Department of Administration

Adopted Permanent Rules Relating to the Minnesota State Building Code

Rules as Adopted

1346.0050 TITLE; INCORPORATION BY REFERENCE.

This chapter is known and may be cited as the "Minnesota Uniform Mechanical Code." As used in this chapter, "the code" and "this code" refer to this chapter.

Chapters 1 to 20 and appendixes A, B, and C of the 1988 edition of the Uniform Mechanical Code, promulgated by the International Conference of Building Officials, 5360 South Workman Mill Road, Whittier, California 90601 and the International Association of Plumbing and Mechanical Officials, 20001 South Walnut Drive, Walnut, California 91789, are incorporated by reference as part of the Minnesota Uniform Mechanical Code with the amendments in this chapter. As used in this chapter, "UMC" means the Uniform Mechanical Code incorporated in this part.

The UMC is not subject to frequent change and a copy of the UMC, with amendments for use in Minnesota, is available in the office of the commissioner of administration.

1346.0201 SECTION 201.

UMC Section 201(a), the second paragraph, is amended to read as follows:

The building official may render interpretations of this code and enforce rules supplemental to this code to clarify the application of this code. The interpretations and rules must conform with the intent and purpose of the Minnesota State Building Code.

1346.0203 SECTION 203.

UMC Section 203(a), the last sentence of the first paragraph, is amended to read as follows:



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The board shall adopt rules of procedure for conducting its business and shall render all decisions and findings in writing to the appellant with a duplicate copy to the building official and to the state building inspector within 15 days of the decision.

1346.0204 SECTION 204.

UMC Section 204 is amended by adding a sentence to read as follows:

A violation of this code is a misdemeanor (Minnesota Statutes, section 16B.69).

1346.0304 SECTION 304.

UMC Section 304(b) is amended to read as follows:

(b) Permit Fees. All permit fees must be established by the local authority except in areas outside the enforcement authority of a city. The fee charged for the issuance of permits and inspections for a single family dwelling may not exceed the greater of $100 or 0.005 times the value of the structure, addition, or alteration (Minnesota Statutes, section 16B.62). The fee structure in UMC Table 3-A may be used as a guideline in establishing a fee schedule to be used by the municipality.

1346.0309 TABLE 3-A.

UMC Table No. 3-A, Mechanical Permit Fees, is deleted in its entirety.

1346.0403 SECTION 403.

UMC Section 403 is amended by adding the following definitions:

"Accessible installation" means to be accessible, such as exposed in shafts or tunnels, or concealed by readily removable construction.

"Appliance fuel connector" means an assembly of listed and approved semi-rigid or flexible tubing and fittings to carry fuel between a fuel piping outlet and a fuel burning appliance installed as required by its listing and approved by this code



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and the building official.

1346.0404 SECTION 404.

UMC Section 404 is amended by adding the following definitions:

"Boiler, high pressure" means a boiler furnishing steam at pressures in excess of 15 pounds per square inch or hot water at temperatures in excess of 250 degrees Fahrenheit, or at pressures in excess of 30 pounds per square inch.

"Boiler, low pressure hot water" or "boiler, low pressure steam" means a boiler furnishing hot water at pressures not exceeding 30 pounds per square inch and at temperatures not more than 250 degrees Fahrenheit, or steam at pressures not more than 15 pounds per square inch.

"Btu" or "British thermal unit" means the amount of energy required to raise the temperature of one pound of water one degree Fahrenheit.

"Btu/h" means the number of Btu's used in an hour.

1346.0405 SECTION 405.

UMC Section 405 is amended by adding the following definitions:

"Continuous pilot" means a pilot that burns without turndown throughout the entire period that the boiler is in service, whether or not the main burner is firing.

"Conversion burner" means a gas burner accessory or device designed to supply gaseous fuel to and properly burn the fuel within the combustion chamber zone of a boiler, furnace, or other device originally designed to use another fuel.

1346.0406 SECTION 406.

UMC Section 406 is amended by adding the following definitions:

"Direct gas-fired makeup air heater" means a gas heating device in which gas is burned and in which the products of combustion are mixed with the air that is to be heated in passing through the heater. The installation includes the unit



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and equipment from its outside air inlet to the outlet where the heated air leaves the unit with all appropriate control devices.

"Dual fuel burner" means a gas burner firing into the same combustion chamber zone into which another fuel is used and connected to an approved flue.

1346.0407 SECTION 407.

UMC Section 407 is amended by adding the following definition:

"Exposed" means visible and accessible without the removal of any other item.

1346.0408 SECTION 408.

UMC Section 408 is amended by adding the following definitions:

"Fire code" means the Minnesota Uniform Fire Code promulgated jointly by the Western Fire Chiefs Association and the International Conference of Building Officials, as adopted by the Minnesota Department of Public Safety.

"Fuel" means natural, manufactured, or liquefied petroleum gas, or a mixture of these gases; all grades of fuel oil; coal; wood; or any other combustible or flammable material; or a mixture of combustible or flammable materials.

"Fuel burner" means a device used to convey the appropriate fuel into the combustion chamber zone, in close proximity to its combustion air supply to permit a stable controlled heat release compatible with the burner design, listing, and applicable approvals in a boiler, furnace, device, or appliance. It includes appliances designed to burn gas fuel, dual fuel appliances, conversion burners, direct gas-fired makeup air heaters, or any other fuel burning appliance.

"Fuel burning equipment" includes a fuel burner, vent connectors, fuel burning systems, vent flues, chimney liners, fans, blowers, valves, control devices, combustion air, and all accessories for proper and safe operation of the appliance.

"Fuel burning system" means the fuel burner and a conveyance system for the purpose of introducing the appropriate



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fuel into the combustion chamber zone.

"Fuel gas" means natural, manufactured, or liquefied petroleum gas or a mixture of these gases.

1346.0409 SECTION 409.

UMC Section 409 is amended by adding the following definitions:

"Gas burner" means a device for the final conveyance of gas or a mixture of gas and air to the combustion chamber zone of a boiler, furnace, device, or appliance used in connection with a heating system and includes gas-designed appliances, conversion burners, direct gas-fired makeup air heaters, and dual fuel burners.

"Gas burning equipment" includes gas burners, vent connectors, vent flues, chimney liners, and all piping from the appliance shutoff valve, fans, blowers, control devices, and accessories connected to the burner.

"Gas-designed appliance" means a space heating appliance designed for the exclusive use of gaseous fuel, except for an auxiliary heater installed in an approved masonry fireplace.

1346.0410 SECTION 410.

UMC Section 410 is amended by adding the following definitions:

"High pressure gas piping system" means a system that operates at a pressure exceeding 14 inches water column.

"High pressure piping" means high pressure piping used in the installation of hot water or steam heating boilers, any system of piping hot water or other medium used for heating that exceeds 30 pounds per square inch gauge and 250 degrees Fahrenheit, or any system of high pressure steam piping, but does not include high pressure piping under the direct jurisdiction of the United States (Minnesota Statutes, section 326.461, subdivision 2).

1346.0411 SECTION 411.

UMC Section 411 is amended by adding the following



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definitions:

"Inaccessible installation" means those sections of piping systems installed in walls, floors, ceilings, or other areas where access cannot be made without the removal of permanent construction.

"Interlock" means a device that senses a limit or off-limit condition or improper sequence of events, shuts down the offending or related piece of equipment, and prevents proceeding in an improper sequence to prevent a hazardous condition from developing.

"Intermittent pilot" means a pilot that burns during light-off and while the main burner is firing and that is shut off with the main burner.

"Interrupted pilot" means a pilot that burns during light-off and that is shut off during normal operation of the main burner.

1346.0414 SECTION 414.

UMC Section 414 is amended by adding the following definition:

"Low pressure gas piping system" means a system operating at a pressure of 14 inches or less water column.

1346.0418 SECTION 418.

UMC Section 418 is amended by adding the following definitions:

"Package boiler" means a boiler equipped and shipped complete with electrical elements or fuel burning equipment, automatic controls and accessories, and mechanical draft equipment, if used.

"Pilot" means a burner smaller than the main burner that is ignited by a spark or other independent and stable ignition source and that provides ignition energy required to immediately light off the main burner.

"Piping system" means the method of conveying liquid, vapor, steam, gases, or slurry from one point to another for purposes of this code, including accessories, appurtenances, and



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equipment necessary for its proper operation.

"Pressure vessel" means an unfired, closed container for liquids, gases, or vapors subjected to pressures exceeding 15 pounds per square inch, or steam and hot water under any pressure.

"Proof of closure switch" means a switch in the safety shut-off valve that will prove that the valve is 100 percent closed. The switch must be interlocked into the system to prevent any starting procedure unless proven closed. The switch must close when the valve has had an overtravel of the valve seat.

"Psig" means pounds of pressure per square inch as read from a measurement device or gauge.

"Purge" means an acceptable method of scavenging the combustion chamber, boiler passages, and breeching to remove all combustion gases. It consists of at least four air changes for trial of ignition, and after lockout at high fire damper setting, at least 90 seconds.

1346.0421 SECTION 421.

UMC Section 421 is amended by adding the following definition:

"Service piping" means the piping and equipment between the street gas main and the structure gas piping system inlet that is installed, controlled, and maintained by the serving gas supplier.

1346.0504 SECTION 504.

UMC Section 504(f) is amended to read as follows:

(f) LPG Appliances. LPG applications and installations must be in accordance with the rules of the Minnesota State Fire Marshal and this code.

1346.0602 SECTION 602.

UMC Section 602(a) is amended to read as follows:

Section 602. (a) Location. Openings for combustion air must be located in an exterior wall or roof or in areas that



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fully communicate to the exterior of the building. Openings in walls must be located at least one foot above grade where it penetrates the exterior wall.

1346.0603 SECTION 603.

UMC Section 603 is amended to read as follows:

Section 603. (a) Air from outside. Combustion air must be obtained from outside the building through continuous ducts of the required cross-section area, complying with Section 607, extending from the appliance area to the outside of the building. Caution must be taken in the installation of the combustion air ducts so that equipment located in the room will not be subjected to freezing temperatures.

(b) Prohibited sources. Openings and ducts must not connect appliance enclosures with attic spaces.

1346.0604 SECTION 604.

UMC Section 604 is amended to read as follows:

Section 604. (a) General. Combustion air ducts must:

1. be of galvanized steel complying with chapter 10 or equivalent corrosion-resistant material approved for this use.

2. have a minimum cross-sectional area at least equal to the required flue serving the equipment requiring combustion air, and discharge the air at a point not more than one foot above the floor of the equipment area;

3. have the same cross-sectional area as the free area of the opening to which it is connected; and

4. serve a single appliance enclosure.

(b) Dampers. Dampers may be installed as required in UMC Section 602(b).

(c) Other installations. A manufacturer's installation instructions that require combustion air supply and distribution different than what is provided for in this section may be approved by the building official.

1346.0605 SECTION 605.

UMC Section 605 is amended to read as follows:



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Section 605. Gravity-type warm air furnaces must be provided with combustion air as specified in this code. Combustion and cold air return for gravity-type warm air furnaces may be obtained from the same area.

