliances, the exhaust system shall be fan powered and the appliances shall be interlocked with the exhaust hood system to prevent appliance operation when the exhaust hood system is not operating. Where a solenoid valve is installed in the gas piping as part of an interlock system, gas piping shall not be installed to bypass such valve. Dampers shall not be installed in the exhaust system.~~

~~**Exception:** An interlock between the cooking appliance(s) and the exhaust hood system shall not be required where heat sensors or other approved methods automatically activate the exhaust hood system when cooking operations occur.~~

**SECTION C601** is amended as follows:

**SECTION C601  
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** is amended as follows:

**SECTION C603  
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** is amended as follows:

**SECTION C613  
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** is amended as follows:

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

## SECTION C614 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 and shall convey the moisture and any products of combustion to the outside of the building. See Chapter 5, Section 504.~~

(Sections 614.2 through 614.7 have been deleted in their entirety.)

SECTION C615 is amended as follows:

## SECTION C615 SAUNA HEATERS

**C615.1 General.** Sauna heaters shall be installed in accordance with the manufacturer's installation instructions and Chapter 9.

(Sections 615.2 and 615.3 have been deleted in their entirety.)

(Sections 615.4 and 615.5 have been re-numbered.)

(Sections 615.6 and 615.7 have been deleted in their entirety.)

SECTION C618 is amended as follows:

## SECTION C618 FORCED-AIR WARM-AIR FURNACES

**C618.5 Prohibited sources.** Outside or return air for a forced-air heating system 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.

2. Where there is the presence of objectionable odors, fumes or flammable vapors; or where located less than 10 feet (3048 mm) above the 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. ~~the International Mechanical Code.~~

4. A room or space, the volume 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 Section C618.2, 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 room or space containing an appliance where such a room or space serves as the sole source of return air.

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**Exception:** This shall not apply where:

1. The appliance is a direct-vent appliance or an appliance not requiring a vent in accordance with Section 501.8.
2. The room or space complies with the following requirements:
  - 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.
  - 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.
  - 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.
3. 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 such appliances.
6. A closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room or furnace room.

**SECTION C623** is amended as follows:

### **SECTION C623 COOKING APPLIANCES**

**C623.4.1 Installation of a listed cooking appliance or microwave over a listed cooking top appliance.** The installation of a listed cooking appliance or microwave oven over a listed cooking top appliance shall conform to the conditions of the upper appliance's listing and the manufacturer's installation instructions.

~~**623.6 Commercial cooking appliance venting.** Commercial cooking appliances, other than those exempted by Section 501.8, shall be vented by connecting the appliance to a vent or chimney in accordance with this code and the appliance manufacturer's instructions or the appliance shall be vented in accordance with Section 505.1.1.~~

**SECTION C624** is amended as follows:

### **SECTION C624 WATER HEATERS**

**C624.1 General.** Water heaters shall be tested in accordance with ANSI Z 21.10.1 and ANSI Z 21.10.3 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*, Chapter 10.~~

**C624.1.1 Installation requirements.** The requirements for water heaters relative to sizing, relief valves, drain pans and scald protection shall be in accordance with the *Plumbing Code*.

**C624.2 Water heaters utilized for space heating.** Water heaters utilized both to supply potable hot water and provide hot water for space-heating applications shall be listed and labeled for such applications by the manufacturer and shall be installed in accordance with the manufacturer's installation instructions, this code and the *Plumbing Code*.

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

**SECTION C629** is amended as follows:

**SECTION C629**  
**SMALL CERAMIC KILNS**

**C629.2 Unlisted fuel-gas kiln installation.** Unlisted fuel-gas kilns shall be installed in accordance with the manufacturer's installation instructions and the provisions of this appendix.

**C629.2.1 Installations inside Buildings.** In addition to other requirements specified in this section, interior installation shall meet the following requirements:

**C629.2.2 Clearances for interior installation.** The sides and tops of kilns shall be located a minimum of 18 inches (457 mm) from any noncombustible wall 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 provide to and approved by the Building Official.

**C629.2.3 Control side clearance.** The clearance on the control side of a kiln shall not be reduced to less than 30 inches (762 mm).

**C629.2.4 Hoods.** 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.

**C629.2.5 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 duct shall be supported at each section by noncombustible supports.

**C629.2.6 Hood and duct clearances.** Every hood and duct serving a fuel-gas 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 C308.2.

**C629.2.6.1 Makeup air.** Provisions shall be made for air to enter the room in which a kiln is installed at a rate at least equal to the air being removed through the kiln hood.

**C629.3 Exterior Installations.** Kilns shall be installed with minimum clearances as specified in Section C629.2.2. 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 C629.2.4 C629.2.5 and C629.2.6.

**SECTION C631** is amended as follows:

**SECTION C631**  
**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~~

Underline represents code language that has been added by Oregon. ~~Strikethrough~~ represents model code language that has been deleted.

~~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.~~

~~**C631.2 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.~~

**SECTION 632** is deleted as follows:

#### **SECTION 632**

##### **EQUIPMENT INSTALLED IN EXISTING UNLISTED BOILERS**

~~**632.1 General.** Gas equipment installed in existing unlisted boilers shall comply with Section C631.1 and shall be installed in accordance with the manufacturer's instructions and the *International Mechanical Code*.~~