CHAPTER 1346

DEPARTMENT OF LABOR AND INDUSTRY

MINNESOTA MECHANICAL AND FUEL GAS CODES

MINNESOTA MECHANICAL CODE

CHAPTER 16
INSTALLATION AND TESTING OF OIL OR LIQUID FUEL-FIRED EQUIPMENT

MINNESOTA FUEL GAS CODE

MINNESOTA MECHANICAL CODE

1346.0050 TITLE; INCORPORATION BY REFERENCE.

Parts 1346.0050 to 1346.1500 are known and may be cited as the "Minnesota Mechanical Code."

Chapters 2 to 15 of the 2012 edition of the International Mechanical Code ("IMC"), promulgated by the International Code Council, Inc., Washington, DC, are incorporated by reference as part of the Minnesota Mechanical Code except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended in this chapter. Portions of this chapter reproduce excerpts from the 2012 IMC, International Code Council, Inc., Washington, DC, copyright 2012, reproduced with permission, all rights reserved.

The IMC is not subject to frequent change and a copy of the IMC with amendments for use in Minnesota is available in the office of the commissioner of labor and industry.

Chapters 1 to 10 and 12 to 15 of the 2014 edition of NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, promulgated by the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471, are incorporated by reference as part of the Minnesota Mechanical Code as amended in this chapter. As used in this code, "NFPA 96" means the NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations chapters that are incorporated into this code. Portions of this chapter reproduce text and tables from the NFPA 96. The NFPA 96 is copyrighted, 2014, by the National Fire Protection Association. All rights reserved.

The NFPA 96 is not subject to frequent change and a copy of the NFPA 96, with amendments for use in Minnesota, is available in the office of the commissioner of labor and industry.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *15 SR 71; 19 SR 1306; 29 SR 299; L 2007 c 140 art 1 s 1; art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0060 REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL (ICC) CODES.

Subpart 1. **General.** References to other codes and standards promulgated by the International Code Council in the IMC and IFGC are modified in subparts 2 to 11.

Subp. 2. **Building code.** References to the International Building Code mean the Minnesota Building Code, Minnesota Rules, chapter 1305, adopted pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

Subp. 3. **Residential code.** References to the International Residential Code mean the Minnesota Residential Code, Minnesota Rules, chapter 1309, adopted pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

Subp. 4. **Electrical code.** References to the International Code Council Electrical Code mean the Minnesota Electrical Code, Minnesota Rules, chapter 1315, adopted pursuant to Minnesota Statutes, section 326B.35.

Subp. 5. **Fuel gas code.** References to the International Fuel Gas Code mean the Minnesota Fuel Gas Code, Minnesota Rules, parts 1346.5050 to 1346.6014, adopted pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

Subp. 6. [Repealed, 39 SR 690]

Subp. 7. **Plumbing code.** References to the International Plumbing Code mean the Minnesota Plumbing Code, Minnesota Rules, chapter 4715, adopted pursuant to Minnesota Statutes, section 326B.106, subdivisions 1 and 2.

Subp. 8. **Private sewage disposal code.** References to the International Private Sewage Disposal Code mean the Minnesota Pollution Control Agency's minimum standards and criteria for individual sewage treatment systems Minnesota Rules, chapter 7080, adopted pursuant to Minnesota Statutes, chapters 103F, 103G, 115, and 116.

Subp. 9. **Energy conservation code.** References to the International Energy Conservation Code mean the Minnesota Residential Energy Code, Minnesota Rules, chapter 1322, and the Minnesota Commercial Energy Code, Minnesota Rules, chapter 1323, adopted pursuant to Minnesota Statutes, section 326B.115.

Subp. 10. **Property maintenance code.** References to the International Property Maintenance Code are deleted.

Subp. 11. **Fire code.** References to the International Fire Code mean the Minnesota State Fire Code, Minnesota Rules, chapter 7511, adopted pursuant to Minnesota Statutes, chapter 299F.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 5 s 32; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0101 SCOPE.

This code shall regulate the design, installation, maintenance, alteration, and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings. Fuel gas piping systems, fuel gas utilization equipment and appliances, and related accessories shall be regulated by parts 1346.5050 through 1346.6000.

This code shall also regulate those mechanical systems, system components, equipment, and appliances specifically addressed in the IMC as amended in this chapter. This code shall also regulate process piping installed within, or in conjunction with, buildings or structures. For the purposes of this section, the term "process piping" includes piping or tubing which conveys gas, liquid, or fluidized solids and which is used directly in research, laboratory, or production processes. Process piping and tubing shall be installed in accordance with ASME B31.3, Process Piping Code, or ASME B31.9, Building Services Piping, as applicable. Refer to Minnesota Rules, chapter 1300, for additional administrative provisions of the Minnesota State Building Code. Refer to Minnesota Statutes, section 13.7911, for data classification of biotechnology process piping systems.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0102 EXISTING INSTALLATIONS.

Except as otherwise provided for in this chapter, a provision in this code shall not require the removal, alteration, or abandonment of, nor prevent the continued utilization and maintenance of, a mechanical system lawfully in existence at the time of the adoption of this code.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0103 MAINTENANCE.

Mechanical systems, both existing and new, and parts of those systems, shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's designated agent shall be responsible for maintenance of mechanical systems. To determine compliance with this provision, the building official shall have the authority to require a mechanical system to be reinspected.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0104 ADDITIONS, ALTERATIONS, RENOVATIONS, OR REPAIRS.

Additions, alterations, renovations, or repairs to a mechanical system shall conform to this code for a new mechanical system without requiring the remainder of the existing mechanical system to comply with all of the requirements of this code. Additions, alterations, renovations, or repairs shall not cause an existing mechanical system to become unsafe, hazardous, or overloaded.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0105 WORK EXEMPT FROM PERMIT.

Work performed under this code shall be exempted from a permit in accordance with Minnesota Rules, chapter 1300.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0106 REQUIRED INSPECTIONS.

The building official, upon notification from the permit holder or the permit holder's agent, shall make the following inspections and other such inspections as necessary, and shall either release that portion of the construction or shall notify the permit holder or the permit holder's agent of violations that must be corrected. The holder of the permit shall be responsible for the scheduling of these inspections.

1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place. When excavated soil contains rocks, broken concrete, frozen chunks, and other rubble that would damage or break the piping or cause corrosive action, clean backfill shall be used.

2. Rough-in inspection shall be made after the roof, framing, fireblocking, and bracing are in place and all ducting and other components to be concealed are complete, and prior to the installation of wall or ceiling membranes.

3. Final inspection shall be made upon completion of the mechanical system.

Exception: Ground-source heat pump loop systems tested in accordance with this code shall be permitted to be backfilled prior to inspection.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0107 [Repealed, 34 SR 537]

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1346.0108 [Repealed, 29 SR 299]

1346.0108 AUTHORITY TO CONDEMN MECHANICAL SYSTEMS.

Whenever the building official determines that any mechanical system or portion of a system regulated by this code has become hazardous to life, health, or property, or has become unsanitary, the building official shall issue an order in writing to the building's owner or owner's agent. This order shall require

that the system either be removed or restored to a safe condition. A time limit for compliance with the building official's order shall be specified in the written order. A person shall not use or maintain a defective mechanical system after receiving a notice under this section.

When a mechanical system is to be disconnected, written notice shall be given to the building's owner or owner's agent in accordance with Minnesota Rules, chapter 1300. In cases of immediate danger to life or property, the disconnection shall be made immediately without notice.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *19 SR 1306; 29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0109 AUTHORITY TO ORDER DISCONNECTION OF ENERGY SOURCES.

The building official shall have the authority to order disconnection of energy sources supplied to a building, structure, or mechanical system regulated by this code, when it is determined that the mechanical system or any portion of the system has become hazardous or unsafe. Written notice of an order to disconnect service and the causes of the order shall be given within 24 hours to the owner and occupant of the building, structure, or premises, provided, however, that in cases of immediate danger to life or property, the disconnection shall be made immediately without notice. Where energy sources are provided by a public utility, the building official shall immediately notify the serving utility in writing of the issuance of an order to disconnect.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0110 CONNECTION AFTER ORDER TO DISCONNECT.

A person shall not make energy source connections to mechanical systems regulated by this code which have been:

1. disconnected; or
2. ordered to be disconnected by the building official; or
3. the use of which has been ordered to be discontinued by the building official

until the building official authorizes the reconnection and use of such mechanical systems.

When a mechanical system is maintained in violation of this code, and in violation of a notice issued pursuant to this part, the building official shall institute appropriate action to prevent, restrain, correct, or abate the violation.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0201 [Repealed, 19 SR 1306]

1346.0201 SECTION 201 GENERAL.

IMC Section 201.4 is amended to read as follows:

201.4 Terms not defined. Where terms are not defined through the methods authorized by this chapter, the Merriam-Webster Collegiate Dictionary, available at www.m-w.com, shall be considered as providing ordinarily accepted meanings. The dictionary is incorporated by reference, is subject to frequent change, and is available through the Minitex interlibrary loan system.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

Published Electronically: *October 23, 2009*

1346.0202 SECTION 202 GENERAL DEFINITIONS.

Subpart 1. **Section 202; Adding or amending definitions.** IMC section 202 is amended by adding or amending the following definitions:

APPROVED. "Approved" means approval by the building official, pursuant to the Minnesota State Building Code, by reason of: inspection, investigation, or testing; accepted principles; computer simulations; research reports; or testing performed by either a licensed engineer or by a locally or nationally recognized testing laboratory.

CODE. For purposes of parts 1346.0050 to 1346.1500, "the code" or "this code" means the Minnesota Mechanical Code.

CLOSED COMBUSTION SOLID FUEL BURNING APPLIANCE. A heat producing appliance that employs a combustion chamber having no openings other than the flue collar, fuel charging door, and adjustable openings provided to control the amount of combustion air that enters the combustion chamber and includes doors with gaskets or flanges that permit tight closure and glass or ceramic panels which must be tightly sealed or gasketed at their frames.

DECORATIVE SOLID FUEL BURNING APPLIANCE. A natural draft appliance, usually a fireplace, intended primarily for viewing of the fire and which may or may not incorporate doors that substantially close off the firebox opening when the appliance is in operation.

EXHAUST SYSTEM. An assembly of connected ducts, plenums, fittings, registers, grilles and hoods, including domestic kitchen exhaust hoods, domestic kitchen and bathroom exhaust fans, clothes dryers, and subslab soil exhaust systems through which air is conducted from the space or spaces and exhausted to the outside atmosphere.

Exception: Central vacuum systems are allowed to exhaust into an attached residential garage.

FAN-ASSISTED APPLIANCE. An appliance equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber or heat exchanger.

POWER VENT APPLIANCE. An appliance with a venting system which uses a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.

POWERED MAKEUP AIR. Air which must be brought in from the outdoors by means of a fan to replenish the air expelled by a mechanical exhausting device.

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction, and without requiring the use of portable access equipment (see "Access").

SEALED. Secured with a product meeting UL 181 or equivalent.

SOLID FUEL APPLIANCE. A natural draft appliance that is either a closed combustion solid fuel burning appliance or a decorative solid fuel burning appliance.

Subp. 2. **Deleting definitions.** IMC section 202 is amended by deleting the following definitions:

EXTRA-HEAVY-DUTY COOKING APPLIANCE.

HEAVY-DUTY COOKING APPLIANCE.

LIGHT-DUTY COOKING APPLIANCE.

MEDIUM-DUTY COOKING APPLIANCE.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0203 [Repealed, 29 SR 299]

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1346.0204 [Repealed, 29 SR 299]

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1346.0301 SECTION 301 GENERAL.

IMC section 301.7 is amended to read as follows:

301.7 Listed and labeled. Appliances regulated by this code shall be listed and labeled to an appropriate standard by a nationally recognized testing laboratory which is qualified to evaluate the appliance, unless otherwise approved in accordance with the administrative provisions of the Minnesota State Building Code, Minnesota Rules, chapter 1300. The approval of unlisted appliances shall be based upon engineering evaluation. Unlisted appliances shall be installed with clearances to combustibles in accordance with NFPA 211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-burning Appliances; NFPA 31 Standard for the Installation of Oil-burning Equipment; or NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems, as applicable to the unlisted appliances. Unlisted appliances with a fuel input rating of less than 12,500,000 Btu/hr (3,660 kW) shall have fuel trains, controls, and safety devices installed in accordance with Part CF, Combustion Side Control, of ASME CSD-1. Unlisted appliances with a fuel input rating of 12,500,000 Btu/hr (3,660 kW) or greater shall have fuel trains, controls, and safety devices installed in accordance with NFPA 85.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0302 [Repealed, 29 SR 299]

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1346.0304 [Repealed, 29 SR 299]

Published Electronically: *October 23, 2009*

1346.0306 SECTION 306 ACCESS AND SERVICE SPACE.

Subpart 1. **Section 306.5, Mechanical equipment and appliances on roofs or elevated structures.** IMC section 306.5 is amended and a subsection is added to read as follows:

306.5 Mechanical equipment and appliances on roofs or elevated structures. Where mechanical equipment or appliances requiring periodic inspection, service, or maintenance are installed on roofs or elevated structures, a permanent stair shall be provided for access.

Exception: A portable ladder may be used for dwellings, replacement equipment and appliances, on existing buildings, and exterior roof access points not exceeding 16 feet (4.9 m) above grade, unless the building official determines that the unique shape of the roof does not allow safe access with a portable ladder.

The permanent stair shall, at a minimum, meet the following:

1. The stair shall be installed at an angle of not more than 60 degrees measured from the horizontal plane.

2. The stair shall have flat treads at least 6 inches (152 mm) deep and a clear width of at least 18 inches (457 mm) with equally spaced risers at least 10.5 inches (267 mm) high and not exceeding 14 inches (356 mm).

3. The stair shall have intermediate landings not exceeding 18 feet (5.5 m) vertically.

4. Continuous handrails shall be installed on both sides of the stair.

5. Interior stairs shall terminate at the under side of the roof at a hatch or scuttle of at least 8 square feet (0.74 m^2) with a minimum dimension of 20 inches (508 mm).

6. When a roof access hatch or scuttle is located within 10 feet (3.0 m) of a roof edge, a guard shall be installed in accordance with IMC section 304.11.

7. Exterior stairs shall terminate at the roof access point or at a level landing of at least 8 square feet (0.74 m^2) with a minimum dimension of 20 inches (508 mm). The landing shall have a guard installed in accordance with IMC section 304.11.

306.5.1 Permanent ladders. Where a change in roof elevation greater than 30 inches (762 mm) but not exceeding 16 feet (4.9 m) exists, a permanent ladder shall be provided. The ladder may be vertical. The ladder must, at a minimum, meet the following:

1. Width shall be at least 16 inches (406 mm).

2. Rung spacing shall be a maximum of 14 inches (356 mm).

3. Toe space shall be at least 6 inches (152 mm).

4. Side railings shall extend at least 30 inches (762 mm) above the roof or parapet wall.

Subp. 2. **306.5.2 Electrical requirements.** A receptacle outlet shall be provided at or near the equipment or appliance location in accordance with the Minnesota Electrical Code.

Subp. 3. **306.5.3 Sloped roofs.** Where appliances, equipment, fans, or components that require service are installed on a roof having a slope of 3 units vertical in 12 units horizontal (25-percent slope) or greater and having an edge more than 30 inches (762 mm) above grade at such edge, a level platform shall be provided on each side of the appliance to which access is required for service, repair, or maintenance. The platform shall be at least 30 inches (762 mm) in any dimension and shall be provided with guards. The guards shall extend at least 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in Minnesota Rules, chapter 1305.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0309 SECTION 309 TEMPERATURE CONTROL.

IMC section 309 is amended by adding a section and subsections to read as follows:

309.2 Balancing. All mechanical ventilation and hydronic systems shall be capable of being balanced in accordance with this section.

309.2.1 Mechanical ventilation system balancing. Mechanical ventilation systems shall provide airflow rates within +/-10 percent of design capacities and fan speed shall be adjusted to meet design airflow conditions.

Exception: Speed adjustment is not required for fan motors rated at one horsepower (0.746 kW) or less.

309.2.2 Hydronic system balancing. Hydronic systems shall provide flow rates within +/-10 percent of design capacities and pump impellers shall be trimmed or pump speed shall be adjusted to meet design flow conditions.