1346.0606 SECTION 606.

UMC Section 606 is amended to read as follows:

Section 606. Operation of exhaust fans, kitchen ventilation systems, clothes dryers, or fireplaces must be considered in determining combustion air requirements to avoid unsatisfactory operation of installed fuel burning appliances.

1346.0607 SECTION 607.

UMC Section 607 is amended to read as follows:

Section 607. (a) General. The free area of openings, ducts, or plenums supplying combustion air to rooms or spaces containing fuel burning appliances must be as required by this section.

(b) Fuel inputs greater than 400,000 Btu/h. All rooms containing fuel utilization equipment must be provided with combustion air with openings communicating directly to the outside. The net free opening area of these openings must be as follows:

1. Gravity-type fuel burners. The net free area of the combustion air openings must be not less than one square inch for each 5,000 Btu/h input, with a minimum free area of not less than 100 square inches.

2. Power-type fuel burners. The net free area of the combustion air opening must be not less than one-half square foot for each 1,000,000 Btu/h input, with a minimum free area of not less than one-half square foot.

(c) Fuel inputs less than 400,000 Btu/h. Openings of ducts supplying combustion air must have a net free open area not less than the minimum required common flue of flues serving the fuel utilization equipment. The combustion air system must discharge the air at a point not more than one foot above the floor.

EXCEPTION: In lieu of the application in this paragraph,



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the combustion air supply system may be introduced into the cold air return of the heating system with an outlet provided in the supply duct. The size of the supply outlet must be equal to one-half of the cross-sectional area of the common flue or flues serving the fuel utilization equipment.

(d) Designed installations. With prior approval, compliance with paragraphs (b) and (c) is not required for an installation that has been professionally designed to ensure an adequate supply of combustion air.

1346.0608 SECTION 608.

UMC Section 608 is added to read as follows:

Section 608. Equipment ventilation. In addition to air needed for combustion and dilution of flue gases, air for the fuel utilization equipment must be provided as follows:

1. All equipment installations. Adequate ventilation must be provided in areas housing fuel utilization equipment to prevent the accumulation of gas or fuel vapors beyond the danger point if a leakage occurs.

2. In confined spaces. If the floor area of the fuel utilization equipment compartment is less than twice the floor area used by the equipment in the space, ventilation air must be supplied to the confined space through at least two openings communicating to the interior of the building as follows:

A. Ventilation air outlet grille located in the wall or door of the space at a height above the draft hood opening. The net free area of the opening must be at least one square inch for each 2,000 Btu/h input.

B. Ventilation air inlet grille located in the wall or door of the space at a height at or below the combustion air outlet to the burner. The net free area of the opening must be at least one square inch for each 2,000 Btu/h input.

1346.0706 SECTION 706.

UMC Section 706(d) is amended to read as follows:

(d) Dampers. Volume dampers must not be placed in the air inlet to a furnace in a manner that will reduce the required air



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to the furnace.

Volume dampers, splitters, and deflectors must be provided for all ducts to permit balancing of the system. The dampers, splitters, and deflectors must be set according to air measurements of the system and must be locked in place. In finished or inaccessible locations, a friction-type register box damper may be used.

1346.0710 SECTION 710.

UMC Section 710(h) is amended to read as follows:

(h) Access.

1. Every furnace installed in or on an exterior wall of a building that is designed so that the burners or controls must be serviced from the outside of the building must be accessible.

~~A-furnace-located-on-the-roof-of-a-building-must-be accessible.~~

~~Permanent-ladders-providing-roof-access-must:~~

~~1.--have-side-railings-that-extend-at-least-30-inches-above the-roof-edge-or-parapet-wall;~~

~~2.--have-landings-less-than-18-feet-apart-measured-from-the finished-grade;~~

~~3.--be-at-least-14-inches-in-width;~~

~~4.--have-rungs-not-more-than-14-inches-on-center;-and~~

~~5.--have-a-minimum-of-a-3-1/2-inch-toe-space.~~

~~EXCEPTIONS:~~

~~1.--Permanent-exterior-ladders-providing-roof-access-need not-extend-closer-than-eight-feet-to-the-finish-grade.~~

~~2.--A-portable-ladder-may-be-used-for-access-for-furnaces on-the-single-story-portion-of-a-Group-M-or-R-Occupancy.~~

2. Mechanical equipment installed on the roof of a building must be provided with access as required by part 1305.1750.

1346.0807 SECTION 807.

UMC Section 807(a) is amended to read as follows:

Section 807. (a) Vented freestanding. Vented freestanding room heaters must not be installed in bedrooms or sleeping



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quarters when the heaters depend on air for combustion from the room in which they are placed. When approved by the building official, vented freestanding room heaters may be installed in other types of rooms and must be installed with clearances from combustible material as set forth in Table No. 5-A.

UMC Section 807(c) and (d) are deleted in their entirety.

1346.0808 SECTION 808.

UMC Section 808 is added to read as follows:

Section 808. Duct furnaces. Installation of duct furnaces must comply with the requirements of NFPA 54-1984.

1346.0809 SECTION 809.

UMC Section 809 is amended to read as follows:

Section 809. Infrared heaters. Installation of infrared heaters must comply with the requirements of NFPA 54-1988.

NOTE: Mechanical exhaust must be provided in the quantity recommended by the manufacturer and be sufficient to prevent condensation in the space to be heated. Heaters must be installed so they will not operate until the exhaust air quantity has been proved. Makeup air must be provided to the space to be heated.

1346.0906 SECTION 906.

UMC Section 906(a) is amended to read as follows:

Section 906. (a) General. Vents must extend above the roof surface through a flashing.

1346.0913 SECTION 913.

UMC Section 913(b), the first two paragraphs, are amended to read as follows:

(b) Gas venting into masonry chimneys. Lined and unlined masonry chimneys may be used to vent gas appliances, provided:

1. An approved liner must be installed in a masonry chimney when the combined input is less than 400,000 Btu/h or when considered necessary by the building official considering local problems of vent gas condensate. The liner must comply with one of the following:



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A. aluminum 2S-H14, 1/2 hard, thickness .032 inches to eight inches diameter, temperatures not to exceed 550 degrees Fahrenheit at outlet of equipment;

B. stainless steel No. 302, No. 26 U.S. Standard gauge to eight inches diameter, No. 24 U.S. Standard gauge to eight inches diameter;

C. vitreous coated steel of No. 22 U.S. Standard gauge before coating;

D. class "B" vents approved by Underwriters Laboratories, or other approval and listing agencies, temperatures not to exceed 550 degrees Fahrenheit at outlet of appliance; or

E. other types of liners as approved by the building official.

1346.1521 SECTION 1521.

UMC Chapter 15 is amended by adding a section to read as follows:

GAS AIR CONDITIONERS.

Section 1521. The installation of gas-fired air conditioners must comply with the requirements of NFPA 54-1988 Section 6.2.

1346.2003 SECTION 2003.

UMC Section 2003(i) is amended to read as follows:

(i) Makeup air. Each room provided with an exhaust system must have air supplied to the room equal to the amount of air to be exhausted. Makeup diffusers must be located to prevent a short circuiting of air furnished to the exhaust system. Windows and doors must not be used for the purpose of providing makeup air. The exhaust and makeup air systems must be connected by an electrical interlocking switch. Exhaust systems must be provided with tempered makeup air. Tempered air is air of a temperature not less than 55 degrees Fahrenheit, measured at the flow of air from the discharge diffuser into the room. Compensating hoods must meet the airflow requirements in Section 2003(g), 2, 3, and 4. Compensating hoods must extract at least 80 percent of their required exhaust airflow from the kitchen

area.

1346.2101 SECTION 2101.

UMC Appendix B, Section 2101, is amended to read as follows:

Section 2101. The purpose of this chapter is to establish and provide minimum standards for the protection of public welfare, health, safety, and property by regulating and controlling the quality, location, and installation of low pressure, low temperature steam and hot water boilers, pressure vessels, piping systems, and their equipment and appurtenances.

1346.2102 SECTION 2102.

UMC Appendix B, Section 2102, the first paragraph, is amended to read as follows:

Section 2102. This chapter applies to the construction, installation, operation, repair, and alteration of all boilers, pressure vessels, piping systems, and their equipment and appurtenances.

1346.2104 SECTION 2104.

UMC Appendix B, Section 2104, the first paragraph, is amended to read as follows:

Section 2104. The definitions in this section apply to this chapter, unless a word's context clearly indicates a different meaning. For additional definitions, see Chapter 4 of this code.

UMC Appendix B, Section 2104, is amended by adding the following definitions:

"Accessible installation" means accessible whether in a shaft, tunnel, or other concealed space by readily removable construction.

"Exposed installation" means installation that is visible and accessible without the removal of an item of construction.

"Inaccessible installation" means inaccessible whether in a shaft, tunnel, or other concealed space and only accessible by the removal of permanent construction.

"Piping system" means the method of conveying liquid,



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vapor, steam, gases, or slurry from one point to another for purposes of this code, including accessories, appurtenances, and equipment necessary for proper operation.

UMC Appendix B, Section 2104, the definitions of "package boiler" and "pressure vessel (unfired)," are amended to read as follows:

"Package boiler" means a boiler equipped and shipped complete with electrical heating elements or fuel burning equipment, automatic controls and accessories, and mechanical draft equipment, if used.

"Pressure vessel" means an unfired, closed container for liquids, gases, or vapors subjected to pressures exceeding 15 pounds per square inch, or steam and hot water under any pressure.

1346.2106 SECTION 2106.

UMC Appendix B, Section 2106(b) and (e), are amended to read as follows:

(b) Controls. Required electrical, mechanical, safety, and operating controls must carry approval of an approved testing agency. Electrical controls must be designed and built so that they are suitable for installation in the environment in which they are located, and must comply with the National Electrical Code as adopted.

(e) Welding. Welding on pressure vessels and piping must be done by approved welders in conformity with nationally recognized standards. This welding is subject to the approval of the building official.

1346.2107 SECTION 2107.

UMC Appendix B, Section 2107(a), (b), and (c) are amended to read as follows:

Section 2107. (a) General. A hot water heating system must be provided with an air expansion tank securely fastened to the structure. Supports must be adequate to carry twice the weight of the tank filled with water without placing any strain on connecting piping. Hot water heating systems incorporating



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hot water tanks or fluid relief columns must be installed to prevent freezing under normal operating conditions.

EXCEPTION: Small expansion tanks installed consistent with manufacturer's recommendations may be supported by the piping if so designed.

(b) Systems with open expansion tank. Systems equipped with an open expansion tank to satisfy thermal expansion must be provided with an indoor overflow from the upper portion of the expansion tank in addition to an open vent. The indoor overflow must be carried within the building to a suitable plumbing fixture.

(c) Closed-type systems. Systems of the closed type must have an airtight tank or other suitable air cushion that will be consistent with the volume and capacity of the system, and must be suitably designed for a hydrostatic test pressure of 2-1/2 times the allowable working pressure of the system. Expansion tanks for systems designed to operate at or above 50 psig must be constructed according to nationally recognized standards approved by the building official. Provisions must be made for draining the tank without emptying the system, except for pressurized tanks. The valve between the boiler or mains and the expansion tank must have permanently attached to it a metal tag having substantially the following wording stamped or etched on it: "This valve must be OPEN at all times except when draining the expansion tank."

1346.2108 SECTION 2108.

UMC Appendix B, Section 2108, is amended to read as follows:

Section 2108. A hot water liquid boiler or heat exchanger must be equipped with a pressure relief valve and a steam boiler must be equipped with a safety valve. Pressure relief and safety valves must be rated and installed according to ASME boiler and pressure vessel code.

1. Discharge piping from safety and relief valves must be directed to a position so that the danger of scalding a person is minimized and away from operating controls, thus preventing

~~damage~~ injury to the person. In no case may the discharge piping be more than 18 inches from the floor.

2. Inlet and discharge pipes are to be the full size of the valve opening and the discharge end must be reamed and unthreaded.

3. If manifolding two or more valve discharges, the piping must be sized so that its area is equivalent or greater than the combined areas of the discharge openings.

4. Discharge piping from a safety or relief valve when rising up must be provided with a drain opening to prevent the accumulation of condensate at the valve.

5. The required relieving capacity of the pressure relieving device or devices on a boiler or heat exchanger must be equal to or greater than the maximum output of the boiler or heat exchanger.

6. To prevent excessive loss of relieving capacity of the discharge piping because of length of pipe, the discharge piping must be increased in size.

1346.2109 SECTION 2109.

UMC Appendix B, Section 2109, is amended to read as follows:

Section 2109. An approved manual shutoff valve must be installed upstream of all control devices on the main burner of a gas-fired boiler. The takeoff point for the gas supply to the pilot must be upstream of the gas shutoff valve of the main burner and must be valved separately. A union or other approved means of disconnect must be provided immediately downstream of these shutoff valves. All boilers, vessels, equipment, and their appurtenances must have approved valves on the inlet and outlet of the unit. Approved valves must be used in a manner consistent with their testing and listing.

1346.2110 SECTION 2110.

UMC Appendix B, Section 2110, is amended to read as follows:

Section 2110. See Chapter 22, section 2220(c), for the requirements of pressure regulators.



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1346.2111 SECTION 2111.

UMC Appendix B, Section 2111, is amended to read as follows:

Section 2111. An automatically-fired hot water heating or steam generating boiler must be equipped with an automatic low water fuel cutoff to automatically cut off the fuel supply when the surface of the water falls to the lowest safe water level according to items a, b, and c.

(a) An automatically-fired hot water boiler or group of boilers piped together having a rated input in excess of 400,000 Btu/h per hour must be equipped with an automatic low water fuel cutoff to stop the fuel supply when the surface of the water falls below the lowest safe permissible water level established by the boiler manufacturer.

(b) A boiler installed at an elevation where all radiation in the system is below the safe boiler level must be equipped with an automatic low water fuel cutoff to stop the fuel supply when the surface of the water falls below the lowest safe permissible water level established by the boiler manufacturer.

(c) A low water cutoff must be installed when recommended by the manufacturer's installation instructions or listing and when special consideration and installations will require a low water cutoff to protect a hot water or steam boiler in the opinion of the building official.

1346.2113 SECTION 2113.

UMC Appendix B, Section 2113, is amended to read as follows:

Section 2113. Automatic boilers must be equipped with controls and limit devices as set forth in Table No. 21-C. The building official may approve solid fuel-fired boilers that can meet the safety requirements for automatic gas or oil-fired boilers.

1346.2114 SECTION 2114.

UMC Appendix B, Section 2114, is amended to read as follows:

Section 2114. If boilers are installed or replaced, clearance must be provided to allow access for inspection, maintenance, and repair. Passage must have an unobstructed

width of not less than 36 inches on all sides of the equipment. Clearance for repair and cleaning may be provided through a door or access panel into another area if the opening is of sufficient size.

EXCEPTION: Subject to the approval of the building official, boilers may be installed with a side clearance of less than 36 inches if the lesser clearance is part of the testing and listing of the equipment and does not inhibit inspection, maintenance, and repair.

Clearance from the top of the boiler to the ceiling for hot water and steam boilers under 400,000 Btu/h must be at least three feet. Clearance for hot water and steam boilers over 400,000 Btu/h must be at least four feet.

Package boilers, miniature boilers, low pressure heating boilers, and hot water supply boilers with no manhole on top of shell and not exceeding any of the above limits must have a minimum clearance of two feet from the ceiling.

1346.2115 SECTION 2115.

UMC Appendix B, Section 2115, is amended to read as follows:

Section 2115. Boiler rooms and enclosures and their access must comply with UMC chapter 7 and the requirements of the Minnesota State Building Code.

Boilers must not be installed in confined spaces such as alcoves or closets unless specifically approved for the installation. Boilers must be installed to allow sufficient area around the equipment for service and maintenance.

Boiler rooms in other than one- and two-family dwellings must have an area of at least ten times the area occupied by the boiler. If additional equipment is located in the boiler room, additional area must be provided equal to the area occupied by the equipment plus required clearance for servicing. At least 36 inches of clear space must be provided in front of all zone valves, control, and other necessary devices for access and servicing.

1346.2120 SECTION 2120.

UMC Appendix B, Section 2120, is amended to read as follows:

Section 2120. Fuel piping must conform to the requirements of UMC Chapters 22, 25, and 26 or the standard cited in Appendix C, Reference Standards - Oil Tanks, Piping, etc.

1346.2122 SECTION 2122.

UMC Appendix B, Section 2122, is amended to read as follows:

Section 2122. Hot water and steam boiler installations must have all controls set, adjusted, and tested by the installing contractor, and a complete control diagram of a permanent legible type, with complete boiler operating instructions, must be furnished by the installer for each installation. The instruction information must remain at the job site for the owner's use.

1346.2123 SECTION 2123.

UMC Appendix B, Section 2123, is amended to read as follows:

Section 2123. An installation for which a permit is required must not be put into service until it has been inspected and approved by the building official. The owner or the owner's representative shall notify the building official that the installation is ready for inspection and test and provide access for the inspection or test. The owner or the owner's representative shall also post in a conspicuous position on the installation a notice in substantially the following form: "Warning! This installation has not been inspected and approved by the building official and must not be covered or concealed until it has been inspected or approved." It is unlawful for anyone other than the building official to remove the notice. The building official shall require tests the official considers necessary to determine that the installation complies with the UMC. The tests must be made by the owner or the owner's representative in the presence of the building official.

EXCEPTION: Installations designed and supervised by a registered professional engineer may be inspected and tested by that engineer in lieu of the above requirements when approved by the building official.



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If the owner or the owner's representative requests inspection of a boiler before its installation, the building official shall make the inspection.

1346.2124 SECTION 2124.

UMC Appendix B, Section 2124, is deleted in its entirety.

1346.2125 SECTION 2125.

UMC Appendix B, Section 2125, is deleted in its entirety.

1346.2126 SECTION 2126.

UMC Appendix B, Section 2126, is deleted in its entirety.

1346.2127 SECTION 2127.

UMC Appendix B, Section 2127, is amended to read as follows:

Section 2127. Piping systems must comply with the following requirements:

EXCEPTION: High pressure piping systems that are part of a heating system must comply with Minnesota Statutes, sections 326.46 to 326.52, and the rules of the Department of Labor and Industry.

1. Piping systems in which the pressure exceeds 30 psig or the temperature exceeds 250 degrees Fahrenheit must comply with nationally recognized standards approved by the building official, Minnesota Rules, chapter 5230, and the requirements of item 2.

2. Piping systems in which the pressure does not exceed 30 psig and the temperature does not exceed 250 degrees Fahrenheit must comply with the requirements in A to F. If there is a conflict between this code and the rules of the Department of Labor and Industry, the most restrictive must apply.

A. Materials and construction.

(1) Pipe. Pipe must be brass, copper, cast iron, galvanized or black wrought iron, galvanized or black steel, or other approved materials. ~~Plastic pipe must not be used in any service of 120 degrees Fahrenheit or more.~~

EXCEPTION: Galvanized pipe is not permitted for use in steam systems.



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(2) Tubing. Tubing must be copper water tube, type K, L, or M.

EXCEPTION: Type M copper must not be used in steam systems.

(3) [Unchanged.]

(4) Fittings. (i) Plain screwed fittings must be brass, bronze, cast iron, galvanized or black malleable iron, or galvanized or black steel.

EXCEPTION: Galvanized pipe and galvanized fittings must not be used in steam systems.

(ii) and (iii) [Unchanged.]

(iv) [Deleted in its entirety.]

(5) to (9) [Unchanged.]

(10) Gaskets. Flange gaskets must be of metal or other approved materials.

(11) to (15) [Unchanged.]

B. [Unchanged.]

C. Connections.

(1) to (5) [Unchanged.]

(6) [Deleted in its entirety.]

(7) Copper water tubing. Joints in copper tubing must be soldered, sweated, or brazed.

(8) Piping to tubing. Joints connecting piping to tubing must be made with adapter fittings connected as required in items (1) to (7).

D. and E. [Unchanged.]

F. Hangers and supports. All piping and equipment must be adequately supported to the satisfaction of the building official. Hot water and steam piping must be supported, anchored, and provided with swing joints, expansion loops or joints, or other means to avoid excessive strain on piping, equipment, or the building structure by metal hangers or other approved hangers, and spaced so that there will be no sag in the piping between points of suspension. When fastened to walls, piping, and equipment must be securely supported by metal brackets or pipe supports spaced so that there will be no sag in the piping between points of suspension. Supports must be



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arranged so that there will be no undue strain on the threads of any pipe or fittings and equipment connected to it. The maximum spacing of hangers and minimum hanger rod size for steel and copper must be as follows:

| Nominal Pipe Size (in inches) | Maximum Span (in feet) | Minimum Rod Diameter (in inches) |
|---|---|---|
| Up to 3 | 10 | 3/8 |
| 3 | 12 | 1/2 |
| 3 1/2 | 13 | 1/2 |
| 4 | 14 | 5/8 |
| 5 | 16 | 5/8 |
| 6 | 17 | 3/4 |
| 8 | 19 | 7/8 |
| 10 | 22 | 7/8 |
| 12 | 22 | 7/8 |

(1) [Unchanged.]

(2) Horizontal piping.

(i) [Unchanged.]

(ii) In ground. Piping and tubing in the ground must be laid on a firm bed for its entire length, except where support is otherwise provided that is adequate in the judgment of the building official.

G. Installation.

(1) [Unchanged.]

(2) Wall thickness. (i) Piping must be at least standard weight brass or copper, Class 150 cast iron, standard weight wrought iron, or ASTM Schedule 40 steel.

(ii) [Unchanged.]

(3) to (6) [Unchanged.]

(7) Underground piping.

(i) [Unchanged.]

(ii) Beneath buildings.

Ferrous piping. [Unchanged.]

Copper tubing. [Unchanged.]

Asbestos-cement. [Deleted in its entirety.]

(iii) Outside of buildings - black wrought-iron and black steel.

Asbestos-cement. [Deleted in its entirety.]

(iv) and (v) [Unchanged.]

(8) Aboveground piping.