Exception: Impeller trimming or speed adjustment is not required for pump motors rated at five horsepower (3.73 kW) or less.

309.2.3 Systems balancing reports. Systems balancing reports shall verify system performance and shall specify that the minimum amount of outdoor air required in IMC chapter 4, as amended, is provided to the ventilation system. Systems balancing reports shall be submitted to the building official upon request.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326.13; 326B.02; 326B.101; 326B.106; 326B.13*

History: *15 SR 71; 29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.0401 SECTION 401 GENERAL.

Subpart 1. **Section 401.1.** IMC section 401.1, Scope, is amended by adding the following exception to the end of the section:

Exception: Residential buildings complying with the ventilation requirements in Minnesota Rules, chapter 1322.

Subp. 2. **Section 401.4.** IMC section 401.4 is amended to read as follows:

Air intake openings shall comply with all of the following:

A. Intake openings shall be located a minimum of 10 feet (3,048 mm) from lot lines or buildings on the same lot. Intake openings that front on a street or public way must be located a minimum of 10 feet (3,048 mm) horizontally from the centerline of the street or public way.

B. Mechanical outdoor air intake openings shall be located a minimum of 10 feet (3,048 mm) from any hazardous or noxious contaminant, such as chimneys, plumbing vents, streets, alleys, parking lots, and loading docks, except as specified in item C or section 501.2.1. Outdoor air intake openings shall be permitted to be located less than 10 feet (3,048 mm) horizontally from streets, alleys, parking lots, and loading docks provided that the openings are located not less than 25 feet (7,620 mm) vertically above such locations. Where openings front on a street or public way, the distance shall be measured to the centerline of the street or public way.

C. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3,048 mm) of the opening.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

Published Electronically: *January 28, 2015*

1346.0403 [Repealed, 19 SR 1306]

1346.0403 SECTION 403 MECHANICAL VENTILATION.

Subpart 1. **Section 403.1.** IMC Section 403.1 is amended to read as follows:

403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or exhaust air. The amount of supply air shall be approximately equal to the amount of return and exhaust air. The system to convey ventilation air shall be designed and installed in accordance with IMC Chapter 6.

Ventilation supply systems shall be designed to deliver the required rate of supply air to the occupied zone within an occupied space. The occupied zone shall have boundaries measured at 3 inches (76 mm) and 72 inches (1829 mm) above the floor and 24 inches (610 mm) from the enclosing walls.

Subp. 2. **Section 403.2.** IMC Section 403.2 is amended to read as follows:

403.2 Outdoor air required. The minimum ventilation rate of required outdoor air shall be determined in accordance with the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004.

Exceptions:

1. Enclosed parking garages shall comply with amended IMC Section 404.

2. Dwellings that are required to comply with Minnesota Rules, chapter 1322.

3. Buildings or portions of buildings that are not intended for normal human occupancy, or where the primary purpose is not associated with human comfort.

403.2.1 Recirculation of air. The air required by the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004, shall not be recirculated. Air in excess of that required shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

1. Ventilation air shall not be recirculated from one dwelling unit to another or to dissimilar occupancies.

2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless the air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces.

3. Where mechanical exhaust is required by the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required.

403.2.2 Transfer air. Except where recirculation from such spaces is prohibited by the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004, air transferred from occupied spaces is not prohibited from serving as makeup air for required exhaust systems in such spaces as kitchens, baths, toilet rooms, elevators, and smoking lounges. The amount of transfer air and exhaust air shall be sufficient to provide the flow rates as specified in the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004. The required outdoor air rates shall be introduced directly into such spaces or into the occupied spaces from which air is transferred, or a combination of both.

Subp. 3. **Section 403.3.** IMC Section 403.3 is amended to read as follows:

403.3 Ventilation rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate determined in accordance with the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004 or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004, based on the occupancy of the space and the occupant load or other parameters as stated therein. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the estimated maximum occupant load rate indicated in the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004. Ventilation rates for occupancies not represented shall be determined by an approved engineering analysis. The ventilation system shall be designed to supply the required rate of ventilation air continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

Exception: The occupant load is not required to be based on the estimated maximum occupant load rate where approved statistical data document the accuracy of an alternate anticipated occupant density.

Subp. 4. **Section 403.3.1.** IMC Section 403.3.1 is amended to read as follows:

403.3.1 System operation. The minimum flow rate of outdoor air that the ventilation system must be capable of supplying during its operation shall be permitted to be based on the rate per person indicated in the Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004, and the actual number of occupants present.

Subp. 5. **Section 403.3.4.** IMC Section 403.3.4 is amended to read as follows:

403.3.4 Balancing. Ventilation systems shall be balanced in accordance with amended IMC Section 309.2.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537*

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1346.0404 SECTION 404 GARAGES.

Subpart 1. **Section 404.1.** IMC section 404.1 is amended to read as follows:

404.1 Enclosed parking garages. Mechanical ventilation systems shall operate automatically upon detection of certain gas concentrations. If the parking garage will house vehicles that emit carbon monoxide (CO), the parking garage must be equipped with a CO detection device that will trigger the mechanical system to operate automatically upon detection of a CO level of 25 parts per million (ppm). If the parking garage will house vehicles that emit nitrogen dioxide (NO_2), the parking garage shall be equipped with a NO_2 detection device that triggers the mechanical system to operate automatically upon detection of a NO_2 level of 3 ppm. If the parking garage will house vehicles that emit both CO and NO_2, the parking garage shall be equipped with both types of detection devices.

Subp. 2. **Section 404.2.** IMC section 404.2 is amended to read as follows:

404.2 Minimum exhaust. The mechanical ventilation system shall be capable of producing a minimum exhaust rate of 0.75 cfm per square foot (0.0038 $m^3/s \cdot m^2$) of floor area.

Subp. 3. **Section 404.3.** IMC section 404.3 is amended to read as follows:

404.3 Occupied spaces accessory to public garages. Connecting offices, waiting rooms, ticket booths, elevator lobbies, and similar uses that are accessory to a public garage shall be maintained at a positive pressure and shall be provided with ventilation in accordance with IMC section 403.3.

Subp. 4. **Section 404.4.** IMC Section 404.4 is amended by adding a section to read as follows:

404.4 Prohibition of heated commercial parking garages. Commercial parking garages shall comply with the Minnesota Commercial Energy Code, chapter 1323.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *15 SR 71; 29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0501 SECTION 501 GENERAL.

Subpart 1. **Section 501.3.** IMC section 501.3 is amended to read as follows:

501.3 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a nuisance and not less than the distances specified in IMC section 501.3.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or crawl space and the exhaust system shall be equipped with a backdraft damper at the point of discharge.

Exception: Commercial cooking recirculating systems.

IMC subsections 501.3.1, 501.3.1.1, and 501.3.2 still apply.

Subp. 2. **Section 501.4.** IMC section 501.4 is amended and subsections added to read as follows:

501.4 Pressure equalization. Mechanical exhaust systems shall be sized and operated to remove the quantity of air required by this chapter. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust system for a room, adequate means shall be provided for the natural exit of the excess air supplied.

501.4.1 Makeup air in new dwelling units. Makeup air quantity for new dwelling units shall be determined by using IMC Table 501.4.1 and shall be supplied in accordance with IMC section 501.4.2.

Exception. Makeup air provisions of IMC section 501.4.1 are not required when any of the following are demonstrated:

1. A test is performed according to ASTM Standard E1998-02, Standard Guide for Assessing Depressurization-Induced Backdrafting and Spillage from Vented Combustion Appliances, and documentation is provided that the vented combustion appliances continue to operate within established parameters of the test.

2. A test approved by the building official verifies proper operation of vented combustion appliances.

501.4.2 Makeup air supply. Makeup air shall be provided by one of the following methods:

1. Passive makeup air shall be provided by passive openings according to the following:

1.1 Passive makeup air openings from the outdoors shall be sized according to IMC Table 501.4.2.

1.2 Barometric dampers are prohibited in passive makeup air openings when any atmospherically vented appliance is installed.

1.3 Single passive openings larger than 8 inches (204 mm) diameter, or equivalent, shall be provided with a motorized damper that is electrically interlocked with the largest exhaust system.

2. Powered makeup air shall be provided if the size of a single opening or multiple openings exceeds 11 inches (280 mm) diameter, or equivalent, when sized according to IMC Table 501.4.2. Powered makeup air shall comply with the following:

2.1 Powered makeup air shall be electrically interlocked with the largest exhaust system.

2.2 Powered makeup air shall be matched to the airflow of the largest exhaust system.

3. Makeup air shall be provided by a combination of passive openings and powered means according to IMC Table 501.4.2 and the following:

3.1 Passive makeup air openings shall comply with item 1.

3.2 Powered makeup air shall be supplied for the quantity of airflow in excess of the passive makeup air opening provided, and it shall be electrically interlocked with the exhaust system.

501.4.2.1 Makeup air ducts. Makeup air ducts shall be constructed and installed according to IMC chapter 6 and section 501.4.2.

501.4.2.2 Makeup air intake. Makeup air intake openings shall be located to avoid intake of exhaust air in accordance with IMC section 401.4 and IFGC section 503.8, and shall be covered with corrosion resistant screen of not less than 1/4 inch (6.4 mm) mesh. Makeup air intake openings shall be located at least 12 inches (305 mm) above adjoining grade level.

501.4.2.3 Makeup air location. Makeup air requirements of 175 cubic feet per minute (cfm) (0.084 m^3/s) and greater shall be introduced to the dwelling in one of the following locations:

1. In the space containing the vented combustion appliances.

2. In the space containing the exhaust system.

3. In a space that is freely communicating with the exhaust system and is approved by the building official.

501.4.2.4 Makeup air termination restriction. A makeup air opening shall not terminate in the return air plenum of a forced air heating system unless it is installed according to the heating appliance manufacturer's installation instructions.

501.4.2.5 Separate makeup air and combustion air openings. When both makeup air and combustion air openings are required, they shall be provided through separate openings to the outdoors, subject to IFGC section 304, to determine requirements for air for combustion and ventilation:

Exception: Combination makeup air and combustion air systems may be approved by the building official where they are reasonably equivalent in terms of health, safety, and durability.

501.4.2.6 Makeup air effectiveness. The makeup air shall not reduce the effectiveness of exhaust systems or performance of vented combustion appliances, and makeup air shall not adversely affect the heating or cooling capability of the mechanical appliances.

501.4.3 Additions, alterations, or installations of mechanical systems in existing dwelling units. Makeup air shall be supplied to existing dwelling units when any of the following conditions occur:

1. If a dwelling unit was constructed after 2003 using the makeup air provisions of section 501.4.2, makeup air quantity shall be determined by using IMC Table 501.4.1 and shall be supplied according to section 501.4.2 when any of the following conditions occur:

1.1 A vented combustion appliance, including a solid fuel appliance, is installed or replaced.

1.2 An exhaust system is installed or replaced.

Exception: If powered makeup air is electrically interlocked and matched to the airflow of the exhaust system, additional makeup air is not required.

2. If a dwelling unit was constructed after 1999 using the provisions of the Minnesota Energy Code, Minnesota Rules, chapter 7672, makeup air quantity shall be determined by using Table 501.4.1 and shall be supplied in accordance with section 501.4.2 when any of the following conditions occur:

2.1 A vented combustion appliance, including a solid fuel appliance, is installed or replaced.

2.2 An exhaust system is installed or replaced.

Exception: If powered makeup air is electrically interlocked and matched to the airflow of the exhaust system, additional makeup air is not required.

3. When a solid fuel appliance is installed in a dwelling unit constructed during or after 1994 under the Minnesota Energy Code, Minnesota Rules, chapter 7670, makeup air quantity shall be determined by using Table 501.4.1 and shall be supplied according to section 501.4.2.

Exception. If a closed combustion solid fuel burning appliance is installed with combustion air in accordance with the manufacturer's installation instructions, additional makeup air is not required.

4. When an exhaust system with a rated capacity greater than 300 cfm (0.144 m^3/s) is installed in a dwelling unit constructed during or after 1994 under the Minnesota Energy Code, Minnesota Rules, chapter 7670, makeup air quantity shall be determined by using Table 501.4.3(1) and shall be supplied according to section 501.4.2.

Exception: If powered makeup air is electrically interlocked and matched to the airflow of the exhaust system, additional makeup air is not required.

5. When an exhaust system with a rated capacity greater than 300 cfm (0.144 m^3/s) is installed in a dwelling unit constructed prior to 1994, makeup air quantity shall be determined by using Table 501.4.3(2) and shall be supplied according to section 501.4.2.

Exception: If powered makeup air is electrically interlocked and matched to the airflow of the exhaust system, additional makeup air is not required.

6. When a solid fuel appliance is installed in a dwelling unit constructed prior to 1994, makeup air quantity shall be determined by using Table 501.4.3(3) and shall be supplied according to section 501.4.2.

Exception: If a closed combustion solid fuel burning appliance is installed with combustion air in accordance with the manufacturer's installation instructions, additional makeup air is not required.

Exception: Makeup air is not required in items 1 to 6 when any of the following are demonstrated:

1. A test is performed according to ASTM Standard E1998-02, Standard Guide for Assessing Depressurization-Induced Backdrafting and Spillage from Vented Combustion Appliances, and documentation is provided that the vented combustion appliances continue to operate within established parameters of the test.

2. A test approved by the building official verifies proper operation of vented combustion appliances.

Table 501.4.1

Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Dwelling Units

	One or multiple power vent or direct vent appliances or no combustion appliances[A]	One or multiple fan-assisted appliances and power vent or direct vent appliances[B]	One atmospherically vented gas or oil appliance or one solid fuel appliance[C]	Multiple appliances that are atmospherically vented gas or oil appliances or solid fuel appliances[D]
1. Use the Appropriate Column to Estimate House Infiltration				
a) pressure factor (cfm/sf)	0.15	0.09	0.06	0.03
b) conditioned floor area (sf)	_____	_____	_____	_____
(including unfinished basements)				
Estimated House Infiltration (cfm): [1a x 1b]	_____	_____	_____	_____
2. Exhaust Capacity				
a) clothes dryer	135	135	135	135

b) 80% of largest exhaust rating (cfm):	_____	_____	_____	_____

(not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust)

c) 80% of next largest exhaust rating (cfm):	not applicable	_____	_____	_____

(not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust)

Total Exhaust Capacity (cfm): [2a+2b+2c]	_____	_____	_____	_____

3. Makeup Air Requirement

a) Total Exhaust Capacity (from above)	_____	_____	_____	_____
b) Estimated House Infiltration (from above)	_____	_____	_____	_____
Makeup Air Quantity (cfm): [3a - 3b]	_____	_____	_____	_____

(if value is negative, no makeup air is needed)

4. For Makeup Air Opening Sizing, refer to Table 501.4.2

[A]Use this column if there are other than fan-assisted or atmospherically vented gas or oil appliances or if there are no combustion appliances.

[B]Use this column if there is one fan-assisted appliance per venting system. Other than atmospherically vented appliances may also be included.

[C]Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil appliance per venting system or one solid fuel appliance.

[D]Use this column if there are multiple atmospherically vented gas or oil appliances using a common vent or if there are atmospherically vented gas or oil appliances and solid fuel appliances.

Table 501.4.2

Makeup Air Opening Sizing Table for New and Existing Dwelling Units

Type of opening or system	One or multiple power vent or direct vent appliances or no combustion appliances[A] (cfm)	One or multiple fan-assisted appliances and power vent or direct vent appliances[B] (cfm)	One atmospher-ically vented gas or oil appliance or one solid fuel appliance[C] (cfm)	Multiple appliances that are atmospher-ically vented gas or oil appliances or solid fuel appliances[D] (cfm)	Passive makeup air opening duct diameter[E,F,G] (inches)
Passive Opening	1-36	1-22	1-15	1-9	3
Passive Opening	37-66	23-41	16-28	10-17	4
Passive Opening	67-109	42-66	29-46	18-28	5
Passive Opening	110-163	67-100	47-69	29-42	6
Passive Opening	164-232	101-143	70-99	43-61	7
Passive Opening	233-317	144-195	100-135	62-83	8
Passive Opening with Motorized Damper	318-419	196-258	136-179	84-110	9
Passive Opening with Motorized Damper	420-539	259-332	180-230	111-142	10
Passive Opening with Motorized Damper	540-679	333-419	231-290	143-179	11
Powered Makeup Air[H]	>679	>419	>290	>179	Not Applicable

[A]Use this column if there are other than fan-assisted or atmospherically vented gas or oil appliances or if there are no combustion appliances.