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(i) to (v) [Unchanged.]

(vi) [Deleted in its entirety.]

(vii) [Unchanged.]

(viii) Drainage. Means must be provided to drain all piping into an approved floor drain.

(ix) [Unchanged.]

(9) [Unchanged.]

H. Pressure testing.

(1) [Unchanged.]

(2) Media. The piping must be tested with water or other approved methods.

(3) to (6) [Unchanged.]

3. Those portions of the hot-water piping systems in which the ~~design-temperature~~ continuous pressure-temperature relationship does not exceed ~~120-degrees-Fahrenheit~~ the following may be constructed of polybutylene pipe or tubing of SDR-11 conforming to specification ASTM D 3309.

| TEMPERATURE(°F.) | PRESSURE(PSI) |
|---|---|
| 73 | 200 |
| 180 | 100 |
| 200 | 80 |

Polybutylene also may be used for applications requiring up to one year total exposure at conditions of 210°F., 150 psi, typical conditions for temperature and pressure-relief valve discharge lines in heating systems.

A. to D. [Unchanged.]

E. Installation details.

(1) to (4) [Unchanged.]

(5) Above ground piping.

(i) [Unchanged.]

(ii) [Delete in its entirety.]

(6) [Unchanged.]

F. Pressure testing.

(1) [Unchanged.]

(2) Media. The piping must be tested with water or other approved materials.

(3) [Unchanged.]



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1346.2133 TABLE NO. 21-C.

UMC Appendix B, Table No. 21-C, is amended to read as follows:

~~TABLE NO. 21-C--CONTROLS AND LIMIT DEVICES FOR AUTOMATIC BOILERS~~

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| A | Gas | | | | | | | | | | | | | | |
| B | Gas | | | | | | | | | | | | | | |
| C | Gas | | | | | | | | | | | | | | |
| D | Gas | | | | | | | | | | | | | | |
| E | Oil | | | | | | | | | | | | | | |
| F | Oil | | | | | | | | | | | | | | |
| G | Oil | | | | | | | | | | | | | | |
| H | Oil | | | | | | | | | | | | | | |
| K | Electric | All | | | | | | | | | | | | | |

TABLE NO. 21-C--CONTROLS AND LIMIT DEVICES FOR AUTOMATIC BOILERS

| Boiler Group | Fuel | Fuel Input Range 1 (Inclusive) | Type of Pilot 2 | Safety Control Timing (Nominal Maximum Time in Seconds) | | | | Assured Fuel Supply Control 4 | Assured Air Supply Control 5 | Low Fire Start Up Control 6 | Pre-Purging Control 7 | Hot Water Temperature and Low Water Limit Controls 8 | Steam Pressure and Low Water Limit Controls 9 | Approved Fuel Shutoff 10 | POC 10 | Control and Limit Device System Design 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Trial for Pilot | Trial for Main Burner Flame | | Main Burner Flame Failure 3 | | | | | | | | | |
| | | | | | Direct Electric Ignition | Flame Pilot | | | | | | | | | | |
| A | Gas | 0 - 400,000 BTU/h | Interrupted Intermittent or Continuous | 90 | Not Allowed | 90 | 90 | Not Required | Required | Not Required | Not Required | Required | Required | Required | Not Required | Required |
| B | Gas | 400,001 999,999 BTU/h | Interrupted Intermittent | 15 | Not Allowed | 15 | 2 - 4 | Hi Gas Required | Required | Not Required | Required | Required | Required | Required | Not Required | Required |
| C | Gas | 1,000,000 2,499,999 BTU/h | Interrupted | 15 | Not Allowed | 15 | 2 - 4 | Lo/Hi Gas Required | Required | Required | Required | Required | Required | Required | Required | Required |
| D | Gas | 2,500,000 over BTU/h | Interrupted | 10 | Not Allowed | 10 | 2 - 4 | Lo/Hi Gas Required | Required | Required | Required | Required | Required | Required | Required | Required |
| E | Oil | 0 - 5 GPM | Any Type | 15 | 90 | 90 | 90 | Not Required | Required | Not Required | Not Required | Required | Required | Required | Not Required | Required |
| F | Oil | Over 5 GPM | Interrupted | 15 | Not Allowed | 15 | 2 - 4 | Required | Required | Not Required | Required | Required | Required | Required | Not Required | Required |
| G | Oil | 7 to 10 GPM | Interrupted | 15 | Not Allowed | 10/15 | 2 - 4 | Lo - Oil Required | Required | Required | Required | Required | Required | Required | Not Required | Required |
| H | Oil | Over 10 GPM | Interrupted | 15 | Not Allowed | 10/15 | 2 - 4 | Lo - Oil Required | Required | Required | Required | Required | Required | Required | Not Required | Required |
| K | Electric | All | Not Required | Not Required | Not Required | Not Required | Not Required | Not Required | Not Required | Not Required | Not Required | Not Required | Required | Required | Not Required | Not Required | Required |

FOOTNOTES FOR TABLE NO. 21-C

[1] Fuel input must be determined by the maximum burner input as shown on the burner nameplate.

[2] Automatic boilers must have one flame failure device on each burner that must prove the presence of a suitable ignition



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source at the point where it will reliably ignite the main burner, except that boiler group E that is equipped with direct electric ignition must monitor the main burner. Boiler group A equipped with continuous pilot must accomplish 100 percent shutoff within 90 seconds after flame failure. Boiler groups G and H trial for ignition timing is ten seconds for distillate oils and 15 seconds for oil requiring preheating.

[3] Electronic safety equipment must be provided for all burners exceeding 400,000 Btu/h input, except on multiple burner equipment where each section of 400,000 Btu/h input or fraction of it is supervised by an approved safety pilot.

[4] Boiler groups B, C, and D must have controls interlocked to accomplish a nonrecycling fuel shutoff upon high or low gas pressure and boiler groups B, C, D, F, G, and H using steam or air for fuel atomization must have controls interlocked to accomplish a nonrecycling fuel shutoff upon low atomizing steam or air pressure. Boiler groups F, G, and H equipped with a preheated oil system must have controls interlocked to provide fuel shutoff upon low oil temperature. Boiler groups F, G, and H must have controls for high oil temperature, and groups G and H must have controls for low oil pressure.

[5] Automatic boilers must have controls interlocked to shut off the fuel supply in the event of draft failure if forced or induced draft fans are used or, in the event of low combustion air flow, if a gas power burner is used. If a single motor directly driving both the fan and the oil pump is used, a separate control is not required.

[6] Boiler groups B, C, D, G, and H, when firing in excess of 400,000 Btu/h per combustion chamber, must be provided with low fire start of its main burner system to permit smooth light-off. This will normally be a rate of approximately one-third of its maximum firing rate.

[7] Boiler groups B, C, D, F, G, and H must not permit pilot or main burner trial for ignition operation before a purging operation. Purging is an acceptable method of scavenging the combustion chamber, boiler passages, and breeching to remove all

combustion gases. It consists of at least four air changes for trial of ignition and after lockout at high fire damper setting, at least 90 seconds minimum. An atmospheric gas burner with no mechanical means of creating air movement or an oil burner that obtains two-thirds or more of the air required for combustion without mechanical means of creating air movement must not require purge by means of four air changes so long as its secondary air openings are not provided with means of closing. If burners have means of closing secondary air openings, a time delay must be provided that puts these closures in a normally open position for four minutes before an attempt for ignition. An installation with a trapped combustion chamber must in every case be provided with a mechanical means of creating air movement for purging.

[8] Every automatic hot water supply boiler, low pressure hot water heating boiler, and power hot water boiler must be equipped with two high temperature limit controls with a manual reset on the control with the higher setting interlocked to shut off the main fuel supply, except that manual reset on the high temperature limit control must not be required on an automatic package boiler not exceeding 400,000 Btu/h input and that has been approved by an approved testing agency. Every automatic hot water heating, power boiler, and package hot water supply boiler exceeding 400,000 Btu/h input must be equipped with one low water level limit control with a manual reset interlocked to shut off the fuel supply installed to prevent damage to the boiler and to permit testing of the control without draining the heating system.

[9] Every automatic low pressure steam heating boiler, small power boiler, and power steam boiler must be equipped with two high-steam pressure limit controls interlocked to shut off the fuel supply to the main burner with manual reset on the control with the higher setting and two low water level limit controls, one of which must be provided with a manual reset device and independent of the feed water controller.

[10] Boiler groups A, B, C, D, E, F, G, and H must use

approved safety shutoff valves for the main burner fuel shutoff that must be interlocked to the flame safeguard control devices required under UMC Chapter 25. On oil burners where the safety shutoff valves will be subjected to pressures in excess of ten pounds per square inch when the burner is not firing, relief valves must be provided. Proof of closing valves must be provided for boiler groups C and D of over 1,000,000 Btu/h. The requirements in NFPA 85-A may be used for boilers of groups D and H with Btu/h input of over 12,500,000.

[11] Control and limit device systems must be grounded with operating voltage not to exceed 150 volts. Control and limit devices must interrupt the ungrounded side of the current. A readily accessible means of manually disconnecting the control circuit must be provided with controls so arranged that when they are de-energized the burner must be inoperative.

1346.2201 SECTION 2201.

UMC Appendix B, Section 2201, is amended to read as follows:

Section 2201. This chapter governs the installation or repair of fuel or gas burning systems, fuel or gas burners, fuel or gas burning equipment, and fuel or gas piping systems in connection with a building or structure or within the property lines of premises, other than service pipe.

1346.2202 SECTION 2202.

UMC Appendix B, Section 2202, is amended by deleting in their entirety the definitions of "high-distribution pressure" or "second-state pressure" and medium pressure" and by adding the following definitions in their proper sequence:

"Fuel gas burner" means a device to convey fuel or gas into the combustion chamber or zone of a furnace, boiler, device, or appliance in close proximity to its combustion air supply to permit a stable controlled heat release compatible with the burner and systems design.

"Fuel gas burning system" means a system of burners and the systems for conveying fuel gas to burners for any purpose, piping and accessories for natural gas, manufactured gas, and

liquefied petroleum gas. If required, a vent system to dispose of products of combustion is a part of the fuel gas burning system.

"High pressure gas" means gas in a piping system that operates at pressures exceeding a 14-inch water column.

"Liquefied petroleum gas," "LPG," or "LP gas" means and includes a material in either the liquid or gaseous state composed predominantly of any of the following hydrocarbons or mixtures of them: propane, propylene, normal butane or isobutane, and butylenes.

"Low pressure gas" means gas in a piping system that operates at pressures of 14-inch or less water column.

1346.2205 SECTION 2205.

UMC Appendix B, Section 2205, is amended to read as follows:

Section 2205. Gas piping must not be strained or bent and appliances may not be supported by or develop strain or stress on supply piping. Gas piping supplying appliances designed to be supported by the piping may be used to support appliances when installed according to the manufacturer's instructions.