[B]Use this column if there is one fan-assisted appliance per venting system. Other than atmospherically vented appliances may also be included.

[C]Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil appliance per venting system or one solid fuel appliance.

[D]Use this column if there are multiple atmospherically vented gas or oil appliances using a common vent or if there are atmospherically vented gas or oil appliances and solid fuel appliance(s).

[E]An equivalent length of 100 feet of round smooth metal duct is assumed. Subtract 40 feet for the exterior hood and ten feet for each 90-degree elbow to determine the remaining length of straight duct allowable.

[F]If flexible duct is used, increase the duct diameter by one inch. Flexible duct shall be stretched with minimal sags.

[G]Barometric dampers are prohibited in passive makeup air openings when any atmospherically vented appliance is installed.

[H]Powered makeup air shall be electrically interlocked with the largest exhaust system.

Table 501.4.3(1)

Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing Dwelling Units

(Refer to item 4 in section 501.4.3 to determine applicability of this table)

	One or multiple power vent or direct vent appliances or no combustion appliances[A]	One or multiple fan-assisted appliances and power vent or direct vent appliances[B]	One atmospherically vented gas or oil appliance or one solid fuel appliance[C]	Multiple appliances that are atmospherically vented gas or oil appliances or solid fuel appliances[D]
1. Use the Appropriate Column to Estimate House Infiltration				
a) pressure factor (cfm/sf)	0.15	0.09	0.06	0.03
b) conditioned floor area (sf)	_____	_____	_____	_____
Estimated House Infiltration (cfm): [1a x 1b]	_____	_____	_____	_____
2. Exhaust Capacity				
80% of exhaust rating = Exhaust Capacity (cfm):	_____	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust)				
3. Makeup Air Requirement				
a) Exhaust Capacity (from above)	_____	_____	_____	_____
b) Estimated House Infiltration (from above)	_____	_____	_____	_____

Makeup Air Quantity (cfm): [3a - 3b]	_____	_____	_____	_____

(if value is negative, no makeup air is needed)

4. For Makeup Air Opening Sizing, refer to Table 501.4.2

[A]Use this column if there are other than fan-assisted or atmospherically vented gas or oil appliances or if there are no combustion appliances.

[B]Use this column if there is one fan-assisted appliance per venting system. Other than atmospherically vented appliances may also be included.

[C]Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil appliance per venting system or one solid fuel appliance.

[D]Use this column if there are multiple atmospherically vented gas or oil appliances using a common vent or if there are atmospherically vented gas or oil appliances and solid fuel appliances.

Table 501.4.3(2)

Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing Dwelling Units

(Refer to item 5 in section 501.4.3 to determine applicability of this table)

	One or multiple power vent or direct vent appliances or no combustion appliances[A]	One or multiple fan-assisted appliances and power vent or direct vent appliances[B]	One atmospherically vented gas or oil appliance or one solid fuel appliance[C]	Multiple appliances that are atmospherically vented gas or oil appliances or solid fuel appliances[D]
1. Use the Appropriate Column to Estimate House Infiltration				
a) pressure factor (cfm/sf)	0.25	0.15	0.10	0.05
b) conditioned floor area (sf)	_____	_____	_____	_____
(including unfinished basements)				
Estimated House Infiltration (cfm): [1a x 1b]	_____	_____	_____	_____
or Alternative Calculation (by using blower door test)[E]				

c) conversion factor	0.75	0.45	0.30	0.15
d) CFM50 value (from blower door test)	_____	_____	_____	_____
Estimated House Infiltration (cfm): [1c x 1d]	_____	_____	_____	_____
2. Exhaust Capacity				
80% of exhaust rating = Exhaust Capacity (cfm):	_____	_____	_____	_____

(not applicable if recirculating system or if powered makeup air is electrically interlocked with exhaust)

3. Makeup Air Requirement				
a) Exhaust Capacity (from above)	_____	_____	_____	_____
b) Estimated House Infiltration (from above)	_____	_____	_____	_____
Makeup Air Quantity (cfm): [3a - 3b]	_____	_____	_____	_____

(if value is negative, no makeup air is needed)

4. For Makeup Air Opening Sizing, refer to Table 501.4.2

[A]Use this column if there are other than fan-assisted or atmospherically vented gas or oil appliances or if there are no combustion appliances.

[B]Use this column if there is one fan-assisted appliance per venting system. Other than atmospherically vented appliances may also be included.

[C]Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil appliance per venting system or one solid fuel appliance.

[D]Use this column if there are multiple atmospherically vented gas or oil appliances using a common vent or if there are atmospherically vented gas or oil appliances and solid fuel appliances.

[E]As an alternative, the Estimated House Infiltration may be calculated by performing a blower door test and multiplying the conversion factor by the CFM50 value.

Table 501.4.3(3)

Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing Dwelling Units

(Refer to item 6 in section 501.4.3 to determine applicability of this table)

	One or multiple power vent or direct vent appliances or no combustion appliances[A]	One or multiple fan-assisted appliances and power vent or direct vent appliances[B]	One atmospherically vented gas or oil appliance or one solid fuel appliance[C]	Multiple appliances that are atmospherically vented gas or oil appliances or solid fuel appliances[D]
1. Use the Appropriate Column to Estimate House Infiltration				
a) pressure factor (cfm/sf)	0.25	0.15	0.10	0.05
b) conditioned floor area (sf)	_____	_____	_____	_____
(including unfinished basements)				
Estimated House Infiltration (cfm): [1a x 1b]	_____	_____	_____	_____
or Alternative Calculation (by using blower door test)[E]				
c) conversion factor	0.75	0.45	0.30	0.15
d) CFM50 value (from blower door test)	_____	_____	_____	_____
Estimated House Infiltration (cfm): [1c x 1d]	_____	_____	_____	_____
2. Exhaust Capacity				
a) clothes dryer (cfm)	135	135	135	135
b) 80% of largest exhaust rating (cfm):	_____	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked and with exhaust)				
c) 80% of next largest exhaust rating (cfm)	Not applicable	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked with exhaust)				
Total Exhaust Capacity (cfm): [2a+2b+2c]	_____	_____	_____	_____
3. Makeup Air Requirement				
a) Total Exhaust Capacity (from above)	_____	_____	_____	_____
b) Estimated House Infiltration (from above)	_____	_____	_____	_____

Makeup Air Quantity (cfm): [3a - 3b]	_____	_____	_____	_____

(if value is negative, no makeup air is needed)

4. For Makeup Air Opening Sizing, refer to Table 501.4.2

[A]Use this column if there are other than fan-assisted or atmospherically vented gas or oil appliances or if there are no combustion appliances.

[B]Use this column if there is one fan-assisted appliance per venting system. Other than atmospherically vented appliances may also be included.

[C]Use this column if there is one atmospherically vented (other than fan-assisted) gas or oil appliance per venting system or one solid fuel appliance.

[D]Use this column if there are multiple atmospherically vented gas or oil appliances using a common vent or if there are atmospherically vented gas or oil appliances and solid fuel appliances.

[E]As an alternative, the Estimated House Infiltration may be calculated by performing a blower door test and multiplying the conversion factor by the CFM50 value.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 1 s 1; 34 SR 537; 39 SR 690*

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1346.0502 REQUIRED SYSTEMS.

IMC section 502.14 is amended by adding exception 4 to read as follows:

4. A source capture system is not required for any engine repair stall having an exhaust pipe extension duct less than 10 feet (3048 mm) in length, connected directly to the motor vehicle exhaust system and discharging directly to the outside of the building.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *39 SR 690*

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1346.0504 SECTION 504 CLOTHES DRYER EXHAUST.

IMC Section 504.1 is amended to read as follows:

504.1 Installation. Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture and any products of combustion to the outside of the building.

Exception: This section shall not apply to listed and labeled condensing (ductless) clothes dryers. The room where a listed and labeled condensing (ductless) clothes dryer is installed shall be provided with an exhaust ventilation system of 70 cfm or greater and shall have a floor drain or other approved plumbing fixture or disposal area for condensate.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

Published Electronically: *October 23, 2009*

1346.0505 SECTION 505 DOMESTIC KITCHEN EXHAUST APPLIANCES.

IMC section 505.1 is amended to read as follows:

505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are located within dwellings, the hoods and appliances shall discharge to the outdoors through ducts constructed of galvanized steel, stainless steel, aluminum, or copper. The ducts shall have smooth inner walls and shall be air tight and equipped with a backdraft damper. Domestic kitchen exhaust hoods ducted to the outdoors shall have makeup air provided according to Minnesota Rules, part 1346.0501. Refer to part 1346.6010 for Table C-1, "Recommended Capacities for Domestic Kitchen Exhaust Hoods."

Exceptions:

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

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

2.1. The duct shall be installed under a concrete slab poured on grade.

2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.

2.3. The PVC duct shall extend not greater than 1 inch (25 mm) above the indoor concrete floor surface.

2.4. The PVC duct shall extend not greater than 1 inch (25 mm) above grade outside of the building.

2.5. The PVC ducts shall be primed and solvent cemented in accordance with ASTM D2564.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

Published Electronically: *January 28, 2015*

1346.0506 SECTION 506 COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST APPLIANCES.

Subpart 1. **Section 506.3.** IMC section 506.3 is amended to read as follows:

506.3 Ducts serving Type I hoods. Commercial kitchen exhaust systems serving Type I hoods shall be designed, constructed and installed in accordance with NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

Subp. 2. **Sections 506.3.1 to 506.3.2.4.** IMC sections 506.3.1 to 506.3.2.4 are deleted and replaced with chapters 1 to 10 and 12 to 15 of NFPA 96.

Subp. 2a. **Section 506.3.2.5.** IMC section 506.3.2.5 is deleted in its entirety and replaced with the following:

506.3.2.5 Grease duct leakage performance test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed to determine that all welded joints and seams are liquidtight. Ducts shall be considered to be concealed where they are installed in shafts or covered by coatings or wraps that prevent the duct from being visually inspected on all sides. It is permissible to test the duct in sections, provided that, after the duct system is completely assembled, all field-assembled joints are tested, including the duct-to-hood connection. When the testing is performed in this manner, only the field-assembled joints of listed factory-built grease ducts are required to be tested. The leakage test shall consist of a light, air, or water test, or an approved equivalent test. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test.

506.3.2.5.1 Light test. The light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. No light from the duct interior shall be visible through any exterior surface.

506.3.2.5.2 Air test. The air test shall be performed by sealing the entire duct system from the hood exhaust opening(s) to the duct termination. The sealed duct system shall then be pressurized to a minimum pressure of 1.0 inch water column and shall be required to hold the initial set pressure for a minimum of 20 minutes.

506.3.2.5.3 Water test. The water test shall be performed by use of a pressure washer operating at a minimum of 1,500 psi, simulating cleaning operations. The water shall be applied directly to all areas to be tested. No water applied to the duct interior shall be visible on any exterior surface in any volume during the test.

Subp. 2b. **Sections 506.3.3 to 506.3.13.3.** IMC sections 506.3.3 to 506.3.13.3 are deleted in their entirety.

Subp. 3. **Section 506.4.2.** IMC section 506.4.2 is amended to read as follows:

506.4.2 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials. Duct construction, installation, bracing, and supports shall comply with IMC chapter 6, as amended in this chapter. Ducts conveying moisture-laden or waste heat-laden air shall comply with the following requirements:

1. Ducts shall be constructed, joined, and sealed to prevent drips and leaking.

2. Ducts shall slope not less than one-fourth unit vertical in 12 units horizontal (2 percent slope) toward the hood or toward an approved reservoir.

3. Ducts subject to positive pressure shall maintain an air pressure test of 1.0 inch water column positive pressure for a minimum of 20 minutes, unless an equivalent alternate test is specified by the building official.

Subp. 4. **Sections 506.5 to 506.5.5.** IMC sections 506.5 to 506.5.5 are deleted in their entirety.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0507 SECTION 507 COMMERCIAL KITCHEN HOODS.

Subpart 1. **Section 507.1.** IMC Section 507.1 is amended by adding subsection 507.1.1 after the exceptions to read as follows:

507.1.1 Factory built systems with exhaust or recovery. Where factory built commercial cooking recirculating systems or dishwashers and potwashers equipped with heat and vapor exhaust or recovery systems are installed, the sensible and latent heat from the systems shall be included in the HVAC design calculations of the kitchen. A mechanical HVAC system shall be provided to maintain maximum relative humidity of 65 percent in the space.

Subp. 2. **Section 507.2.** IMC section 507.2 is amended to read as follows:

507.2 Where required. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with ASHRAE standard 154. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed.

507.2.1 Type I hoods. Type I hoods shall be installed where cooking appliances produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over medium-duty, heavy-duty, and extra-heavy-duty cooking appliances. Type I hoods shall be installed over light-duty cooking appliances that produce grease or smoke. The duty classifications of cooking appliances served by Type I hoods shall be in accordance with Table 507.2.1.

Exception: A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with Section 17 of UL 710B.

Table 507.2.1

Appliance Duty Classifications by Appliance Type

Appliance Description	Size	Type I Hoods			
		Light Duty	Medium Duty	Heavy Duty	Extra-Heavy Duty
Braising pan/tilting skillet, electric	All	●			
Oven, rotisserie, electric and gas	All	●			
Oven, combi, electric and gas	All	●			
Oven, convection, full-size, electric and gas	All	●			
Oven, convection, half-size, electric and gas (protein cooking)	All	●			
Oven, deck, electric and gas	All	●			
Oven, mini-revolving rack, electric and gas	All	●			
Oven, rapid cook, electric	All	●			

Oven, rotisserie, electric and gas	All	●			
Range, discrete element, electric (with or without oven)	All	●			
Salamander, electric and gas	All	●			
Braising pan/tilting skillet, gas	All		●		
Broiler, chain conveyor, electric	All		●		
Broiler, electric, under-fired	All		●		
Conveyor oven, electric	6 kW or larger		●		
Conveyor oven, gas	All		●		
Fryer, doughnut, electric and gas	All		●		
Fryer, kettle, electric and gas	All		●		
Fryer, open deep-fat, electric and gas	All		●		
Fryer, pressure, electric and gas	All		●		
Griddle, double-sided, electric and gas	All		●		
Griddle, flat, electric and gas	All		●		
Range, cook-top, induction	All		●		
Range, open-burner, gas (with or without oven)	All		●		
Range, hot top, electric and gas	All		●		
Broiler, chain conveyor, gas	All			●	
Broiler, electric and gas, over-fired (upright)	All			●	
Broiler, gas, under-fired	All			●	
Range, wok, gas and electric	All			●	
Appliances using solid fuel (wood, charcoal, briquettes, and mesquite) to provide all or part of the heat source for cooking					●
Exception: Appliances complying with Section 14.3.4 of NFPA Standard 96	All				

507.2.1.1 Operation. Type I hood systems shall be designed and installed to automatically activate the exhaust fan whenever cooking operations occur. The activation of the exhaust fan shall occur through an interlock with the cooking appliances, by means of heat sensors or by means of other approved methods. A

method of interlock between an exhaust hood system and appliances equipped with standing pilot burners shall not cause the pilot burners to be extinguished. A method of interlock between an exhaust hood system and cooking appliances shall not involve or depend upon any component of a fire extinguishing system.

507.2.2 Type II hoods. Type II hoods shall be installed above dishwashers and appliances as required by Table 507.2.2. The duty classifications of cooking appliances served by Type II hoods shall be in accordance with Table 507.2.2. Type II hoods shall be installed above all appliances that produce products of combustion and do not produce grease or smoke as a result of the cooking process. Where hoods are not required, the additional heat and moisture loads generated by such appliances shall be accounted for in the sensible and latent loads for the HVAC system.