1346.2206 SECTION 2206.

UMC Appendix B, Section 2206(c), items 1 and 2, are amended to read as follows:

1. Rough piping inspection. The inspection must be made after gas piping authorized by the permit has been installed and before any piping has been covered or concealed or any fixture or appliance has been attached. The inspection must include a determination that the gas piping size, material, and installation meet the requirements of this chapter. The inspection must include an air pressure test at which time the fuel piping used must stand a pressure of not less than 25 psig, for at least 12 hours but not less than 1-1/2 times the working pressure. Tests must be made using air pressure or other approved means and must be made in the presence of the building official or the official's representative. Necessary apparatus for conducting the test must be furnished by the permit holder.



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2. Final piping inspection. The inspection must be made after piping authorized by the permit has been installed, after all parts that are to be covered or concealed are concealed, and after fixtures, appliances, or shutoff valves have been attached.

1346.2211 SECTION 2211.

UMC Appendix B, Section 2211(f), is amended to read as follows:

(f) Meter location. Gas meters must not be located under a show window or under interior stairways or in engine, boiler, heater, or electric meter rooms. If not prohibited by other regulations, gas meters may be located in the open under exterior stairways. Gas meters must be placed at least three feet from any source of ignition.

1346.2212 SECTION 2212.

UMC Appendix B, Section 2212, is amended to read as follows:

Section 2212. Pipe used for the installation, extension, alteration, or repair of gas piping must be standard weight wrought iron, galvanized or black steel, copper, or brass of full weight standard gauge and thickness, and must comply with either ANSI/ASTM-A-53 or A-120 standards, as applicable (see NFPA-54-1988 Sect. 2.6.2). Copper and brass pipe must comply with ANSI/ASTM D2420. Steel piping run outside exposed above ground must be galvanized or coated with an approved rust resistant material. Fittings for screw or flange piping, except stopcocks and valves, must be malleable iron or steel. Copper tubing must be of standard type K or L, or equivalent, complying with ASTM specifications.

Joints must be made by approved flared gas fittings or by brazing with a material having a melting point in excess of 1,000 degrees Fahrenheit. Compression-type fittings must not be used for this purpose.

Copper or iron tubing must not be used for piping within the burner zone of the burners.

Gas pipe must be new or may have been used previously for conveying gas. It must be in good condition, clean, and free



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from internal obstructions. Burred ends must be reamed to the full bore of the pipe.

Valves and appurtenances for gas piping must be designed and approved for use with fuel gas.

1346.2213 SECTION 2213.

UMC Appendix B, Section 2213, is amended to read as follows:

Section 2213. (a) Joints. Joints in the piping system, unless welded, must be screwed joints having approved standard threads. Screwed joints must be made with approved pipe joint material, insoluble in fuel gas, and applied to the male threads only. Piping 2-1/2 inches or larger must have welded joints.

(b) Location. Gas piping must not be installed in or on the ground under a building or structure and exposed gas piping must be kept at least six inches above grade or structure. Concealed, unprotected gas piping may be installed above grade in approved recesses or channels.

EXCEPTIONS: 1. If necessary due to structural conditions, approved-type gas piping may be installed in other locations if permission has been first obtained from the building official.

2. If gas piping is to be run in false ceilings and the space is to be used as an air plenum, the piping must have all connections made by welding or brazing. No valves, threads, unions, or connectors are permitted.

(c) Drip tees. Drip tees comprised of a tee fitting with the bottom outlet capped must be installed at the base of supply piping dropping down to an automatically controlled gas burner or appliance, before any regulator or automatic gas valve, and ahead of all pounds-to-inches pressure regulators. The tee must be installed so that the gas enters the tee from the top and leaves at a 90 degree angle from the inlet.

(d) Corrosion and covering protection. Ferrous gas piping installed underground in exterior locations must be protected from corrosion by approved coatings or wrapping materials. Horizontal metallic piping must have at least six inches of earth cover or equivalent protection.

(e) Corrosion isolation. If soil conditions present a corrosion problem, underground ferrous gas piping must be electrically isolated from the rest of the gas system with listed isolation fittings installed at least six inches above grade.

(f) [Unchanged.]

(g) Building shutoff. If meters are installed inside the building, a main shutoff valve must be installed in a readily accessible location inside the building on the street side of the meter.

If a meter or meters are installed on the exterior of the building walls, a main shutoff valve the same as the main building gas supply must be installed on the inside of the building between the meter and the first branch gas line. The shutoff valve must be installed in the first readily accessible location for use and operation and must have a permanently attached handle. In multiple dwellings, the main shutoff valve must not be located in an apartment or locked room, but must be in the utility room or otherwise located to be readily accessible to all occupants of the building at all times.

All main shutoff valves must be approved, lubricated plug-type, ball-type, or of a type approved by the administrative authority. Main shutoff valves controlling several gas piping systems must be placed an adequate distance from each other so they will be easily accessible for operation and must be installed to be protected from physical damage. Each valve must be plainly marked with a metal tag attached by the installing contractor so that the gas piping system supplied through it can be readily identified. A shutoff valve must be installed at every location where safety, convenience of operation, and maintenance demands.

In multiple tenant buildings supplied through a master meter or one service regulator when a meter is not provided, or where meters or service regulators are not readily accessible from the appliance location, an individual shutoff valve for each apartment or for each separate house line must be provided

in an accessible location.

(h) and (i) [Unchanged.]

(j) Valves. Valves used in connection with gas piping must be of approved types, including, but not limited to, approved lubricated plug-type, ball-type, or a type approved by the building official.

Gas valves must be of the lever handle type and be installed in the piping system serving each appliance, located within easy reach of the appliance. For inputs exceeding 1,000,000 Btu/h or where metering or regulating pressure exceeds 14 inches water column, the valve must be an approved, lubricated plug-type, ball-type, or of a type approved by the building official.

(k) and (l) [Unchanged.]

(m) [Deleted in its entirety.]

(n) [Unchanged.]

1346.2215 SECTION 2215.

UMC Appendix B, Section 2215, is amended to read as follows:

Section 2215. In addition to the requirements of this chapter for gas piping, the facilities and piping for use with liquefied petroleum gas must ~~comply with Minnesota Rules, part 7510.3260.~~ meet the following requirements:

Liquefied petroleum gas facilities must conform to approved standards. Liquefied petroleum gas facilities and their locations must be approved by the building official and must conform to state and local fire-prevention regulations.

Where liquefied petroleum gas facilities serve more than one customer through separate piping systems, each system must be identified in a manner satisfactory to the building official.

Liquefied petroleum gas facilities must be so placed as to be readily accessible for inspection, reading, testing, and shutting off the gas supply. Service piping and main supply shutoff valves must be outside of the building. Main supply valves must be of approved type and readily accessible.

Gas piping inlets must be located with respect to the



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proposed liquefied petroleum gas facility location in accordance with the requirements of this section.

Pipe-joint compounds used on threaded connections must be insoluble in liquefied petroleum gas.

Every valve and appurtenance used in liquefied petroleum gas systems must be designed and approved for use with liquefied petroleum gas.

Discharge from relief valves must be not less than five feet horizontally away from any opening into a building which is below the discharge.

LP gas appliances, applications, and installations must be in accordance with the rules of the Minnesota State Fire Marshall and this code.

1346.2216 SECTION 2216.

UMC Appendix B, Section 2216, is amended to read as follows:

Section 2216. Leaks. Leaks in gas or fuel piping must be located by applying soapy water to the exterior of the piping or by using a meter leak test to locate the leaks.

Fire or acids must not be used to locate or repair leaks. Substances other than air or inert gas, such as nitrogen, may not be introduced into the gas or fuel piping. It is unlawful to introduce halogenated hydrocarbons such as freon into a gas piping system or a fuel piping system.

It is not permissible to repair defects in gas or fuel piping systems or fittings. After a leak is located, the defective pipe or fittings must be removed and replaced with sound materials.

1346.2220 SECTION 2220.

UMC Appendix B, Section 2220, is amended to read as follows:

Section 2220. (a) General. Approval of the building official and verification from the serving gas or fuel supplier of the availability of the desired pressure must be obtained before a high pressure gas or fuel piping system is installed.

(b) Applicability. This part applies to high pressure gas or fuel piping systems.



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(c) Pressure regulators. Approved regulators must be installed on high pressure gas or fuel piping systems, in approved locations either outside the building or when vented to the outside, in nonhazardous, well ventilated interior locations, and must be readily accessible for servicing. Each regulator must have a separate vent to the outside.

EXCEPTIONS: Pounds-to-inches water column regulators installed at the appliance location and equipped with limiting orifices capable of releasing not more than five cubic feet of gas per hour when supplied with five pounds per square inch pressure need not be vented to an outside location if the appliance regulators have been approved by the building official. These appliance regulators, when installed at each appliance location, must:

1. be connected to the same piping material used to pipe the structure (a listed gas connector may be used to attach the low pressure piping downstream of the regulator to the appliance manifold);

2. have an approved gas valve in the supply line upstream of the pcunds-to-inches water column regulator;

3. be accessible;

4. have the upstream pressure identified by a metal tag permanently attached to the regulator stating: "Warning! 1/2 to 5 pounds natural gas pressure. DO NOT REMOVE"; and

5. be installed in a location that communicates with a ventilated area.

An approved gas valve must be installed immediately preceding each regulator. Regulators that may be subjected to mechanical damage must be substantially protected to the satisfaction of the building official.

(d) Three or five psig. Tables Nos. 22-F and 22-G may be used to size a natural gas piping system carrying three or five psig gas. The procedure to determine the size of each section of the system is similar to that in UMC Section 2219 using the pipe length from the meter to the most remote regulator and sizing the downstream low pressure piping from Table No. 22-D.



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(e) [Unchanged.]

(f) Corrosion and cover protection. Buried gas piping must be protected from corrosion as required by UMC Section 2213 and must have a minimum earth cover of six inches. Piping must be covered with at least six inches of hand-placed selected backfill devoid of rocks, building materials, or other matter that may damage the pipe or wrapping.

1346.2226 TABLES NOS. 22-D-1; 22-D-2; 22-D-3; AND 22-D-4.

Subpart 1. UMC Appendix B, Chapter 22, is amended by adding Table 22-D-1 to read as follows:

| Length in Feet | NOMINAL IRON PIPE SIZE, INCHES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 4 |
| 10 | 132 | 278 | 520 | 1050 | 1600 | 3050 | 4800 | 8500 | 17500 |
| 20 | 92 | 190 | 350 | 730 | 1100 | 2100 | 3300 | 5900 | 12000 |
| 30 | 73 | 152 | 285 | 590 | 890 | 1650 | 2700 | 4700 | 9700 |
| 40 | 62 | 130 | 245 | 500 | 760 | 1450 | 2300 | 4100 | 8300 |
| 50 | 56 | 115 | 215 | 440 | 670 | 1270 | 2000 | 3600 | 7400 |
| 60 | 50 | 105 | 196 | 400 | 610 | 1150 | 1850 | 3250 | 6800 |
| 70 | 46 | 96 | 180 | 370 | 560 | 1050 | 1700 | 3000 | 6200 |
| 80 | 43 | 90 | 170 | 350 | 530 | 990 | 1600 | 2800 | 5800 |
| 90 | 40 | 84 | 160 | 328 | 498 | 930 | 1500 | 2600 | 5400 |
| 100 | 38 | 79 | 150 | 308 | 468 | 870 | 1400 | 2500 | 5100 |
| 125 | 34 | 72 | 135 | 275 | 410 | 780 | 1250 | 2200 | 4500 |
| 150 | 31 | 64 | 120 | 250 | 380 | 710 | 1130 | 2000 | 4100 |
| 175 | 28 | 59 | 110 | 228 | 350 | 650 | 1050 | 1850 | 3900 |
| 200 | 26 | 55 | 100 | 210 | 320 | 610 | 980 | 1700 | 3500 |

Subp. 2. UMC Appendix B, Chapter 22, is amended by adding Table No. 22-D-2 to read as follows:

| Length in Feet | NOMINAL PIPE OR I. D. TUBING SIZE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ¼ | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 4 |
| 5 | 146 | 280 | 750 | 1080 | 2300 | 3450 | 7000 | 11200 | 20000 | 42000 |
| 10 | 98 | 187 | 500 | 760 | 1550 | 2450 | 4950 | 9000 | 14200 | 29600 |
| 15 | 78 | 148 | 398 | 620 | 1300 | 2000 | 4000 | 6500 | 11500 | 24000 |
| 20 | 66 | 128 | 328 | 520 | 1100 | 1700 | 3450 | 5600 | 10000 | 21000 |
| 25 | 59 | 108 | 288 | 440 | 900 | 1400 | 2850 | 4600 | 8300 | 17000 |
| 30 | 54 | 94 | 225 | 380 | 790 | 1200 | 2500 | 4000 | 7200 | 14500 |
| 40 | 46 | 74 | 200 | 348 | 700 | 1100 | 2200 | 3550 | 6350 | 13000 |
| 50 | 40 | 67 | 180 | 316 | 640 | 1000 | 2000 | 3250 | 5800 | 12000 |
| 60 | 37 | 61 | 165 | 290 | 600 | 920 | 1850 | 3000 | 5400 | 11000 |
| 70 | 33 | 57 | 155 | 270 | 560 | 860 | 1750 | 2800 | 5060 | 10400 |
| 80 | 30 | 53 | 145 | 255 | 520 | 810 | 1650 | 2650 | 4750 | 9700 |
| 90 | 28 | 50 | 134 | 240 | 500 | 770 | 1580 | 2500 | 4500 | 9200 |
| 100 | 26 | 44 | 118 | 218 | 460 | 680 | 1400 | 2250 | 4000 | 8400 |
| 150 | 21 | 36 | 108 | 186 | 410 | 630 | 1280 | 2060 | 3650 | 7600 |
| 175 | 19 | 33 | 97 | 180 | 380 | 580 | 1190 | 1900 | 3400 | 7000 |
| 200 | 18 | 34 | 90 | 170 | 358 | 540 | 1100 | 1780 | 3200 | 6600 |
| 250 | 16 | 30 | 78 | 150 | 315 | 480 | 980 | 1600 | 2850 | 5900 |
| 300 | 14 | 28 | 71 | 140 | 285 | 440 | 900 | 1460 | 2600 | 5400 |



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| Length in Ft. | NOMINAL PIPE OR I. D. TUBING SIZE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ¼ | ⅜ | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 4 |
| 5 | 190 | 440 | 850 | 2200 | 2800 | 6000 | 9200 | 19000 | 30000 | 54000 | 110M |
| 10 | 128 | 296 | 570 | 1540 | 2000 | 4200 | 6500 | 13000 | 20000 | 38000 | 80000 |
| 15 | 103 | 238 | 450 | 1200 | 1650 | 3400 | 5300 | 10900 | 17500 | 31000 | 64000 |
| 20 | 88 | 208 | 380 | 1030 | 1400 | 2900 | 4600 | 9300 | 15000 | 27000 | 55000 |
| 30 | 67 | 169 | 308 | 830 | 1150 | 2400 | 3700 | 7000 | 12000 | 22000 | 45000 |
| 40 | 57 | 128 | 256 | 700 | 1000 | 2100 | 3200 | 6500 | 10500 | 19000 | 39000 |
| 50 | 50 | 117 | 228 | 610 | 900 | 1850 | 2850 | 5900 | 9400 | 17000 | 35000 |
| 60 | 46 | 108 | 208 | 550 | 820 | 1700 | 2600 | 5400 | 8600 | 15500 | 31000 |
| 70 | 41 | 98 | 188 | 500 | 780 | 1600 | 2470 | 5000 | 8000 | 14000 | 29500 |
| 80 | 38 | 88 | 173 | 470 | 710 | 1500 | 2250 | 4700 | 7500 | 13000 | 27500 |
| 90 | 35 | 84 | 163 | 440 | 660 | 1400 | 2150 | 4400 | 7000 | 12500 | 26000 |
| 100 | 34 | 78 | 153 | 410 | 625 | 1300 | 2000 | 4150 | 6700 | 12000 | 25000 |
| 125 | 30 | 68 | 135 | 360 | 570 | 1150 | 1800 | 3700 | 6000 | 10500 | 22000 |
| 150 | 27 | 63 | 123 | 328 | 520 | 1080 | 1650 | 3400 | 5400 | 9600 | 20000 |
| 175 | 25 | 58 | 113 | 308 | 480 | 1000 | 1550 | 3100 | 5000 | 9000 | 18500 |
| 200 | 23 | 53 | 108 | 280 | 450 | 940 | 1450 | 2900 | 4750 | 8400 | 17000 |
| 250 | 20 | 47 | 90 | 240 | 400 | 850 | 1300 | 2600 | 4300 | 7500 | 15500 |
| 300 | 18 | 43 | 81 | 220 | 370 | 760 | 1150 | 2400 | 3900 | 7000 | 14000 |

Subp. 4. UMC Appendix B, Chapter 22, is amended by adding Table No. 22-D-4 to read as follows:

| Length in Ft. | NOMINAL PIPE OR I. D. TUBING SIZE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ¼ | ⅜ | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 4 |
| 5 | 540 | 1280 | 2400 | 6500 | 10500 | 21000 | 31000 | 58000 | 90000 | 150M | 310M |
| 10 | 360 | 850 | 1630 | 4350 | 7600 | 15000 | 22000 | 41000 | 64000 | 110M | 220M |
| 15 | 285 | 670 | 1280 | 3450 | 6200 | 12000 | 18000 | 34000 | 52000 | 90000 | 180M |
| 20 | 240 | 570 | 1080 | 2950 | 5400 | 10500 | 15000 | 29000 | 45000 | 790M | 150M |
| 30 | 192 | 456 | 860 | 2300 | 4400 | 8600 | 13000 | 24000 | 36000 | 630M | 125M |
| 40 | 168 | 380 | 730 | 2000 | 3800 | 7500 | 11000 | 20000 | 32000 | 55510 | 110M |
| 50 | 148 | 333 | 648 | 1750 | 3350 | 6700 | 9800 | 18000 | 2?000 | 49000 | 97000 |
| 60 | 130 | 308 | 580 | 1560 | 3050 | 6100 | 9000 | 17000 | 25000 | 45900 | 90000 |
| 70 | 118 | 275 | 530 | 1430 | 2800 | 5600 | 8200 | 15000 | 24000 | 41000 | 82000 |
| 80 | 110 | 255 | 488 | 1330 | 2650 | 5200 | 7700 | 14000 | 22000 | 3?000 | 77000 |
| 90 | 102 | 240 | 460 | 1230 | 2500 | 4900 | 7200 | 13500 | 21000 | 36500 | 72000 |
| 100 | 96 | 228 | 430 | 1160 | 2350 | 4700 | 6900 | 12500 | 20000 | 34500 | 70000 |
| 125 | 85 | 198 | 380 | 1025 | 2100 | 4150 | 6100 | 11300 | 1?000 | 31000 | 62000 |
| 150 | 78 | 178 | 340 | 920 | 1900 | 3800 | 5600 | 10400 | 16000 | 28400 | 56000 |
| 175 | 69 | 164 | 315 | 845 | 1800 | 3550 | 5200 | 9700 | 15500 | 20000 | 53000 |
| 200 | 64 | 148 | 290 | 790 | 1700 | 3300 | 4900 | 9000 | 14000 | 24000 | 49000 |
| 250 | 58 | 140 | 255 | 690 | 1500 | 2950 | 4300 | 8100 | 12500 | 22600 | 44000 |
| 300 | 51 | 120 | 230 | 620 | 1350 | 2700 | 4000 | 7400 | 11500 | 19000 | 40000 |

1346.2500 CHAPTER 25.

UMC Appendix B is amended by adding a new chapter to read as follows:

Chapter 25

INSTALLATION AND TESTING OF GAS- OR FUEL-FIRED EQUIPMENT

Subpart 1. SECTION 2501.

Section 2501. General. Chapter 25 governs the installation and testing or repair of gas or fuel burning systems, gas or fuel burners, gas or fuel burning equipment, and gas or fuel piping systems used in connection with buildings or structures or within the property lines of the premises.

Subp. 2. SECTION 2502.

Section 2502. Standards. The standards to be used in conjunction with this chapter are the appropriate standards published by ANSI/UL-1984, NFPA 54-1988, and NFPA 85A-1987.

Subp. 3. SECTION 2503.



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Section 2503. Use of approved equipment. Only approved gas or fuel burning equipment may be used. "Approved" means acceptable to the administrative authority as to design, equipment, installation, or intended use as required by the UMC. Devices listed for a specific purpose by an approved testing agency may be considered as meeting the requirements of the UMC.

Subp. 4. SECTION 2504.

Section 2504. Placing equipment in operation. After completion of all installations, the installer shall test all safety and operating controls and venting before placing the burner in service. The correct input of fuel must be determined and the fuel-to-air ratio set. Each gas or fuel burner must be adjusted to its proper input according to the manufacturer's instructions. Overrating of burners is prohibited.

1. The rate of flow of the gas or fuel must be adjusted to within plus or minus two percent of the required Btu/h rating at the manifold pressure specified by the manufacturer. When the prevailing pressure is less than the manifold pressure specified, the rates must be adjusted at the prevailing pressure.

2. For conversion burners installed in hot water boilers or warm air furnaces, the rate of flow of the gas or fuel in Btu/h must be adjusted to within plus or minus five percent of 1.7 times the calculated Btu/h heat loss of the building in which it is installed.

3. For conversion burners installed in steam boilers, the gas or fuel hourly input demand must be adjusted to meet the steam load requirements. The gas or fuel input demand necessitated by an oversized boiler must be established and added to the input demand for load requirements to arrive at a total input demand.

Subp. 5. SECTION 2505.

Section 2505. Pilot operation. Pilot flames must be effective to ignite the gas or fuel at the main burner or burners and must be adequately protected from drafts. Pilot flames must not become extinguished when the main burner or burners are turned on or off in a normal manner either manually

or by automatic controls.

Subp. 6. SECTION 2506.

Section 2506. Burner operation. In making the tests to determine compliance with this section, care must be exercised to prevent the accumulation of unburned gas or fuel in the appliance or flues that might result in explosion or fire.

1. The flames from each burner must freely ignite the gas or fuel from adjacent burners when operating at the prevailing gas or fuel pressure and when the main control valve is regulated to deliver at one-third the full gas or fuel rate.