Table 507.2.2

Type II Hood Requirements by Appliance Description

Appliance Description	Size	Hood Not Required[a,b]	Type II Hoods[a]	
			Light Duty	Medium Duty
Cabinet, holding, electric	All	●		
Cabinet, proofing, electric	All	●		
Cheese-melter, electric	All	●		
Coffee maker, electric	All	●		
Cooktop, induction, electric	All	●		
Dishwasher, under-counter, electric	All	●		
Dishwasher, powered sink, electric	All	●		
Drawer warmer, 2 drawer, electric	All	●		
Egg cooker, electric	All	●		
Espresso machine, electric	All	●		
Grill, panini, electric	All	●		
Hot dog cooker, electric	All	●		
Hot plate, countertop, electric	All	●		
Ovens, conveyor, electric	< 6 kW	●		
Ovens, microwave, electric	All	●		
Ovens, warming, electric	All	●		
Popcorn machine, electric	All	●		
Rethermalizer, electric	All	●		
Rice cooker, electric	All	●		

Steam table, electric	All	●		
Steamers, bun, electric	All	●		
Steamer, compartment atmospheric, countertop, electric	All	●		
Steamer, compartment pressurized, countertop, electric	All	●		
Table, hot food, electric	All	●		
Toaster, electric	All	●		
Waffle iron, electric	All	●		
Cheese-melter, gas	All		●	
Dishwasher, conveyor rack, chemical sanitizing	All		●	
Dishwasher, conveyor rack, hot water sanitizing	All		●	
Dishwasher, door-type rack, chemical sanitizing	All		●	
Dishwasher, door-type rack, hot water sanitizing	All		●	
Kettle, steam jacketed, tabletop, electric, gas and direct steam	< 20 gallons		●	
Oven, convection, half-size, electric and gas (nonprotein cooking)	All		●	
Pasta cooker, electric	All		●	
Rethermalizer, gas	All		●	
Rice cooker, gas	All		●	
Steamer, atmospheric, gas	All		●	
Steamer, pressurized, gas	All		●	
Steamer, atmospheric, floor-mounted, electric	All		●	
Steamer, pressurized, floor-mounted, electric	All		●	
Kettle, steam-jacketed floor-mounted, electric, gas and direct steam	< 20 gallons		●	
Pasta cooker, gas	All			●
Smoker, electric and gas, pressurized	All			●
Steam-jacketed kettle, floor-mounted, electric and gas	20 gallons or larger			●

[a] A hood shall be provided for an electric appliance if it produces 3.1 x 10^{-7} lb/ft^3 (5 mg/m^3) of grease or more when measured at 500 cfm (236 L/s).

[b] Where hoods are not required, the additional heat and moisture loads generated by such appliances shall be accounted for in the sensible and latent loads for the HVAC system.

507.2.2.1. Type II hood exhaust flow rates. The net exhaust flow rate for Type II hoods shall comply with Table 507.2.2.1. The duty level for the hood shall be the duty level of the appliance that has the highest (heaviest) duty level of all of the appliances that are installed underneath the hood according to Table 507.2.2.

Table 507.2.2.1

Type II Hood Minimum Net Exhaust Airflow Rates

	Minimum Net Exhaust Flow Rate per Linear Hood Length in cfm/ft (L/s/m)	
Type of Hood	Light-Duty Equipment	Medium-Duty Equipment
Wall-mounted canopy	200 (310)	300 (465)
Single island	400 (620)	500 (775)
Double island (per side)	250 (388)	300 (465)
Eyebrow	250 (388)	250 (388)
Backshelf/Pass-over	200 (310)	300 (465)

507.2.2.2 Type II hood overhang. Type II hoods shall overhang the appliances and equipment served in accordance with Table 507.2.2.2.

Table 507.2.2.2

Minimum Overhang Requirements for Type II Hoods

Type of Hood	End Overhang	Front Overhang	Rear Overhang
Wall-mounted canopy	6 in. (154 mm)	12 in. (154 mm)	N/A
Single-island canopy	12 in. (154 mm)	12 in. (154 mm)	12 in. (154 mm)
Double-island canopy	12 in. (154 mm)	12 in. (154 mm)	N/A
Eyebrow	N/A	12 in. (154 mm)	N/A
Backshelf/Proximity/ Pass-over	6 in. (154 mm)	10 in. (254 mm) (setback)	N/A

N/A = not applicable

Subp. 3. [Repealed, 34 SR 537]

Subp. 4. [Repealed, 39 SR 690]

Subp. 5. [Repealed, 34 SR 537]

Subp. 6. **Section 507.4.** IMC section 507.4 is deleted.

Subp. 7. **Section 507.5.** IMC section 507.5 is amended to read as follows:

507.5 Type II hood materials. Type II hood materials shall be constructed of stainless steel not less than 0.024 inch (0.61 mm) (No. 24 Gage) in thickness, copper sheets weighing not less than 24 ounces per square foot (7.3 kg/m^2), or of other approved material and gage.

Subp. 8. **Section 507.7.** IMC section 507.7 is amended to read as follows:

507.7 Hood joints, seams, and penetrations. Hood joints, seams, and penetrations shall comply with amended IMC sections 507.7.1 and 507.7.2.

Subp. 9. **Section 507.7.1.** IMC section 507.7.1 is amended to read as follows:

507.7.1 Type I hoods. Type I hoods shall be designed, constructed, and installed in accordance with Chapter 5 of NFPA 96.

Subp. 10. **Sections 507.8 to 507.11.2.** IMC sections 507.8 to 507.11.2 are deleted.

Subp. 11. [Repealed, 34 SR 537]

Subp. 12. **Section 507.14.** IMC section 507.14 is deleted.

Subp. 13. [Repealed, 34 SR 537]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0508 SECTION 508 COMMERCIAL KITCHEN MAKEUP AIR.

Subpart 1. **Section 508.1.** IMC section 508.1 is amended to read as follows:

508.1 Makeup air. Makeup air shall be supplied during the operation of commercial kitchen exhaust systems that are provided for commercial food heat-processing appliances. The amount of makeup air supplied shall be approximately equal to the exhaust air. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by mechanical means and the exhaust and makeup air systems shall be electrically interlocked to insure that makeup air is provided whenever the exhaust system is in operation. Makeup air intake openings shall comply with IMC sections 401.4 and 401.5.

Exception: This section shall not apply to dwelling units.

508.1.1 Makeup air temperature. Makeup air shall be not less than 50°F (10°C), measured at the flow of air from the supply diffuser into the space.

508.1.2 Makeup and ventilation air distribution. Makeup and ventilation air supply diffusers located within 12 feet (3.7 m) of an exhaust hood shall be directed away from the hood.

Exception: Perimeter perforated supply plenums installed in accordance with the manufacturer's installation instructions.

Subp. 2. **Section 508.2.** IMC Section 508.2 is amended to read as follows:

508.2 Compensating hoods. Manufacturers of compensating hoods shall provide a label indicating minimum exhaust flow and maximum makeup airflow that provides capture and containment of the exhaust effluent. Short-circuit compensating hoods are prohibited.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0510 SECTION 510 HAZARDOUS EXHAUST SYSTEMS.

Subpart 1. **Section 510.1.** IMC section 510.1 is amended by adding an exception to the end of this section as follows:

Exception: Other than IMC sections 510.4 and 510.7, this section shall not apply to laboratory ventilation systems that comply with NFPA 45.

Subp. 2. [Repealed, 34 SR 537]

Subp. 3. [Repealed, 34 SR 537]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0512 SECTION 512 SUBSLAB SOIL EXHAUST SYSTEMS.

IMC section 512.1, General, is amended by adding an exception to the end of this section as follows:

Exception: For radon gas control in residential occupancies, see Minnesota Rules, parts 1303.2400 to 1303.2403.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *39 SR 690*

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1346.0601 SECTION 601 GENERAL.

IMC Section 601.1 is amended to read as follows:

601.1 Scope. Duct systems used for the movement of air in air-conditioning, heating, ventilating, and exhaust systems shall conform to the provisions of this chapter except as otherwise specified in chapters 5 and 7.

Exception: Linen chutes, trash chutes, and ducts discharging combustible material directly into any combustion chamber, shall conform to the requirements of NFPA 82. Chutes shall not be required to be open to the atmosphere, as required by NFPA 82, section 5.2.2.4.3.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

Published Electronically: *October 23, 2009*

1346.0602 SECTION 602 PLENUMS.

IMC Section 602.2.1 is amended by adding a subsection to read as follows:

Section 602.2.1.7. Piping in Plenums. Piping carrying flammable or combustible gases or liquids in a plenum must have all connections made by welding or brazing. No flanges, valves, threaded fittings, unions, or connectors are permitted.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

Published Electronically: *October 23, 2009*

1346.0603 SECTION 603 DUCT CONSTRUCTION AND INSTALLATION.

Subpart 1. [Repealed, 34 SR 537]

Subp. 2. **Table 603.4.** IMC Table 603.4 is amended to read as follows:

Table 603.4 Duct Construction Minimum Sheet Metal Thicknesses for Single Dwelling Units

	GALVANIZED		ALUMINUM MINIMUM THICKNESS Gauge
DUCT SIZE	Minimum thickness (in.)	Equivalent galvanized gauge no.	
Round ducts and enclosed rectangular ducts			
14 inches or less	0.013	30	26
Over 14 inches	0.016	28	24
Exposed rectangular ducts			
14 inches or less	0.016	28	24
Over 14 inches	0.019	26	22

For SI: 1 inch = 25.4 mm, 1 inch water gauge = 249 Pa.

Subp. 2a. **Section 603.4.** IMC section 603.4 is amended to read as follows:

603.4 Metallic ducts. All metallic ducts shall be constructed as specified in the SMACNA HVAC Duct Construction Standards - Metal and Flexible.

Exception: Ducts installed within a single dwelling unit shall have a minimum thickness as specified in IMC Table 603.4 as amended in this part.

603.4.1 Minimum fasteners. Round metallic ducts shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint.

Exception: Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion so as to prevent a hinge effect.

603.4.2 Elbows. Radius elbows with velocities exceeding 1,000 feet per minute (fpm) (5 m/sec) shall have an inside radius not less than the width of the duct or shall have turning vanes. Square throat elbows with velocities exceeding 1,000 feet per minute (fpm) (5 m/sec) shall have turning vanes.

Exception: Ducts installed within a single dwelling unit.

603.4.3 Transition fittings. Transition fittings shall be constructed with a maximum slope of 45 degrees.

603.4.4 Obstructions. Where a pipe or other obstruction passes through a duct, a streamlined sleeve must be constructed equal in type and gage to the duct. The area of the duct, at the point of obstruction, must be increased by an amount equal to the area of the streamlined sleeve.

Subp. 3. **Section 603.7.** IMC Section 603.7 is amended to read as follows:

603.7 Rigid duct penetrations. Duct system penetrations of walls, floors, ceilings, and roofs and air transfer openings in any of those building components shall be protected as required by IMC Section 607. Ducts in a private garage and ducts penetrating the walls or ceilings separating a dwelling from a private garage shall be continuous and constructed of minimum 26 gage (0.48 mm) galvanized sheet metal and shall have no openings into the garage. Fire and smoke dampers are not required in such ducts passing through the wall or ceiling separating a dwelling from a private garage, unless required by International Building Code Chapter 7.

Subp. 4. **Section 603.8.** IMC Section 603.8 is amended to read as follows:

603.8 Underground ducts. Ducts shall be approved for underground installation. Metallic ducts not having an approved protective coating shall be completely encased in a minimum of 2 inches (51 mm) of concrete.

Subp. 5. **Section 603.8.1.** IMC Section 603.8.1 is amended to read as follows:

603.8.1 Slope. Ducts shall slope to allow drainage to a point provided with access for inspection and cleaning at each low point of the duct system.

Subp. 6. **Section 603.8.2.** IMC Section 603.8.2 is amended to read as follows:

603.8.2 Sealing. Ducts shall have a polyethylene vapor retarder of at least 4 mils (0.102 mm) thickness installed around the outside. Where encased in concrete, the ducts shall be sealed and secured prior to pouring the concrete encasement.

Subp. 7. **Section 603.8.3.** IMC Section 603.8.3 is amended to read as follows:

603.8.3 Plastic ducts and fittings. Plastic ducts shall be constructed of PVC or high-density polyethylene having a minimum pipe stiffness of 8 psi (55 kPa) at 5-percent deflection when tested in accordance with ASTM D2412. Plastic duct fittings shall be constructed of either PVC or high-density polyethylene. Plastic duct and fittings shall be utilized in underground installations only. The maximum design temperature for systems utilizing plastic duct and fittings shall be 150°F (66°C).

Subp. 8. **Section 603.8.** IMC Section 603.8 is amended by adding a subsection to read as follows:

603.8.4 Drainage and insulation.

Underground ducts shall be insulated in accordance with amended IMC Section 604.1 and provided with drain tile around the perimeter of the duct system to prevent water intrusion. The top of the drain tile shall be installed at an elevation lower than the bottom of the underground duct system. The building official may approve an alternate drainage system if soil conditions are adequate.

Subp. 9. **Section 603.9.** IMC section 603.9 is amended to read as follows:

603.9 Joints, seams, and connections. All longitudinal and transverse joints, seams, and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards - Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards. All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants, or tapes. Closure systems used to seal ductwork listed and labeled in accordance with UL 181A shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic, or "181 A-H" for heat-sensitive tape. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-M" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked "181B-C." Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturer's installation instructions. Pressure-sensitive tape shall not be used as the primary sealant on ducts, unless it has been certified to comply with UL-181A or UL-181B by a nationally recognized testing laboratory and the tape is used in accordance with that certification. Unlisted duct tape is not permitted as a sealant on any duct.

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

Subp. 10. **Section 603.18.** IMC section 603.18 is amended by adding a subsection to read as follows:

603.18.3 Adjustment of volume dampers. Volume dampers shall be adjusted to the required airflow of the system and locked in place. In finished or inaccessible locations, a friction-type register box may be used.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *15 SR 71; 29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0604 SECTION 604 INSULATION.

IMC section 604.1 is amended to read as follows:

604.1 General. Duct insulation shall conform to the requirements in Minnesota Rules, chapter 1322 or 1323, as applicable.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *15 SR 71; 29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.0605 [Repealed, 29 SR 299]

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1346.0606 [Repealed, 29 SR 299]

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1346.0607 [Repealed, 29 SR 299]

1346.0607 SECTION 607, DUCT AND TRANSFER OPENINGS.

IMC section 607.6.1 is amended to read as follows:

607.6.1 Through penetrations. In occupancies other than Group I-2 and I-3, a duct constructed of approved materials in accordance with this code that penetrates a fire-resistance-rated floor or floor/ceiling assembly that connects not more than two stories is permitted without a shaft enclosure protection, provided a listed fire damper is installed at the floor line or the duct is protected in accordance with IBC section 714.4, as amended. For air transfer openings, see IBC section 712.1.8, as amended.

Exceptions:

1. A duct is permitted to penetrate three floors or less without a fire damper at each floor, provided such duct meets all of the following requirements:

   a. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel having a minimum wall thickness of 0.0187 inches (0.4712 mm) (No. 26 gage) or the duct shall be protected by an approved through-penetration firestop system installed and tested in accordance with ASTM E 814 or UL 1479. The approved through-penetration firestop system shall have an F rating or T rating of not less than the required rating of the horizontal assembly being penetrated.

   b. The duct shall open into only one dwelling unit or sleeping unit and the duct system shall be continuous from the unit to the exterior of the building.

   c. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m^2) in any 100 square feet (64,516 mm^2 per 9.3 m^2) of the floor area.

   d. The annular space around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E 119 or UL 263 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

   e. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a listed ceiling radiation damper installed in accordance with IBC section 717.6.2.1, as amended.

2. In Group I-2 and I-3 occupancies, a duct constructed of approved materials in accordance with this code that penetrates a fire-resistance-rated floor or floor/ceiling assembly that connects not more than two stories is permitted without a shaft enclosure protection, if a listed smoke/fire damper is installed at the floor line.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *39 SR 690*

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1346.0608 [Repealed, 29 SR 299]

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1346.0701 SECTION 701 GENERAL.

Subpart 1. **Section 701.4.** IMC Section 701.4 is amended to read as follows:

701.4 Engineered installations. Engineered combustion air installations shall provide adequate supply of combustion, ventilation, and dilution air, and shall be approved by the building official.