2. Burner flames must not flash back after immediate ignition nor after turning the fuel cock until the flow rate to the burner is one-third the full supply.

3. Burner flames must not flash back when the gas or fuel is turned on or off by an automatic control mechanism.

4. Main burner flames must ignite freely from each pilot when the main control valve is regulated to one-third the full gas or fuel rate or when the pilot flame is reduced to a minimum point at which it will actuate the safety device.

5. When ignition is made in a normal manner, the flame must not flash outside the appliance.

6. Burners must not expel gas or fuel through air openings when operating at prevailing pressure.

Subp. 7. SECTION 2507.

Section 2507. Method of test. 1. The appliance must be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products must be taken from the appliance flue outlet, ahead of the draft hood. The sample taken must be analyzed for carbon monoxide, carbon dioxide, and oxygen.

NOTE: Furnace designs incorporating induced draft assemblies may require a flue gas sample to be taken ahead of the inducer fan.

2. The venting, safety, and operating controls of the appliance must be checked by the installer to ensure their proper and safe operation.

3. After completion of the test of newly-installed gas or fuel burner equipment as provided in this section, the installer shall file with the building official complete records of the test on a form approved by the building official. A tag stating the date of the test and the name of the tester must be attached to the appliance at the main valve.

Subp. 8. SECTION 2508.

Section 2508. (a) The concentration of oxygen in the undiluted flue products of gas burners must in no case be less than four percent nor more than ten percent. The allowable limit of carbon monoxide must not exceed 0.04 percent.

The flue gas temperature of a gas designed appliance, as taken on the appliance side of the draft hood, must not exceed 480 degrees Fahrenheit above the room temperature surrounding the appliance.

The oxygen figures do not apply when there is an approved oxygen trim system on the burner that is designed for that use, including a combustion interlock.

Performance standards for atmospheric burners must meet the following requirements:

1. minimum of 74 percent efficiency as determined by flue gas analysis method at appliance flue outlet;

2. carbon monoxide concentration in flue gas not greater than 0.04 percent;

3. stack temperature not greater than 480 degrees Fahrenheit, plus ambient;

4. carbon dioxide concentration between six and nine percent; and

5. oxygen concentration between four and ten percent.

(b) Gas or fuel burners over 1,000,000 Btu/h input must be tested in the presence of the building official in a manner set forth by the administrative authority before the installation is approved. Testing must include safety and operating controls, input, flue gas analysis, and venting. Flue gas must be tested at high and low fires. Provisions must be made in the piping system to allow firing test in warm weather.

(c) Installation of oxygen trim systems, modulating dampers, or other draft control or combustion devices must require a supervised startup as in (b).

(d) Direct fired heaters must require a supervised startup as in (b).

(e) The wiring diagram of the installation and suitable operating instructions must be supplied and posted near the appliance.

(f) Gas pressure regulators are required on all installation of gas burning equipment. Regulators must be installed consistent with the listing and approval of the unit. All gas regulators must be designed to regulate gas at a pressure of not less than the protected metering pressure. All pounds-to-pounds and pounds-to-inches regulators must be of a full lockup type. Regulator vents must not be vented into a combustion chamber. All regulators must be vented to the outside of the building, except that regulators equipped with and approved for use with vent limiting devices to limit the escape of gas from the vent opening in the event of diaphragm failure may be used without outside vents when approved.

(g) All regulator installations must comply with the following:

1. regulators must be installed according to the manufacturer's instructions;

2. regulators must be rated to supply the total load required;

3. regulators must be exposed and readily accessible for servicing and in no case may regulators be covered by a ceiling or other unventilated construction; and

4. regulators must be provided with an accessible shutoff valve and union for servicing. When regulators are required to be vented to the outside of the building, vent piping must be sized according to the manufacturer's instructions. Vent piping must terminate a minimum of six feet away from any combustion or air inlet to the building and must be suitably screened and hooded to prevent accidental closure of the vent pipe.

Regulators must be vented individually unless otherwise approved by the building official. Regulator vents must not terminate into a vent connector, breeching stack, chimney, or combustion chamber.

Subp. 9. SECTION 2509.

Section 2509. Special requirements based on Btu/h input.

(a) 0 to 400,000 Btu/h per burner:

1. one approved manual shutoff valve with lever handle;

2. an approved regulator vented to the outside or with an approved vent limiter;

3. a flame safety pilot control capable of providing 100 percent shutoff in the event of flame or pilot failure;

4. two controls, one operating and one high limit, activated by temperature or pressure, as appropriate; and

5. approved automatic safety shutoff valve to provide 100 percent shutoff.

(b) All installations over 400,000 Btu/h must include the following basic controls:

1. two controls, one operating and one high limit, actuated by temperature or pressure, as appropriate;

2. one high gas or fuel pressure interlock manual reset;

3. if hot water or steam, one low water cutoff;

4. one electronic flame safeguard pilot control;

5. a separately supervised and proven pilot, 100 percent shutoff;

6. for power burners, a fuel/air interlock fan proving switch; and

7. for atmospheric burners and power burners, a combustion air damper proving switch.

(c) Additional controls based on 400,000 to 999,999 Btu/h must be as follows:

1. one manual shutoff with lever handle;

2. a regulator full lockup type, vented outside;

3. two safety shutoff valves in series, maximum five seconds closing time;

4. a manual firing cock;

5. a programmed flame safeguard control with manual reset lockout; and

6. power burners must include proven prepurge.

(d) Controls based on 1,000,000 to 2,499,000 Btu/h input must be as follows:

1. one manual shutoff with lever handle;

2. a regulator full lockup type, vented outside;

3. two safety shutoff valves in series, five seconds maximum closing time, with one valve being solenoid or hydro type and a second valve being hydro type with proof of closure, and neither valve being modulating, diaphragm, or butterfly type;

4. low gas or fuel pressure interlock, manual reset;

5. leak test port;

6. burner pressure test port;

7. separate firing rate control valve;

8. manual firing cock;

9. programmed electronic flame safeguard, including manual reset lockout, 100 percent shutoff, separately safety supervised, and proved pilot, with power burners including a proven purge of at least four air changes before trial for ignition and after lockout at high fire damper setting at least 90 seconds minimum;

10. high limit must be manual reset; and

11. if steam or hot water, two low water cutoffs, with one being a manual reset.

(e) Controls based on 2,500,000 Btu/h input and above must be as follows:

1. manual shutoff valve with lever handle;

2. regulator full lockup type, vented outside;

3. two hydro type safety shutoff valves in series, maximum one second closing time, in event of flame failure, with one valve having proof of closure and neither valve being modulating, butterfly, diaphragm, or solenoid type;

4. low gas or fuel pressure interlock, manual reset;

5. high gas or fuel pressure interlock, manual reset;



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6. leak test port;

7. separate firing rate control valve;

8. manual firing cock;

9. burner pressure test port;

10. programmed flame safeguard, including proved low fire start, manual reset lockout, 100 percent shutoff, separately safety supervised, and proved pilot; and

11. power burners must include a proven purge of at least four air changes before trial for ignition and after lockout at high fire dampers setting at least 90 seconds minimum.

Subp. 10. SECTION 2510.

Section 2510. Equipment information. (a) All installations of gas or fuel burners with a consumption of over 400,000 Btu/h and all combination gas or fuel burners must be approved before installation. The following information must be supplied as required by the building official:

1. name, model, and serial number of the burner;

2. input rating and type of fuel;

3. name of the nationally recognized testing laboratory that tested and listed the unit;

4. name, model, and serial number of furnace or boiler that the burner will be installed in if not part of a complete package;

5. complete wiring diagram showing the factory and fuel wiring installed or to be installed including all controls, identified by the brand name and model number; and

6. a print of the gas or fuel train from the manual shutoff to the appliance showing all controls that will be installed, their names, model numbers, and approvals.

(b) All installations of gas or fuel burners over 400,000 Btu/h and all combination gas and oil or other combination fuel burners that are installed in new or renovated boiler or equipment rooms or are installed in a package with the boiler or furnace must include the following information, in addition to that required in item (a), subitems 1 to 6, for approval before installation:

1. a complete piping diagram from the supply source showing all components and materials identified by brand name and model number with relevant approvals;

2. detailed provisions for combustion air, venting, and stacks; and

3. a floor plan drawn to scale showing all relevant equipment. Contractors must receive approval of a plan or specifications or both before proceeding with an installation.

1346.2600 CHAPTER 26.

UMC Appendix B is amended by adding a new chapter to read as follows:

Chapter 26

INSTALLATION AND TESTING OF OIL- OR FUEL-FIRED EQUIPMENT

Subpart 1. SECTION 2601.

Section 2601. General. This chapter governs the installation, testing, or repair of oil or fuel burners, oil or fuel burning systems, oil or fuel burning equipment, and the oil or fuel piping systems used in connection with buildings or structures and equipment within the property lines of the premises.

Subp. 2. SECTION 2602.

Section 2602. Accepted practices. The installation, testing, and repair of oil or fuel burning equipment systems must comply with the standards in UMC Appendix C and other information outlined in the UMC such as, but not limited to, combustion air, flue requirements, room clearance, and controls.

Subp. 3. SECTION 2603.

Section 2603. Definitions. Except as defined in this chapter or in UMC, Section 402, words used in this chapter have the meanings given in the Uniform Building Code and Webster's Third New International Dictionary of the English Language, Unabridged, copyright 1981.

The definitions in this subpart apply to the oil- or fuel-fired equipment requirements. Certain definitions in part 1346.3002 may also apply to this section.

1. "Antiflooding device" means a primary safety control that causes the flow of oil or fuel to be shut off after a rise in oil or fuel level or after receiving excess oil or fuel, and that operates before the hazardous discharge of oil or fuel can occur.

2. "Burner, automatically ignited" means a burner equipped so that main burner fuel may be turned on and ignited automatically.

3. "Burner, manually ignited" means a burner equipped so that main burner fuel is turned on only by hand and ignited under supervision.

4. "Burner, mechanical draft type" means a burner that includes a power-driven fan, blower, or other mechanism as the primary means for supplying the air for combustion.

5. "Burner, natural draft type" means a burner that depends primarily on the natural draft created in the chimney or venting system to induce air required for combustion into the burner.

6. "Constant level valve" means a device for maintaining within a reservoir a constant level of oil fuel for delivery to an oil burner.

7. "Control limit" means an automatic safety control responsive to changes in fluid flow or level, pressure, or temperature, and that is normally set beyond the operating range for limiting the operation of the controlled equipment by shutting off the energy supply.

8. "Control, safety" means automatic controls including relays, switches, and other auxiliary equipment used in conjunction with them to form a safety control system that are intended prevent unsafe operation of the controlled equipment.

9. "Draft booster" means a power operated fan, blower, or other device installed in the chimney connector to increase the natural draft developed in the connected chimney.

10. "Draft regulator, barometric" means a device built into a fuel burning appliance or made part of a chimney connector or vent connector that functions to reduce excessive

draft through an appliance to a desired value by admitting ambient air into the appliance chimney, chimney connector, vent, or vent connector.