Subp. 2. **Sections 701.4.1 and 701.4.2.** IMC Sections 701.4.1 and 701.4.2 are deleted.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.0703 SECTION 703 OUTDOOR AIR.

IMC Sections 703.1 through 703.1.2.2 are amended to read as follows:

703.1 All air from the outdoors. Where all combustion and dilution air is to be provided by outdoor air, the required combustion and dilution air shall be obtained by opening the room to the outdoors. Openings connecting the room to the outdoor air shall comply with IMC Sections 703.1.1 through 703.1.2.2.

703.1.1 One permanent opening method. When any natural draft equipment is installed, one permanent opening, commencing within 12 inches (300 mm) of the bottom of the enclosure, shall be provided. When other than natural draft equipment is installed, one permanent opening, commencing within 12 inches (300 mm) of the top of the enclosure, shall be provided. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces that freely communicate with the outdoors and shall have a minimum free area of 1 inch^2/3,000 Btu/hr (700 mm^2/kW/hr) of the total input rating of all equipment located in the enclosure.

703.1.2 Two permanent openings method. Two openings shall be provided, one within 1 foot (305 mm) of the ceiling of the room and one within 1 foot (305 mm) of the floor.

703.1.2.1 Size of horizontal openings. The net free area of each opening, calculated in accordance with IMC Chapter 709 and connected to the outdoors through a horizontal duct, shall be a minimum of 1 square inch per 2,000 Btu/h (1,100 mm^2/kW) of combined input rating of the fuel-burning appliances drawing combustion and dilution air from the room. The cross-sectional area of the duct shall be equal to or greater than the required size of the opening.

703.1.2.2 Size of vertical openings. The net free area of each opening, calculated in accordance with IMC Chapter 709 and connected to the outdoors through a vertical duct, shall be a minimum of 1 square inch per 4,000 Btu/h (550 mm^2/kW) of combined input rating of the fuel-burning appliances drawing combustion and dilution air from the room. The cross-sectional area of the duct shall be equal to or greater than the required size of the opening.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537*

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1346.0706 [Repealed, 19 SR 1306]

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1346.0707 [Repealed, 29 SR 299]

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1346.0709 [Repealed, 34 SR 537]

Published Electronically: *October 23, 2009*

1346.0710 [Repealed, 29 SR 299]

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1346.0801 SECTION 801 GENERAL.

Subpart 1. **Section 801.10.** IMC Section 801.10 is amended to read as follows:

801.10 Connection to fireplace. Connection of appliances to chimney flues serving fireplaces is prohibited. Refer to IFGC Section 602 for *Decorative Appliances for Installation in Fireplaces* and IFGC Section 603 for *Log Lighters.*

Subp. 2. [Repealed, 34 SR 537]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537*

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1346.0803 SECTION 803 CONNECTORS.

IMC Section 803 is amended to read as follows:

803.10.1 Supports and joints. Connectors shall be supported in an approved manner, and joints shall be fastened with a minimum of three equally spaced sheet metal screws, rivets, or other approved means.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.0809 [Repealed, 29 SR 299]

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1346.0901 SECTION 901 GENERAL.

IMC Section 901 is amended by adding a section to read as follows:

901.5 Unvented heaters and appliances. Unvented room heaters, unvented infrared heaters, and unvented decorative appliances shall not be installed in any dwelling or occupancy.

Exception: Unvented infrared heaters may be installed when mechanical ventilation is provided to exhaust at least 4 cubic feet per minute (cfm) (0.0203 m^3/s) per 1000 Btu/hr (0.292 kW) input and it is electrically interlocked with the heater. Makeup air shall be provided to the space to be heated.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.0906 [Repealed, 19 SR 1306]

Published Electronically: *October 23, 2009*

1346.0913 [Repealed, 29 SR 299]

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1346.1001 SECTION 1001 GENERAL.

Subpart 1. **Section 1001.1.** IMC section 1001.1 is amended as follows:

1001.1 Scope. This chapter shall govern the installation, alteration, and repair of boilers, water heaters, and pressure vessels.

Exceptions:

1. Pressure vessels used for unheated water supply.

2. Portable unfired pressure vessels and Interstate Commerce Commission containers.

3. Containers for bulk oxygen and medical gas.

4. Unfired pressure vessels having a volume of 5 cubic feet (0.14 m^3) or less operating at pressures not exceeding 250 pounds per square inch (psi) (1724 kPa) and located within occupancies of Groups B, F, H, M, R, S, and U.

5. Pressure vessels used in refrigeration systems that are regulated by IMC chapter 11.

6. Pressure tanks used in conjunction with coaxial cables, telephone cables, power cables, and other similar humidity control systems.

7. Any boiler pressure vessel under the direct jurisdiction of the United States.

Subp. 1a. **Section 1001.2.** IMC section 1001 is amended by adding a section to read as follows:

1001.2 Scope; boilers; labor and industry. Anyone who installs a boiler must ensure that the boiler is inspected by the Department of Labor and Industry after installation is complete and before the boiler is placed in operation if the individual or combined Btu input exceeds:

A. 100,000 Btu/hr for steam boilers;

B. 500,000 Btu/hr for hot water supply boilers; or

C. 750,000 Btu/hr for hot water heating boilers.

Boilers utilizing fuel gas systems with Btu/hr inputs that are rated at or below items A to C shall comply with section 631 of the 2012 IFGC.

Exceptions: Boilers identified in Minnesota Statutes, section 326B.988, including the following, are not subject to this section:

1. Boilers in buildings occupied solely for residential purposes with accommodations for not more than five families.

2. Boilers under the direct jurisdiction of the United States.

3. Boilers located on farms used solely for agricultural or horticultural purposes; for the purposes of this subpart, boilers used for mint oil extraction are considered used for agricultural or horticultural purposes, provided that the owner or lessee complies with the inspection requirements contained in Minnesota Statutes, section 326B.958.

Subp. 1b. **Section 1001.3.** IMC section 1001 is amended by adding a section to read as follows:

1001.3 Scope; pressure vessels; labor and industry. The owner of a pressure vessel not specifically exempted by Minnesota Statutes, section 326B.988, must ensure that the pressure vessel is inspected by an insurance company authorized to do business in the state or the Department of Labor and Industry at least every two years.

Exceptions: Pressure vessels identified in Minnesota Statutes, section 326B.988, including the following, are not subject to this subpart:

1. Pressure vessels in buildings occupied solely for residential purposes with accommodations for not more than five families.

2. Pressure vessels under the direct jurisdiction of the United States.

3. Pressure vessels located on farms used solely for agricultural or horticultural purposes; for the purposes of this section, boilers used for mint oil extraction are considered used for agricultural or horticultural purposes, provided that the owner or lessee complies with the inspection requirements contained in Minnesota Statutes, section 326B.958.

Subp. 2. **High-pressure piping for boilers.** Pursuant to Minnesota Rules, chapter 5230, and Minnesota Statutes, sections 326B.90 to 326B.925, high-pressure piping for boilers shall be regulated by the Department of Labor and Industry for the following operating conditions:

A. Steam systems operating over 15 psi; or

B. Hot water or other heating medium operating over 30 psi and 250° F.

Subp. 3. [Repealed, 39 SR 690]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 9 s 27; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.1002 [Repealed, 29 SR 299]

Published Electronically: *October 23, 2009*

1346.1003 SECTION 1003 PRESSURE VESSELS.

IMC Section 1003.3 is amended to read as follows:

1003.3 Welding. Welding on boilers and pressure vessels shall be performed by approved welders in compliance with the *ASME Boiler and Pressure Vessel Code* Section IX and the *National Board Inspection Code.*

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

Published Electronically: *October 23, 2009*

1346.1004 SECTION 1004 BOILERS.

Subpart 1. **Section 1004.1.** IMC section 1004.1 is amended to read as follows:

1004.1 Standards. Oil-fired boilers and their control systems shall be listed and labeled in accordance with UL 726 or shall utilize burner assemblies and control systems listed and labeled in accordance with UL 296 and shall be installed in accordance with NFPA 31 and the manufacturer's installation instructions. Electric boilers and their control systems shall be listed and labeled in accordance with UL 834. Boilers with an input rating above 400,000 Btu/hr (3,660 kW) shall be designed and constructed in accordance with the standards referenced in Minnesota Statutes, section 326B.964, as applicable.

Subp. 2. **Section 1004.2.** IMC section 1004.2 is amended to read as follows:

1004.2 Installation. In addition to the requirements of this code, the installation of boilers shall conform to the manufacturer's instructions. Operating instructions of a permanent type shall be attached to the boiler. Boilers shall have all controls set, adjusted, and tested by the installer in accordance with Minnesota Rules, parts 1346.1601 to 1346.1606. A complete control diagram together with complete boiler instructions shall be furnished by the installer. The manufacturer's rating data and the nameplate shall be attached to the boiler.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *19 SR 1306; 29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

Published Electronically: *January 28, 2015*

1346.1005 [Repealed, 29 SR 299]

Published Electronically: *October 23, 2009*

1346.1006 SECTION 1006 SAFETY AND PRESSURE RELIEF VALVES AND CONTROLS.

Subpart 1. **Section 1006.4.** IMC section 1006.4 is amended to read as follows:

1006.4 Approval of safety and safety relief valves. Safety and safety relief valves shall meet the requirements of Section I, IV or VIII of the ASME Boiler and Pressure Vessel Code, as applicable. All boilers and pressure vessels shall have a safety relief valve stamped with the ASME code symbol and shall be set no higher than the maximum allowable working pressure of the pressure vessel. Safety relief valves

shall have a rated volumetric capacity greater than the boiler or pressure vessel can produce at nameplate pressure and shall have a nonadjustable pressure set point below the rating of the boiler or pressure vessel capable of relieving all excess pressure at its pressure set point. Safety and safety relief valves shall have a manual method to test the valve, without endangering the operator, to ensure proper mechanical operation of the valve.

Subp. 2. **Section 1006.6.** IMC Section 1006.6 is amended to read as follows:

1006.6 Safety and relief valve discharge. Safety and relief valve discharge pipes shall be of rigid pipe that is approved for the temperature and pressure of the system. The discharge pipe shall be no smaller than the diameter of the safety or relief valve outlet and the discharge end shall be reamed and unthreaded. Safety and relief valves shall not discharge so as to be a hazard, a potential cause of damage, or otherwise a nuisance and shall terminate within 18 inches of the floor. High-pressure steam safety valves shall be vented to the outside of the structure in accordance with Minnesota Rules, parts 5225.4100 and 5230.0990 on boilers, pressure vessels, and high-pressure piping under the jurisdiction of the Department of Labor and Industry, as applicable. Where a low-pressure safety valve or a relief valve discharges to the drainage system, the installation shall conform to the Minnesota Plumbing Code, Minnesota Rules, Chapter 4715.

Subp. 3. **Section 1006.9.** IMC section 1006 is amended by adding a section to read as follows:

1006.9 Boiler shutdown switch. A manually operated remote shutdown switch shall be located as required by ASME CSD-1.

Exception: A single hot water boiler with a rated input of less than 400,000 Btu/hr (117 kW).

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.1007 SECTION 1007 BOILER LOW-WATER CUTOFF.

Subpart 1. **Section 1007.1.** IMC section 1007.1 is amended to read as follows:

1007.1 General. Steam and hot water boilers shall be protected with a low-water fuel cutoff control to stop the combustion operation when the water level drops below the lowest safe permissible water level in accordance with the following items:

1. An automatically fired hot water boiler or group of boilers piped together having a rated input of 400,000 Btu/hr (117 kW) or above shall be equipped with an automatic low-water fuel cutoff to stop the combustion operation before the water level drops below the lowest safe permissible water level established by the boiler manufacturer.

2. A boiler installed at an elevation where all radiation in the system is below the lowest safe permissible water level shall be equipped with an automatic low-water fuel cutoff to stop the combustion operation when the water level drops below the lowest safe permissible water level established by the boiler manufacturer.

3. A low-water fuel cutoff shall be installed when recommended by the manufacturer's installation instructions or listing and when special consideration and installations will require a low-water fuel cutoff to protect a hot water or steam boiler.

4. A means shall be provided for testing the operation of the low-water fuel cutoff without requiring the entire system to be drained.

5. A watertube or coil-type boiler requiring forced circulation to prevent overheating of the tubes or coils shall have a flow-sensing device installed, in lieu of the low-water fuel cutoff, to automatically stop the combustion operation when the circulating flow is interrupted.

Subp. 2. [Repealed, 34 SR 537]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.1011 SECTION 1011 TESTS.

IMC section 1011.1 is amended to read as follows:

1011.1 Tests. Upon completion of the assembly and installation of boilers and pressure vessels, acceptance tests shall be conducted in accordance with the requirements of the Minnesota Statutes, sections 326B.958 and 326B.966. Where field assembly of pressure vessels or boilers is required, a copy of the completed Manufacturer's Data Report required by the ASME Boiler and Pressure Vessel Code shall be submitted to the building official.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.1101 SECTION 1101 GENERAL.

IMC section 1101.1 is amended by adding an exception to read as follows:

Exception: For all ammonia refrigeration systems, refer to Minnesota Rules, chapter 5230.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *39 SR 690*

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1346.1104 [Repealed, 29 SR 299]

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1346.1107 [Repealed, 29 SR 299]

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1346.1204 SECTION 1204 PIPE INSULATION.

IMC Section 1204.2 is amended to read as follows:

1204.2 Required thickness. Hydronic, steam, and condensate piping shall be insulated in accordance with this section.

Exceptions: Piping insulation is not required for:

1. Piping installed within HVAC equipment; or

2. Piping installed in basements, crawl spaces, and cellars.

Insulation Thickness for Nominal Pipe Diameters

Fluid Temperature Range °F	Runouts (see item C)	1 inch (25.4 mm) and Less	1.25 to 2" (31.7 to 50.8 mm)	2.5 to 4" (63.5 to 101.6 mm)	5 to 6" (127 to 152 mm)	8" (203 mm) and Larger
Piping System Type - Heating						
Above 350	1.5	2.5	2.5	3.0	3.5	3.5
251-350	1.5	2.0	2.5	2.5	3.5	3.5
201-250	1.0	1.5	1.5	2.0	2.0	3.5
141-200	0.5	1.5	1.5	1.5	1.5	1.5
105-140	0.5	1.0	1.0	1.0	1.5	1.5
Piping System Type - Cooling						
40-55	0.5	0.5	0.75	1	1	1
Below 40 (see item D)	1	1	1.5	1.5	1.5	1.5

A. Insulation thickness in this section assumes a k-value of 0.27. If the k-value of a product is less than 0.22, then the thickness must be adjusted to have an equivalent *R*-value.

B. For piping exposed to outdoor air, insulation thickness must be 0.5 inch (12.7 mm) greater than required in the table.

C. This column applies only to runouts (branches) 2 inches (50.8 mm) in diameter and less, not exceeding 12 feet (3658 mm) in length, to individual terminal units. All other runouts shall meet the requirements given in other columns in the table, as appropriate.

D. For applications with fluid temperatures of 32°F (0°C) and below, a vapor retarder shall be installed in accordance with IMC Section 604.11.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.1205 SECTION 1205 VALVES.

IMC Section 1205.1.6 is amended to read as follows:

1205.1.6 Expansion tanks. Shutoff valves shall be installed at connections to nondiaphragm-type expansion tanks. The pipe between the boilers or mains and the expansion tank shall be a minimum of 1/2" nominal size. The valve between boilers or mains and an expansion tank shall have permanently attached thereto a metal tag that contains the following language stamped or etched thereon: "This valve must be open at all times, except when draining expansion tank."

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

Published Electronically: *October 23, 2009*

1346.1206 SECTION 1206 PIPING INSTALLATION.

Subpart 1. **Section 1206.1.1.** IMC Section 1206.1.1 is amended to read as follows:

1206.1.1 Prohibited tee applications. Fluid in the supply side of a hydronic system shall not enter a tee fitting through the branch opening. Fluid from two returns shall not enter on the run of the same tee.

Subp. 2. **Section 1206.12.** IMC Section 1206 is amended by adding a new subsection to the end of the section to read as follows:

1206.12 Mixing of radiation. Mixing radiation with different rates of heat transfer shall not be permitted in the same heating zone.

Exception: Engineered design installations.