11. "Fuel oil" means any hydrocarbon oil as specified by ASTM D396, or the Canadian Government Specification Board, 3-GP-28, and having a flash point of not less than 100 degrees Fahrenheit.

12. "Indirect-fired appliance" means an oil or fuel burning appliance in which products of combustion (flue gases) are not mixed in the appliance with the air or other medium being heated.

13. "Installation" means the complete setting in place, ready for operation, of oil or fuel burning equipment with its accessories and equipment.

14. "Labeled" means having attached a label, symbol, or other identifying mark of an organization acceptable to the building official and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

15. "Listed" See UMC, Section 414.

16. "Oil or fuel burner" means a device for burning oil or fuel in heating appliances such as boilers, furnaces, water heaters, and ranges. It may be a pressure atomizing gun type, a horizontal or vertical rotary type, or a mechanical or natural draft vaporizing type.

17. "Oil or fuel burning equipment" means an oil or fuel burner of any type with its tank, piping, wiring, controls, and related devices and including all oil or fuel burners, oil- or fuel-fired units, and heating and cooking appliances.

18. "Pump, automatic oil or fuel" means a pump, not an integral part of an oil or fuel burner, that automatically pumps oil or fuel from the supply tank and delivers the oil by gravity under a constant head to an oil burning appliance, and that is designed to stop pumping automatically in case of total breakage

of the oil or fuel supply line between the pump and the appliance.

19. "Pump, oil or fuel transfer" means an oil or fuel pump, automatically or manually operated, that transfers oil or fuel through continuous piping from a supply tank to an oil or fuel burning appliance or to an auxiliary tank, and that is not designed to stop pumping automatically in case of total breakage of the oil or fuel supply line between the pump and the appliance.

20. "Tank, auxiliary" means a tank having a capacity of not over 60 gallons listed for installation in the supply piping between a burner and its main fuel supply tank. It may be included as an integral part of an automatic pump, a transfer pump, or may be a separate tank.

21. "Tank, gravity" means a supply tank from which the oil or fuel is delivered directly to the burner by gravity.

22. "Tank, integral" means a tank that is furnished by the manufacturers as an integral part of an oil or fuel burning appliance.

23. "Tank, storage" means a separate tank that is not connected to the oil or fuel burning appliance.

24. "Tank, supply" means a separate tank connected directly or by a pump to the oil or fuel burning appliance.

25. "Tank, vacuum or barometric" means a tank not exceeding five gallons capacity that maintains a definite level of oil or fuel in a sump or similar receptacle by barometric feed. Fuel is delivered from the sump to the burner by gravity.

26. "Valve, manual oil or fuel shutoff" means a manually operated valve in an oil or fuel line for the purpose of turning on or completely shutting off the oil or fuel supply to the burner.

27. "Valve, oil or fuel control" means an automatically or manually operated device consisting essentially of an oil or fuel valve for controlling the fuel supply to a burner.

Subp. 4. SECTION 2604.

Section 2604. Approval of equipment. Oil or fuel burning

equipment must be approved. "Approved" means acceptable to the building official as to design, equipment, installation, or intended use as required by the UMC. Devices listed for a specific purpose by an approved testing agency may be considered as meeting the requirements of the UMC.

Subp. 5. SECTION 2605.

Section 2605. Installation of oil or fuel burning equipment. (a) General. The installation of oil or fuel burning equipment must be in keeping with the requirements of the appropriate ANSI/UL Standards, NFPA 31-1987, or the UMC.

(b) Placing equipment in operation. Following completion of all installation, the installer shall test all safety and operating and venting before placing the burner in service. The correct input of fuel must be determined and the fuel-to-air ratio set.

Each fuel burner must be adjusted to its proper input according to the manufacturer's instructions. Overrating of burners is prohibited.

(c) Conversion burners. For conversion burners installed in hot water boilers or warm air furnaces, the rate of flow of the fuel in Btu/h must be adjusted to within plus or minus five percent of 1.7 times the calculated Btu/h heat loss of the building in which it is installed.

For conversion burners installed in steam boilers, the fuel hourly input demand must be adjusted to meet the steam load requirements. The fuel input demand necessitated by an oversized boiler must be established and added to the input demand for load requirements to arrive at a total input demand.

(d) Pilot operation. Pilot flames must be effective to ignite the fuel at the main burner and must be adequately protected from drafts. Pilot flames must not become extinguished when the main burner is turned on or off in a normal manner either manually or by automatic controls.

(e) Burner operation. In conducting tests to determine compliance with the requirements of this section, care must be exercised to prevent the accumulation of unburned fuel in the

appliance that might result in an explosion or fire.

1. The flames from the burner must freely ignite the fuel when operating at the prevailing fuel pressure and when the main control valve is regulated to deliver at one-third the full fuel rate.

2. Burner flames must not flash back after immediate ignition nor after turning the fuel cock until the flow rate to the burner is one-third the full supply.

3. Burner flames must not flash back when the fuel is turned on or off by an automatic control mechanism.

4. Main burner flames must ignite freely from the pilot when the main control valve is regulated to one-third the full fuel rate or when the pilot flame is reduced to a minimum point that will actuate the safety device.

5. When ignition is made in a normal manner, the flame must not flash outside the appliance.

6. Burners must not expel fuel through air openings when operating at prevailing pressure.

(f) Method of test. The appliance must be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products must be taken from the appliance flue outlet ahead of the draft hood.

The sample taken must be analyzed for carbon monoxide, carbon dioxide, and oxygen.

NOTE: Furnace designs incorporating induced draft assemblies may require flue gas samples to be taken ahead of the inducer fan.

The venting, safety, and operating controls of the appliance must be checked by the installer to ensure proper and safe operation. After completion of the test of newly installed fuel burner equipment as provided in this section, the installer must file with the building official complete records of the test on a form approved by the building official. A tag stating the date of the test and the name of the tester must be attached to the appliance at the main appliance valve.

Oil- or fuel-fired equipment must have draft in water and

smoke samples taken.

Subp. 6. SECTION 2607.

Section 2607. Appliance performance. (a) The concentration of oxygen in the undiluted flue products of burners must not be less than four percent or more than ten percent. The flue gas temperature of oil or fuel designed appliances, as taken on the appliance side of the barometric damper, must not exceed 700 degrees Fahrenheit above that of the room temperature surrounding the appliance. Draft in water and smoke samples must also be taken.

Installation of appliances must meet the following performance standards:

1. minimum of 75 percent efficiency as determined by flue gas analysis method at appliance flue outlet;

2. stack temperature not greater than 700 degrees Fahrenheit, plus ambient;

3. carbon dioxide between eight and 13 percent;

4. oxygen between four and ten percent;

5. smoke test no higher than #2 for light oils, or #4 for heavier oils, over #4 oil;

6. draft not less than 0.01 inch water column over fire; and

7. monoxide not greater than 0.04 percent.

(b) Fuel burners over 1,000,000 Btu/h input must be tested in the presence of the building official in a manner set forth before the installation is approved.

Testing must include safety and operating controls, input, flue gas analysis, and venting. Flue gas must be tested at high and low fires. Provisions must be made in the piping system to allow firing in warm weather.

(c) Installation of oxygen trim systems, modulating dampers, or other draft control or combustion devices must require a supervised startup as in (b).

(d) The wiring diagram of the installation and suitable operating instruction must be supplied and posted near the appliance.

Subp. 7. SECTION 2608.

Section 2608. Special requirements based on Btu/h input.

(a) zero to five gallons oil per hour consumption:

1. one approved manual shutoff valve with lever handle;

2. a flame safeguard control capable of providing 100 percent shutoff in the event of flame or pilot failure;

3. two controls, one operating and one high limit, activated by temperature or pressure, as appropriate; and

4. approved automatic safety shutoff valve to provide 100 percent shutoff.

(b) over five gallons per hour consumption:

1. two controls, one operating and one high limit, actuated by temperature or pressure, as appropriate;

2. one electronic flame safeguard control, manual reset;

3. air fuel interlock fan proving interlock;

4. combustion air interlock;

5. atomizing medium proving switch;

6. two safety shutoff valves in series with a combined flame failure response and valve closing time not to exceed five seconds with strainer directly before the valve;

7. a separately supervised and proven pilot 100 percent shutoff, combined flame failure response, and valve closing time not to exceed five seconds. Direct spark ignition is allowed only in the case of #2 oil or lighter and if approved by the building official;

8. one manual shutoff valve;

9. low temperature oil or fuel switch for oil or fuel requirement preheating;

10. separate firing rate control valve;

11. oil pump must not operate or rotate while alternate fuel is firing;

12. proven purge of at least four air changes before trial for ignition and after lockout at high fire damper setting at least 90 seconds minimum;

13. pressure relief valve must be provided between safety shutoff valves and between pump and safety valves if an integral

valve is used with a pump;

14. there must be a relief device to prevent over pressure of oil or fuel train or oil or fuel piping components, which may be integral with a pump;

15. there must be a separate relief device on each transfer pump; and

16. high oil or fuel temperature interlock for oil or fuel requiring preheating.

(c) seven to ten gallons per hour consumption:

1. a low oil or fuel pressure switch, manual reset;

2. flame safeguard must be a programmed type with a manual reset proven low fire start; and

3. firing cock.

(d) ten gallons per hour or more consumption:

1. one high oil or fuel pressure switch, manual reset.

(e) 12,500,000 Btu/h or more consumption:

1. two oil or fuel valves in series, one with proof of closure combined with flame failure response, and with valve closing time not exceeding two seconds; and

2. compliance with NFPA 85-A-1987.

(f) Shutoff valve. All oil or fuel burner installations must include a nonelectric shutoff valve that is held open by a fuseable link designed to close at 165 degrees Fahrenheit, installed near the burner in the same room as the burner. This must prevent the flow of oil or fuel to the burner through the supply and return pipes.

Subp. 8. SECTION 2609.

Section 2609. Equipment information. (a) All installations of oil or fuel burners with consumption over five gallons per hour and all combination fuel burners must be approved before installation. The following information must be supplied as required by the building official:

1. name, model, and serial number of the burner;

2. input rating and type of fuel;

3. name of the nationally recognized testing laboratory that tested and listed the unit;

4. name, model, and serial number of furnace or boiler that the burner will be installed in if not part of a complete package;

5. complete wiring diagram showing the factory and fuel wiring installed or to be installed including all controls, identified by the brand name and model number; and

6. a print of the oil or fuel train from the manual shutoff to the appliance showing all controls that will be installed, their names, model numbers, and approvals.

(b) All installations of oil or fuel burners consuming over three gallons per hour and all combination gas/oil or other combination fuel burners that are installed in new or renovated boiler or equipment rooms or are installed in a package with the boiler or furnace must include the following information in addition to that required in paragraphs 1 to 6 above, for approval before installation:

1. a complete piping diagram from the supply source showing all components and materials identified by brand name, and model number with relevant approvals;

2. provisions for combustion air, venting, and stacks must be completely detailed; and

3. a floor plan drawn to scale showing all relevant equipment. Contractors must receive approved plan and/or specifications before proceeding with an installation.

REPEALER. Minnesota Rules, parts 1345.0010 to 1345.3300, are repealed.



Approved
by Revisor _____