Subp. 3. **Section 1206.13.** IMC Section 1206 is amended by adding a new subsection to the end of the section to read as follows:

1206.13 Draining and venting. Hydronic pipes shall be installed so that the pipes can be drained and so that air can be completely removed from the system during filling.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

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1346.1207 [Repealed, 29 SR 299]

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1346.1500 CHAPTER 15, REFERENCED STANDARDS.

Subpart 1. [Repealed, 39 SR 690]

Subp. 2. **Supplemental standards.** The standards listed in this part shall supplement the list of referenced standards in chapter 15 of the 2012 IMC. The standards referenced in this rule shall be considered part of the requirements of this rule to the extent prescribed in each rule or reference.

A. ASHRAE 154-2011 *Ventilation for Commercial Cooking Operations*;

B. ASME BPVC-2007 (Sections I, II, IV, V, VIII & IX) *Boiler and Pressure Vessel Code*;

C. ASME B31.3-2008 *Process Piping Code*;

D. ASTM E1998-02 2014 *Standard Guide for Assessing Depressurization-Induced Backdrafting and Spillage from Vented Combustion Appliances*;

E. NFPA 96-2014 *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*;

F. NFPA 85-2011 *Boiler and Combustion Systems Hazards Code*;

G. NFPA 45-2011 *Standard on Fire Protection for Laboratories Using Chemicals*;

H. NFPA 90B-2012 *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*; and

I. NFPA 54-2012 *National Fuel Gas Code*.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 36 SR 1479; 39 SR 690*

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1346.1503 [Repealed, 29 SR 299]

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1346.1505 [Repealed, 29 SR 299]

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1346.1520 [Repealed, 29 SR 299]

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1346.1521 [Repealed, 29 SR 299]

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CHAPTER 16
INSTALLATION AND TESTING OF OIL OR LIQUID FUEL-FIRED EQUIPMENT

1346.1601 SECTION 1601 GENERAL.

The IMC is amended by adding a section to read as follows:

SECTION 1601

GENERAL

1601.1 General. Chapter 16 governs the installation, testing, or repair of: oil or liquid fuel burners, oil or liquid fuel burning systems, oil or liquid fuel burning equipment, and the oil or liquid fuel piping systems installed within, or in conjunction with, buildings or structures. The requirements of this chapter shall apply to the following equipment:

1. Equipment utilized to provide control of environmental conditions.

Exception: Equipment and appliances listed and labeled to an appropriate standard by a nationally recognized testing laboratory, which is qualified to evaluate the equipment or appliance, when installed and tested according to the manufacturer's installation instructions.

2. Equipment with a fuel input of 1,000,000 Btu/hr or greater.

3. Unlisted equipment.

4. Miscellaneous equipment when required by the building official.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.1602 SECTION 1602 EQUIPMENT PLACEMENT.

The IMC is amended by adding a section to read as follows:

SECTION 1602

EQUIPMENT PLACEMENT

1602.1 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 liquid fuel shall be determined and the fuel-to-air ratio set. Each oil or liquid fuel burner shall be adjusted to its proper input according to the manufacturer's instructions. Overrating the burners or the appliance is prohibited. The input range shall be appropriate to the appliance.

1. For conversion burners installed in hot water (liquid) boilers or warm air furnaces, the rate of flow of the oil or liquid fuel in Btu/h shall be adjusted to within plus or minus five percent of the design load, and not to exceed the design rate of the appliance.

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

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.1603 SECTION 1603 PILOT OPERATION.

The IMC is amended by adding a section to read as follows:

SECTION 1603

PILOT OPERATION

1603.1 Pilot operation. Igniter or pilot flames shall be effective to ignite the oil or liquid fuel at the main burner or burners and shall be adequately protected from drafts. Pilot flames shall not become extinguished during the pilot cycle when the main burner or burners are turned on or off in a normal manner either manually or by automatic controls.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.1604 SECTION 1604 BURNER OPERATION.

The IMC is amended by adding a section to read as follows:

SECTION 1604

BURNER OPERATION

1604.1 Burner operation. In making tests to determine compliance with the requirements of this section, care shall be exercised to prevent the accumulation of unburned liquid fuel in the appliance that might result in an explosion or fire.

1. The flames from the burner shall freely ignite the liquid fuel when operating at the lowest firing position.

2. Burner flames shall not flash back when the liquid fuel is turned on or off by an automatic control mechanism.

3. Main burner flames shall ignite freely from the pilot when the pilot flame is reduced to a minimum point that will actuate the pilot safety device.

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

5. Burners shall not expel liquid fuel through air openings when operating at prevailing pressure.

6. Burners shall have a proper liquid fuel air mixture to insure smooth ignition of the main burner.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

Published Electronically: *October 23, 2009*

1346.1605 SECTION 1605 TEST METHODS.

The IMC is amended by adding a section to read as follows:

SECTION 1605

TEST METHODS

1605.1 Method of test.

1. **Operational checking.** The flue gas, venting, safety, and operating controls of the appliance shall be checked to ensure proper and safe operation.

2. **Method of test - atmospheric type/induced draft type/fan assisted types.** The appliance shall be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products shall be taken from the appliance flue outlet. The sample taken shall be analyzed for carbon monoxide, carbon dioxide, and oxygen. Stack temperature shall be noted.

Note: Appliance designs incorporating induced draft assemblies may require a flue gas sample to be taken after the draft regulator or induced draft fan.

3. **Performance standards for atmospheric type.**

a. Minimum of 75 percent efficiency as determined by flue gas analysis method at appliance flue outlet.

b. Carbon monoxide concentration in flue gas not greater than 0.04 percent.

c. Stack temperature not greater than 700°F (371°C), plus ambient.

d. Carbon dioxide concentration between 8 and 13 percent, inclusive.

e. Oxygen concentration between 4 and 10 percent.

f. Smoke test no higher than #2 for light oils, or #4 for oils heavier than #4.

g. Draft shall be in accordance with burner manufacturer's specifications.

3a. **Performance standards for induced draft type/fan assisted types.**

a. Minimum of 75 percent efficiency as determined by flue gas analysis method at appliance flue outlet.

b. Carbon monoxide concentration in flue gas not greater than 0.04 percent.

c. Stack temperature not greater than 700°F (371°C), plus ambient.

d. Carbon dioxide concentration between 8 and 13 percent, inclusive.

e. Oxygen concentration between 4 and 10 percent, inclusive.

f. Smoke test no higher than #2 for light oils, or #4 for oils heavier than #4.

g. Draft shall be in accordance with burner manufacturer's specifications.

Note: Induced draft and fan assisted types of appliances may require a sample to be taken after the induced draft fan, which may cause oxygen figures in excess of the limits stated. In such cases, safe liquid fuel combustion ratios shall be maintained and be consistent with appliance listing.

4. **Method of test - power type.** The appliance shall be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products shall be taken from the appliance flue outlet. The sample shall be analyzed for carbon monoxide, carbon dioxide, and oxygen. Stack temperature shall be recorded.

5. **Performance standards for power type.**

a. Minimum of 80 percent efficiency as determined by flue gas analysis method at appliance flue outlet.

b. Carbon monoxide concentration in the flue gas not greater than 0.04 percent.

c. Stack temperature not greater than 700°F (371°C) plus ambient.

d. Carbon dioxide concentration between 8 and 13 percent, inclusive.

e. Oxygen concentration between 4 and 10 percent, inclusive.

f. Smoke test no higher than #2 for light oils, or #4 for oils heavier than #4.

g. Draft shall be in accordance with burner manufacturer's specifications.

6. **Test records filing; tag.** After completion of the test of newly installed oil or liquid fuel burner equipment as provided in this section, complete test records shall be filed with the building official on an

approved form. The tag stating the date of the test and the name of the installer shall be attached to the appliance at the main valve.

7. **Oxygen concentration.**

a. The concentration of oxygen in the undiluted flue products of oil or liquid fuel burners shall in no case be less than 3 percent nor more than 10 percent, shall be in conformance with applicable performance standards and shall be consistent with the appliance listing.

b. The allowable limit of carbon monoxide shall not exceed 0.04 percent.

c. The flue gas temperature of an oil appliance, as taken on the appliance side of the draft regulator, shall not exceed applicable performance standards and shall be consistent with the appliance listing.

8. **Approved oxygen trim system.** The oxygen figures may not apply when there is an approved oxygen trim system on the burner that is designed for that use, including a low oxygen interlock when approved by the building official.

9. **Supervised start-up.**

a. Supervised start-up may be required to verify safe operation of oil or liquid fuel burner and to provide documentation that operation is consistent with this code, listing and approval. Supervised start-up is required for all liquid fuel burners listed in b, c, and d. Supervised start-up requires that the liquid fuel burner shall be tested in the presence of the building official in an approved manner. Testing shall include safety and operating controls, input, flue gas analysis, and venting. Flue gas shall be tested at high, medium, and low fires. Provisions shall be made in the system to allow firing test in warm weather. After completion of the test of newly installed oil or liquid fuel burner equipment as provided in this section, complete test records shall be filed with the building official on an approved form. The tag stating the date of the test and the name of the installer shall be attached to the appliance at the main valve.

b. Oil and liquid fuel burners of 1,000,000 Btu/hr input or more require a supervised start-up as in a.

c. Installation of oxygen trim systems, modulating dampers, or other draft control or combustion devices require a supervised start-up as in a.

d. All direct fired heaters require a supervised start-up as in a.

10. **Control diagram.** A complete control diagram of the installation and suitable operating instructions shall be supplied to the building official.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.1606 SECTION 1606 EQUIPMENT.

The IMC is amended by adding a section to read as follows:

SECTION 1606

EQUIPMENT

1606.1 Equipment information.

A. All installations of gas or fuel burners with input above 400,000 Btu/hr 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 the furnace or boiler that the burner will be installed in if not part of a complete package.

5. A 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.

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 with input above 400,000 Btu/hr 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, shall include the following information in addition to that required in item A, subitems 1 to 6.

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.

3. A floor plan drawn to scale showing all relevant equipment. Plans and specifications shall be approved before proceeding with an installation.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.2002 [Repealed, 29 SR 299]

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1346.2500 [Repealed, 29 SR 299]

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1346.2600 [Repealed, 29 SR 299]

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MINNESOTA FUEL GAS CODE

1346.5050 TITLE; INCORPORATION BY REFERENCE.

Parts 1346.5050 to 1346.6014 are known and may be cited as the "Minnesota Fuel Gas Code."

Chapters 2 to 8 of the 2012 edition of the International Fuel Gas Code ("IFGC"), as promulgated by the International Code Council, Inc., Washington, DC, are incorporated by reference as part of the Minnesota Fuel Gas Code except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended in this code. Portions of this code reproduce excerpts from the 2012 IFGC, International Code Council, Inc., Washington, DC, copyright 2012, reproduced with permission, all rights reserved.

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

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 1 s 1; art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

Published Electronically: *January 28, 2015*

1346.5060 REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL (ICC) CODES.

Subpart 1. **General.** References to other codes and standards promulgated by the International Code Council in the IMC and IFGC are modified in subparts 2 to 10.

Subp. 2. **Building code.** References to the International Building Code mean the Minnesota Building Code, Minnesota Rules, chapter 1305, adopted pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

Subp. 3. **Residential code.** References to the International Residential Code mean the Minnesota Residential Code, Minnesota Rules, chapter 1309, adopted pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

Subp. 4. **Electrical code.** References to the International Code Council Electrical Code mean the Minnesota Electrical Code, Minnesota Rules, chapter 1315, adopted pursuant to Minnesota Statutes, section 326B.35.

Subp. 5. **Mechanical code.** References to the International Mechanical Code mean the Minnesota Mechanical Code, Minnesota Rules, parts 1346.0050 to 1346.1500, adopted pursuant to Minnesota Statutes, section 326B.106, subdivision 1.

Subp. 6. **Plumbing code.** References to the International Plumbing Code mean the Minnesota Plumbing Code, Minnesota Rules, chapter 4715, adopted pursuant to Minnesota Statutes, section 326B.106, subdivisions 1 and 2.

Subp. 7. **Private sewage disposal code.** References to the International Private Sewage Disposal Code mean the Minnesota Pollution Control Agency's minimum standards and criteria for individual sewage treatment systems, Minnesota Rules, chapter 7080, adopted pursuant to Minnesota Statutes, chapters 103F, 103G, 115, and 116.

Subp. 8. **Energy conservation code.** References to the International Energy Conservation Code mean the Minnesota Residential Energy Code, Minnesota Rules, chapter 1322, and the Minnesota Commercial Energy Code, Minnesota Rules, chapter 1323, adopted pursuant to Minnesota Statutes, section 326B.115.

Subp. 9. **Property maintenance code.** References to the International Property Maintenance Code are deleted.

Subp. 10. **Fire code.** References to the International Fire Code mean the Minnesota State Fire Code, Minnesota Rules, chapter 7511, adopted pursuant to Minnesota Statutes, chapter 299F.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *39 SR 690*

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1346.5101 ADMINISTRATION.

Subpart 1. **Scope.** This code shall apply to the installation of fuel gas piping systems, fuel gas appliances, gaseous hydrogen systems, and related accessories in accordance with this code.

Subp. 2. **Gaseous hydrogen systems.** Gaseous hydrogen systems shall be regulated by IFGC chapter 7, as amended.

Subp. 3. **Piping systems.** This code applies to piping systems for natural gas with an operating pressure of 125 pounds per square inch gauge (psig) (862 kPa gauge) or less, and for LP-gas with an operating pressure of 20 psig (140 kPa gauge) or less, except as provided in IFGC section 402.6.1. Coverage shall extend from the point of delivery to the outlet of the appliance shutoff valves. Piping system requirements shall include design, materials, components, fabrication, assembly, installation, testing, inspection, operation, and maintenance.

Subp. 4. **Gas appliances.** This code applies to gas appliances and related accessories on the side of the meter that supply gas to the building piping system and shall include installation, combustion, and ventilation air and venting and connections to piping systems.

Subp. 5. **Systems, appliances, and equipment outside the scope.** This code shall not apply to the following:

1. Portable LP-gas appliances and equipment of all types that is not connected to a fixed fuel piping system.

2. Installation of farm appliances and equipment such as brooders, dehydrators, dryers, and irrigation equipment.

3. Raw material (feedstock) applications except for piping to special atmosphere generators.

4. Oxygen-fuel gas cutting and welding systems.

5. Industrial gas applications using gases such as acetylene and acetylenic compounds, hydrogen, ammonia, carbon monoxide, oxygen, and nitrogen.

6. Petroleum refineries, pipeline compressor or pumping stations, loading terminals, compounding plants, refinery tank farms, and natural gas processing plants.

7. Integrated chemical plants or portions of such plants where flammable or combustible liquids or gases are produced by, or used in, chemical reactions.

8. LP-gas installations at utility gas plants.

9. Liquefied natural gas (LNG) installations.

10. Fuel gas piping in power and atomic energy plants.

11. Proprietary items of equipment, apparatus, or instruments such as gas-generating sets, compressors, and calorimeters.

12. LP-gas equipment for vaporization, gas mixing, and gas manufacturing.

13. Temporary LP-gas piping for buildings under construction or renovation that is not to become part of the permanent piping system.

14. Installation of LP-gas systems for railroad switch heating.

15. Installation of hydrogen gas, LP-gas, and compressed natural gas (CNG) systems on vehicles.

16. Except as provided in IFGC section 401.1.1, gas piping, meters, gas pressure regulators, and other appurtenances used by the serving gas supplier in the distribution of gas, other than undiluted LP-gas.

17. Building design and construction, except as specified in this rule.

18. Piping systems for mixtures of gas and air within the flammable range with an operating pressure greater than 10 psig (69 kPa gauge).

19. Portable fuel cell appliances that are neither connected to a fixed piping system nor interconnected to a power grid.

Subp. 6. **Other fuels.** The requirements for the design, installation, maintenance, alteration, and inspection of mechanical systems operating with fuels other than fuel gas shall be regulated by the Minnesota Mechanical Code, parts 1346.0050 to 1346.1500.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *34 SR 537; 39 SR 690*

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1346.5201 SECTION 201 (IFGC) GENERAL.

IFGC Section 201.4 is amended to read as follows:

201.4 Terms not defined. Where terms are not defined through the methods authorized by this chapter, the Merriam-Webster Collegiate Dictionary, available at www.m-w.com, shall be considered as providing ordinarily accepted meanings. The dictionary is incorporated by reference, is subject to frequent change, and is available through the Minitex interlibrary loan system.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.5202 SECTION 202 (IFGC) GENERAL DEFINITIONS.

Subpart 1. **Section 202.** IFGC section 202 is amended by adding the following definitions:

APPROVED. "Approved" means approval by the building official, pursuant to the Minnesota State Building Code, by reason of: inspection, investigation, or testing; accepted principles; computer simulations; research reports; or testing performed by either a licensed engineer or by a locally or nationally recognized testing laboratory.

CODE. For purposes of parts 1346.5050 to 1346.6014, "the code" or "this code" means the portion of this rule that adopts the 2012 International Fuel Gas Code, with amendments.

GAS PIPING SYSTEM - LOW PRESSURE. A system that operates at a pressure not exceeding 14 inches of water column. LPG is a pressure not exceeding 14 inches of water column.

GAS PIPING SYSTEM - MEDIUM PRESSURE. A system that operates at a pressure exceeding 14 inches of water column but not exceeding 5 psig. LPG is a pressure exceeding 14 inches of water column but not exceeding 20 psig.

GAS PIPING SYSTEM - HIGH PRESSURE. A system that operates at a pressure exceeding 5 psig. LPG is a pressure exceeding 20 psig.

POWER VENT APPLIANCE. An appliance with a venting system that uses a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.

Subp. 2. **Definition amended.** The definition of "Ready Access (to)" in IFGC Section 202, is amended to read as follows:

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction, and without requiring the use of portable access equipment (see "Access").

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5301 SECTION 301 (IFGC) GENERAL.

IFGC section 301.3 is amended to read as follows:

301.3 Listed and labeled. Appliances regulated by this code shall be listed and labeled to an appropriate standard by a nationally recognized testing laboratory which is qualified to evaluate the appliance, unless otherwise approved in accordance with the administrative provisions of the Minnesota Building Code, Minnesota Rules, chapter 1300. The approval of unlisted appliances shall be based upon engineering evaluation. Unlisted appliances shall be installed with clearances to combustibles in accordance with NFPA 54. Unlisted appliances with a fuel input rating of less than 12,500,000 Btu/hr (3,660 kW) shall have fuel gas trains, controls and safety devices installed in accordance with Part CF, Combustion Side Control, of ASME CSD-1. Unlisted appliances with a fuel input rating of 12,500,000 Btu/hr (3,660 kW) or greater shall have fuel gas trains, controls and safety devices installed in accordance with NFPA 85.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5303 [Repealed, 34 SR 537]

1346.5303 SECTION 303, (IFGC) APPLIANCE LOCATION.

IFGC section 303.3, Prohibited locations, is amended by deleting items 3 and 4 from the list of exceptions.

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *39 SR 690*

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1346.5304 SECTION 304 (IFGC) COMBUSTION, VENTILATION AND DILUTION AIR.

Subpart 1. **Section 304.1.** IFGC section 304 is amended by adding language to the end of the first paragraph and additional exceptions to read as follows:

304.1 General. Refer to IFGC Appendix E for Worksheet E-1, "Residential Combustion Air Calculation Method" and Table E-1, "Residential Combustion Air Required Volume " in part 1346.6012.

Exceptions:

1. Direct vent appliances.

2. Type 1 clothes dryers that are provided with makeup air in accordance with the manufacturer's installation instructions.

3. Replacement of a fuel gas utilization appliance that complies with all of the following conditions:

3.1 Replacement appliance has a Btu/hr (kW) input rating not greater than 30 percent above the original appliance input rating.

3.2 Combustion air provisions meet the code requirements in effect at the time of the original installation.

3.3 Replacement appliance shall not cause an existing mechanical system to become unsafe, hazardous, or overloaded.

4. Combustion air may be determined using Table 304.1 for gas-fired appliances when combustion air is provided from a single opening from the outdoors, commencing within 12 inches of the bottom of the enclosure.

5. Combustion air for power burner appliances equipped with a draft control device and having an input above 400,000 Btu/hr shall have a net free area of 0.2 square inches per 1,000 Btu/hr. Combustion air shall be provided from a single opening from the outdoors, terminating within 12 inches of the bottom of the enclosure. In lieu of this requirement, combustion air requirements specified by the manufacturer for a specific power burner appliance may be approved by the building official.

6. Combustion air for power burner appliances not equipped with a draft control device and having an input above 400,000 Btu/hr shall have a net free area of 0.1 square inches per 1,000 Btu/hr. Combustion air shall be provided from a single opening from the outdoors, terminating within 12 inches of the bottom of the enclosure. In lieu of this requirement, combustion air requirements specified by the manufacturer for a specific power burner appliance may be approved by the building official.

Table 304.1

Combustion Air Requirements for Gas-Fired Appliances When the Combined Input is Up to and Including 400,000 Btu/hr

Total input of appliances[1], thousands of Btu/hr (kW)	Required free area of air-supply opening or duct, square inches (sq mm)	Acceptable approximate round duct equivalent diameter[2], inch (mm)
25 (8)	7 (4,500)	3 (75)
50 (15)	7 (4,500)	3 (75)
75 (23)	11 (7,000)	4 (100)
100 (30)	14 (9,000)	4 (100)
125 (37)	18 (12,000)	5 (125)
150 (45)	22 (14,000)	5 (125)
175 (53)	25 (16,000)	6 (150)
200 (60)	29 (19,000)	6 (150)

225 (68)	32 (21,000)	6 (150)
250 (75)	36 (23,000)	7 (175)
275 (83)	40 (26,000)	7 (175)
300 (90)	43 (28,000)	7 (175)
325 (98)	47 (30,000)	8 (200)
350 (105)	50 (32,000)	8 (200)
375 (113)	54 (35,000)	8 (200)
400 (120)	58 (37,000)	9 (225)

[1]For total inputs falling between listed capacities, use next largest listed input.

[2]If flexible duct is used, increase the duct diameter by one inch.[*]

[*]Flexible duct shall be stretched with minimal sags.

Subp. 2. [Repealed, 34 SR 537]

Subp. 2a. **Section 304.6.1.** IFGC section 304.6.1, Two-permanent-openings method, is deleted in its entirety.

Subp. 3. **Section 304.6.2.** IFGC section 304.6.2 is amended to read as follows:

304.6.2 One permanent opening method. When any natural draft appliances are installed, one permanent opening, commencing within 12 inches (300 mm) of the bottom of the enclosure, shall be provided. When other than natural draft appliances are installed, one permanent opening, commencing within 12 inches (300) of the top of the enclosure, shall be provided. The appliances shall have clearances of at least 1 inch (25 mm) from the sides and back and 6 inches (160 mm) from the front of the appliance. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces that freely communicate with the outdoors and shall have a minimum free area of 1 inch^2/3,000 Btu/hr (700 mm^2/kW) of the total input rating of all appliances located in the enclosure.

Subp. 4. [Repealed, 34 SR 537]

Subp. 5. [Repealed, 34 SR 537]

Subp. 6. [Repealed, 34 SR 537]

Subp. 7. [Repealed, 34 SR 537]

Subp. 8. **Section 304.11.** IFGC Section 304.11 is amended to read as follows:

304.11 Combustion air ducts. Combustion air ducts shall comply with the following:

1. Ducts shall be of galvanized steel or an equivalent corrosion-resistant material. If flexible duct is used, increase the duct diameter by one inch. Flexible duct shall be stretched with minimal sags.

2. Ducts shall terminate in an unobstructed space, allowing free movement of combustion air to the appliances.

3. Ducts shall serve a single space.

4. Ducts shall not service both upper and lower combustion air openings where both such openings are used. The separation between ducts serving upper and lower combustion air openings shall be maintained to the source of combustion air.

5. Ducts shall not terminate in an attic space.

6. The remaining space surrounding a chimney liner, gas vent, special gas vent, or plastic piping installed within a masonry, metal or factory-built chimney shall not be used to supply combustion air.

Exception: Direct vent gas-fired appliances designed for installation in a solid fuel-burning fireplace where installed in accordance with the listing and the manufacturer's instructions.

7. Vertical ducts shall not extend through two or more stories without prior approval from the building official.

8. Ducts shall not terminate in the return air plenum of a forced air heating system unless installed in accordance with the heating equipment manufacturer's installation instructions.

9. Combustion air intake openings shall be located to avoid intake of exhaust air in accordance with IMC Section 401.5 and IFGC Section 503.8 and shall be covered with corrosion resistant screen of not less than 1/4 inch (6.4 mm) mesh.

10. Combustion air intake openings shall be located at least 12 inches (305 mm) above adjoining grade level.

11. When both makeup air and combustion air openings are required, they shall be provided through separate openings to the outdoors.

Exception: Combination makeup air and combustion air systems may be approved by the building official where they are reasonably equivalent in terms of health, safety, and durability.

Subp. 9. [Repealed, 34 SR 537]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5306 SECTION 306 (IFGC) ACCESS AND SERVICE SPACE.

Subpart 1. **Section 306.5.** IFGC section 306.5 is amended to read as follows:

306.5 Mechanical equipment and appliances on roofs or elevated structures. Where mechanical equipment or appliances requiring periodic inspection, service or maintenance are installed on roofs or elevated structures, a permanent stair shall be provided for access.

Exception: A portable ladder may be used for dwellings, replacement equipment and appliances on existing buildings, and for exterior roof access points not exceeding 16 feet (4.9 m) above grade, unless the building official determines that the unique shape of the roof does not allow safe access with a portable ladder.

The permanent stair shall be as required by relevant safety regulations, but shall not be less than the following:

1. The stair shall be installed at an angle of not more than 60 degrees measured from the horizontal plane.

2. The stair shall have flat treads at least 6 inches (152 mm) deep and a clear width of at least 18 inches (457 mm) with equally spaced risers at least 10.5 inches (267 mm) high and not exceeding 14 inches (356 mm).

3. The stair shall have intermediate landings not exceeding 18 feet (5.5 m) vertically.

4. Continuous handrails shall be installed on both sides of the stair.

5. Interior stairs shall terminate at the under side of the roof at a hatch or scuttle of at least 8 square feet (0.74 m^2) with a minimum dimension of 20 inches (508 mm).

6. When a roof access hatch or scuttle is located within 10 feet (3.0 m) of a roof edge, a guard shall be installed in accordance with IFGC section 306.6.

7. Exterior stairs shall terminate at the roof access point or at a level landing of at least 8 square feet (0.74 m^2) with a minimum dimension of 20 inches (508 mm). The landing shall have a guard installed in accordance with IFGC section 306.6.

Subp. 2. **Section 306.5.** IFGC Section 306.5 is amended by adding a section to read as follows:

306.5.3 Permanent ladders. Where a change in roof elevation greater than 30 inches (762 mm) but not exceeding 16 feet (4.9 m) exists, a permanent ladder shall be provided. The ladder may be vertical and shall be as required by relevant safety regulations, but shall not be less than the following:

1. Width shall be at least 16 inches (406 mm).

2. Rung spacing shall be a maximum of 14 inches (356 mm).

3. Toe space shall be at least 6 inches (152 mm).

4. Side railings shall extend at least 30 inches (762 mm) above the roof or parapet wall.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.5401 SECTION 401 (IFGC) GENERAL.

Section 401.5.1. IFGC Section 401.5 is amended by adding a section to read as follows:

401.5.1 Medium and high pressure identification. Exposed medium and high pressure gas piping systems shall include the operating pressure on the label required by Section 401.5.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.5402 SECTION 402 (IFGC) PIPE SIZING.

Subpart 1. [Repealed, 34 SR 537]

Subp. 2. **Section 402.4, Tables.** IFGC Section 402.4 is amended by adding tables as follows:

Table 402.4(2)A

Pipe Sizing Table for Natural Gas

Schedule 40 Metallic Pipe			Inlet Pressure			7" wc	
For 0.60 Specific Gravity Natural Gas			Pressure Drop			1" wc	
Nominal	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2
Actual ID	0.364	0.493	0.622	0.824	1.049	1.380	1.610
Length (ft)			Maximum Capacity in Cubic Feet of Gas per Hour				
10	61	135	248	518	976	2004	3003
20	42	93	170	356	671	1378	2064
30	34	74	137	286	539	1106	1657
40	29	64	117	245	461	947	1419
50	25	56	104	217	409	839	1257
60	23	51	94	197	370	760	1139
80	20	44	80	168	317	651	975
100	17	39	71	149	281	577	864
125	16	34	63	132	249	511	766
150	14	31	57	120	226	463	694
175	13	29	53	110	208	426	638
200	12	27	49	102	193	396	594
250	11	24	43	91	171	351	626
300	10	21	39	82	155	318	477
350	9	20	36	76	143	293	439
400	8	18	34	70	133	272	408
450	8	17	32	66	124	256	383
500	7	16	30	62	118	241	362
Nominal	2	2-1/2	3	4	5	6	8
Actual ID	2.067	2.469	3.068	4.026	5.047	6.065	7.891
Length (ft)			Maximum Capacity in Cubic Feet of Gas per Hour				
10	5784	9218	16296	33239	60134	97370	194195
20	3975	6336	11200	22845	41330	66922	133469
30	3192	5088	8994	18345	33189	53741	107181
40	2732	4354	7698	115701	28406	45995	91733

50	2421	3859	6822	13916	25175	40765	81301
60	2194	3497	6182	12609	22811	36936	73665
80	1878	2993	5291	10791	19523	31612	63047
100	1664	2652	4689	9564	17303	28017	55878
125	1475	2351	4156	8477	15335	24831	49523
150	1336	2130	3765	7680	13895	22499	44872
175	1229	1960	3464	7066	12783	20699	41281
200	1144	1823	3223	6573	11892	19256	38404
250	1014	1616	2856	5826	10540	17066	34037
300	918	1464	2588	5279	9550	15463	30840
350	845	1347	2381	4856	8786	14226	28373
400	786	1253	2215	4518	8173	13235	26395
450	738	1176	2078	4239	7669	12418	24766
500	697	1110	1963	4004	7244	11730	23394

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537*

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1346.5403 SECTION 403 (IFGC) PIPING MATERIALS.

Subpart 1. **Section 403.8.** IFGC Section 403.8 is amended to read as follows:

403.8 Protective coating. Where in contact with material, or passing through concrete or other abrasive material or atmosphere exerting a corrosive action, metallic piping and fittings coated with a corrosion-resistant material, sleeve, or casing shall be used. Steel pipe exposed in exterior locations shall be galvanized or coated with approved corrosion-resistant material. External or internal coatings or linings used on piping or components shall not be considered as adding strength.

Subp. 1a. **Section 403.10.1.** IFGC section 403.10.1 is amended to read as follows:

403.10.1 Pipe joints. Pipe joints shall be threaded, flanged, brazed, welded, or made with press-connect fittings complying with ANSI LC-4. Where nonferrous pipe is brazed, the brazing materials shall have a melting point in excess of 1,000°F (538°C). Brazing alloys shall not contain more than 0.05 percent phosphorus.

Subp. 1b. **Section 403.10.2.** IFGC section 403.10.2 is amended to read as follows:

403.10.2 Tubing joints. Tubing joints shall be either made with approved gas tubing fittings or brazed with a material having a melting point in excess of 1,000°F (538°C), or made by press connect fittings complying with ANSI LC-4, Press-Connect Copper and Copper Alloy, Fittings for Use in Fuel Gas Distribution Systems. Brazing alloys shall not contain more than 0.05-percent phosphorus.

Subp. 2. **Section 403.10.4.** IFGC Section 403.10.4 is amended to read as follows:

403.10.4 Metallic fittings. Metallic fittings, including valves, strainers, and filters, shall comply with the following:

1. Threaded fittings in sizes larger than 2 inches (51 mm) shall not be used except where approved.

2. Fittings used with steel or wrought-iron pipe shall be steel, brass, bronze, or malleable iron.

3. Fittings used with copper or brass pipe shall be copper, brass, or bronze.

4. Fittings used with aluminum alloy pipe shall be of aluminum alloy.

5. Brass, bronze, or copper fittings. Fittings, if exposed to soil, shall have a minimum 80 percent copper content.

6. Aluminum alloy fittings. Threads shall not form the joint seal.

7. Zinc-aluminum alloy fittings. Fittings shall not be used in systems containing flammable gas-air mixtures.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5404 SECTION 404 (IFGC) PIPING SYSTEM INSTALLATION.

Subpart 1. **Section 404.6.** IFGC section 404.6 is amended to read as follows:

404.6 Underground penetrations prohibited. Gas piping shall not penetrate building foundation walls at any point below grade. Gas piping shall enter and exit a building at a point above grade and the annular space between the pipe and the wall shall be sealed. If necessary due to structural conditions, underground piping may be installed with prior approval from the building official.

Subp. 2. **Section 404.8.** IFGC section 404.8 is amended to read as follows:

404.8 Piping in solid floors. Piping in solid floors shall be laid in channels in the floor and covered in a manner that will allow access to the piping with a minimum amount of damage to the building. Where such piping is subject to exposure to excessive moisture or corrosive substances, the piping shall be protected in an approved manner. As an alternative to installation in channels, the piping shall be installed in a conduit of Schedule 40 steel, wrought iron, PVC, or ABS pipe in accordance with IFGC section 404.8.1 or 404.8.2. If necessary due to structural conditions, piping may be installed in other locations with prior approval from the building official.

Subp. 3. [Repealed, 34 SR 537]

Subp. 4. [Repealed, 34 SR 537]

Subp. 5. **Section 404.14.** IFGC section 404.14 is amended to read as follows:

404.14 Piping underground beneath buildings. Piping installed underground beneath buildings is prohibited except where the piping is encased in a conduit of wrought iron, plastic pipe, or steel pipe designed to withstand the superimposed loads and with prior approval from the building official. Such conduit shall extend into an occupiable portion of the building and, at the point where the conduit terminates in the building, the space between the conduit and the gas piping shall be sealed to prevent the possible entrance of any gas leakage. Where the end sealing is capable of withstanding the full pressure of the gas pipe, the conduit shall be designed for the same pressure as the pipe. Such conduit shall extend not less

than 4 inches (102 mm) outside the building, shall be vented above grade to the outdoors, and shall be installed so as to prevent the entrance of water and insects. Such conduit shall be identified with a yellow label marked "Gas" in black letters, spaced at intervals not exceeding 5 feet (1,524 mm), and shall be located a minimum of 6 inches (152 mm) below the bottom of the concrete floor. The conduit shall be protected from corrosion in accordance with IFGC section 404.11.

Subp. 6. [Repealed, 39 SR 690]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5406 SECTION 406 (IFGC) INSPECTION, TESTING AND PURGING.

Subpart 1. **Section 406.1.2.** IFGC section 406.1.2 is amended to read as follows:

406.1.2 Alterations, repairs and additions. In the event alterations, repairs or additions are made following the pressure test, the affected piping shall be tested.

Exception: Equipment or appliance replacement, minor alterations, repairs, or additions, provided the work is inspected and connections are tested with a noncorrosive leak-detecting fluid or other leak-detecting methods approved by the building official.

Subp. 2. **Section 406.1.5.** IFGC Section 406.1.5 is deleted.

Subp. 3. **Section 406.4.1.** IFGC Section 406.4.1 is amended to read as follows:

406.4.1 Test pressure. The test pressure to be used shall be no less than one and one-half times the proposed maximum working pressure, but not less than 25 psig (172 kPa gauge), irrespective of design pressure. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe.

Subp. 4. **Section 406.4.2.** IFGC Section 406.4.2 is amended to read as follows:

406.4.2 Test duration. Test duration shall be not less than one-half hour. When testing a system in a single-family dwelling, the test duration shall be permitted to be reduced to 10 minutes with prior approval from the building official.

Subp. 5. **Section 406.4.** IFGC Section 406.4 is amended by adding a section to read as follows:

406.4.3 Test gauges. Tests which utilize dial gauges shall be performed with gauges of 2 psi (13.8 kPa) incrementation or less and shall have a pressure range not greater than twice the test pressure applied. The test pressure shall be within the middle 50 percent of the test gauge pressure range.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5407 SECTION 407 (IFGC) PIPING SUPPORT.

IFGC Section 407 is amended by adding a section to read as follows:

407.3 Expansion and flexibility. Piping systems shall be designed to have sufficient flexibility to prevent thermal expansion or contraction from causing excessive stresses in the piping material, excessive bending or loads at joints, or undesirable forces at points of connections to equipment and at anchorage or guide points.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.5408 SECTION 408 (IFGC) DRIPS AND SLOPED PIPING.

IFGC section 408.4 is amended to read as follows:

408.4 Sediment trap. A sediment trap shall be installed before all automatically controlled gas appliances where a sediment trap is not incorporated as part of the appliance. The sediment trap shall be installed as close to the inlet of the appliance as practical, before any regulator or automatic gas valve, and ahead of all pounds-to-inches pressure regulators. The sediment trap shall be either a tee fitting with a capped nipple, a minimum of 3 inches (80 mm) in length, in the bottom opening of the run of the tee, or other device approved as an effective sediment trap. If a tee fitting is used, it shall provide a 90-degree change of direction of gas flow and the cap shall be at an elevation lower than the tee fitting.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 39 SR 690*

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1346.5409 SECTION 409 (IFGC) SHUTOFF VALVES.

Subpart 1. **Section 409.1.** IFGC section 409.1 is amended by adding subsection 409.1.4 to read as follows:

409.1.4 Main shutoff valve. Piping systems shall be provided with an approved main shutoff valve before the first branch line. The main shutoff valve shall be installed in the first available location inside the building that provides ready access and shall have a permanently attached handle.

Exception: Gas piping that serves an appliance on the roof of a building shall install the shutoff valve on the roof, ten feet or more from the roof's edge, before the first branch line.

Main shutoff valves controlling several gas piping systems shall be protected from physical damage and shall be placed an adequate distance from each other so they will be easy to operate.

Subp. 2. **Section 409.2.** IFGC Section 409.2 is amended to read as follows:

409.2 Meter valve. Every meter shall be equipped with a shutoff valve located on the side of the meter that supplies gas to the building piping system. The main shutoff valve required in subpart 1 shall serve as the shutoff valve.

Subp. 3. **Section 409.3.1.** IFGC Section 409.3.1 is amended to read as follows:

409.3.1 Multiple tenant buildings. In multiple tenant buildings, where a common piping system is installed to supply other than one- and two-family dwellings, shutoff valves shall be provided for each tenant. Each tenant shall have access to the shutoff valve serving that tenant's space. A main shutoff valve

shall be installed in a common utility room or otherwise located to provide ready access to all tenants of the building, and it shall not be located in a locked room without prior permission from the building official.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5410 SECTION 410 (IFGC) FLOW CONTROLS.

IFGC Section 410.3 is amended to read as follows:

410.3 Venting of regulators. Pressure regulators that require a vent shall have an independent vent to the outside of the building. The vent shall be designed to prevent the entry of water or foreign objects. Regulator vents shall terminate at least 3 feet (914 mm) from doors, operable windows, nonmechanical intake openings, and openings into direct-vent appliances. The vent termination shall be located at least 12 inches (305 mm) above grade and shall be suitably screened and hooded to prevent accidental closure of the vent pipe.

Exception: A vent to the outside of the building is not required for regulators equipped with and labeled for utilization with approved vent-limiting devices installed in accordance with the manufacturer's instructions.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.5501 SECTION 501 (IFGC) GENERAL.

Subpart 1. **Section 501.7.** IFGC Section 501.7 is amended to read as follows:

501.7 Connection to fireplace. Connection of any appliance to chimney flues serving fireplaces is prohibited. Refer to IFGC Section 602 for Decorative Appliances for Installation in Fireplaces and IFGC Section 603 for Log Lighters.

Subp. 2. **Section 501.8.** IFGC section 501.8 is amended to read as follows:

501.8 Appliances not required to be vented. The following appliances shall not be required to be vented.

1. Ranges.

2. Built-in domestic cooking units listed and marked for optional venting.

3. Hot plates and laundry stoves.

4. Type 1 clothes dryers (Type 1 clothes dryers shall be exhausted in accordance with the requirements of IFGC sections 613 and 614).

5. A single booster-type automatic instantaneous water heater, where designed and used solely for the sanitizing rinse requirements of a dishwashing machine, provided that the heater is installed in a commercial kitchen having a mechanical exhaust system. Where installed in this manner, the draft hood, if required, shall be in place and unaltered and the draft hood outlet shall be not less than 36 inches (914 mm) vertically and 6 inches (152 mm) horizontally from any surface other than the heater.

6. Refrigerators.

7. Counter appliances.

8. Direct-fired make-up air heaters.

9. Specialized equipment of limited input such as laboratory burners and gas lights.

Automatically operated equipment vented with a hood or exhaust system shall comply with IFGC section 503.3.4. Where the appliances and equipment listed in items 5 to 9 are installed so that the aggregate input rating exceeds 20 Btu/hr per cubic foot (207 watts per m^3) of volume of the room or space in which such appliances and equipment are installed, one or more shall be provided with venting systems or other approved means for conveying the vent gases to the outdoor atmosphere so that the aggregate input rating of the remaining unvented appliances and equipment does not exceed the 20 Btu/hr per cubic foot (207 watts per m^3) figure. Where the room or space in which the equipment or appliance is installed is directly connected to another room or space by a doorway, archway, or other opening of comparable size that cannot be closed, the volume of such adjacent room or space shall be permitted to be included in the calculations.

Subp. 3. **Section 501.12.** IFGC Section 501.12 is amended to read as follows:

501.12 Residential and low-heat appliances flue lining systems. An approved metallic liner shall be installed in masonry chimneys used to vent gas appliances. The liner shall comply with one of the following:

1. Aluminum (1100 or 3003 alloy or equivalent) not less than 0.032 inches thick to 8 inches diameter.

2. Stainless steel (304 or 430 alloy or equivalent) not less than 26 gauge (0.018 inches thick) to 8 inches diameter or not less than 24 gauge (0.024 inches thick) 8 inches diameter and larger.

3. Listed vent systems.

Exception: Metallic liners are not required when each appliance connected into the masonry chimney has a minimum input rating greater than 400,000 Btu/hr.

501.12.1 Terminations. Metallic liners shall terminate in accordance with the requirements for gas vents in IFGC Section 503.6.6.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5503 SECTION 503 (IFGC) VENTING OF APPLIANCES.

Subpart 1. **Section 503.2.2.** IFGC Section 503.2.2 is deleted.

Subp. 2. [Repealed, 34 SR 537]

Subp. 3. **Section 503.5.5.** IFGC section 503.5.5 is amended to read as follows:

503.5.5 Size of chimneys. The effective area of a chimney venting system serving listed appliances with draft hoods, Category I appliances, and other appliances listed for use with Type B vents shall be in accordance with IFGC section 504 or other approved engineering methods.

Exceptions:

1. As an alternate method of sizing an individual chimney venting system for a single appliance with a draft hood, the effective areas of the vent connector and chimney flue shall be not less than the area of the appliance flue collar or draft hood outlet, nor greater than four times the draft hood outlet area.

2. As an alternate method for sizing a chimney venting system connected to two appliances with draft hoods, the effective area of the chimney flue shall be not less than the area of the larger draft hood outlet plus 50 percent of the area of the smaller draft hood outlet, nor greater than four times the smallest draft hood outlet area.

Where an incinerator is vented by a chimney serving other gas utilization appliance, the gas input to the incinerator shall not be included in calculating chimney size, provided the chimney flue diameter is not less than 1 inch (25.4 mm) larger in equivalent diameter than the diameter of the incinerator flue outlet.

Subp. 4. **Section 503.5.6.** IFGC Section 503.5.6 is amended to read as follows:

503.5.6 Inspection of chimneys. Before replacing an existing appliance or connecting a vent connector to a chimney, the chimney passageway shall be examined to ascertain that it is clear and free of obstructions and it shall be cleaned if previously used for venting solid or liquid fuel-burning appliances or fireplaces.

Exception: Existing chimneys shall be lined in accordance with amended IFGC Section 501.12 unless otherwise approved by the building official.

Subp. 5. [Repealed, 34 SR 537]

Subp. 6. **Section 503.6.9.1.** IFGC Section 503.6.9.1 is amended to read as follows:

503.6.9.1 Category I appliances. The sizing of natural draft venting systems serving one or more listed appliances equipped with a draft hood or appliances listed for use with Type B gas vent, installed in a single story of a building, shall be in accordance with one of the following methods:

1. The provisions of Section 504.

2. For sizing an individual gas vent for a single draft-hood-equipped appliance, the effective area of the vent connector and the gas vent shall be not less than the area of the appliance draft hood outlet, nor greater than four times the draft hood outlet area.

3. For sizing a gas vent connected to two appliances with draft hoods, the effective area of the vent shall be not less than the area of the larger draft hood outlet plus 50 percent of the area of the smaller draft hood outlet, nor greater than four times the smaller draft hood outlet area.

4. Approved engineering practices.

Subp. 7. **Section 503.7.9.** IFGC section 503.7.9 is amended to read as follows:

503.7.9 Size of single-wall metal pipe. A venting system constructed of single-wall metal pipe shall be sized in accordance with one of the following methods and the appliance manufacturer's instructions:

1. For a draft hood-equipped appliance, in accordance with IFGC section 504.

2. For a venting system for a single appliance with a draft hood, the areas of the connector and the pipe each shall be not less than the area of the appliance flue collar or draft hood outlet, whichever is smaller. The vent area shall not be greater than four times the draft hood outlet area.

3. Other approved engineering methods.

Subp. 8. [Repealed, 34 SR 537]

Subp. 9. [Repealed, 39 SR 690]

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5504 SECTION 504 (IFGC) SIZING OF CATEGORY 1 APPLIANCE VENTING SYSTEMS.

Subpart 1. **Section 504.2.7.** IFGC section 504.2.7 is amended to read as follows:

504.2.7 Liner system sizing. Listed corrugated metallic chimney liner systems in masonry chimneys shall be sized by using IFGC Table 504.2(1) or 504.2(2) for Type B vents with the maximum capacity reduced by 20 percent (0.80 x maximum capacity) and the minimum capacity as shown in IFGC Table 504.2(1) or 504.2(2). Corrugated metallic liner systems installed with bends or offsets shall have their maximum capacity further reduced in accordance with IFGC section 504.2.3. Approved metallic liners, other than listed corrugated metallic liner systems, installed in accordance with amended IFGC section 501.12, shall be sized by using IFGC Table 504.2(1) or 504.2(2) for Type B vents. When IFGC Table 504.2(1) or 504.2(2) permits more than one diameter for a connector or vent of a fan-assisted appliance, the smallest permitted diameter shall be used.

Subp. 1a. **Table 504.2(3).** IFGC Table 504.2(3) is amended to read as follows:

In the row with the heading "Maximum Internal Area of Chimney (square inches)," change the phrase "Seven times" to "Four times."

Subp. 1b. **Table 504.2(4).** IFGC Table 504.2(4) is amended to read as follows:

In the row with the heading "Maximum Internal Area of Chimney (square inches)," change the phrase "Seven times" to "Four times."

Subp. 2. **Section 504.2.8.** IFGC Section 504.2.8 is amended to read as follows:

504.2.8 Vent area and diameter. Where the vertical vent has a larger diameter than the vent connector, the vertical vent diameter shall be used to determine the minimum vent capacity, and the connector diameter shall be used to determine the maximum vent capacity. The flow area of the vertical vent shall not exceed four times the flow area of the listed appliance categorized vent area, flue collar area, or draft hood outlet area unless designated in accordance with approved engineering methods.

Subp. 3. **Section 504.3.17.** IFGC Section 504.3.17 is amended to read as follows:

504.3.17 Vertical vent maximum size. Where two or more appliances are connected to a vertical vent or chimney, the flow area of the largest section of vertical vent or chimney shall not exceed four times the smallest listed appliance categorized vent areas, flue collar area, or draft hood outlet area unless designed in accordance with approved engineering methods.

Subp. 4. **Section 504.3.19.** IFGC Section 504.3.19 is amended to read as follows:

504.3.19 Liner system sizing. Listed corrugated metallic chimney liner systems in masonry chimneys shall be sized by using IFGC Table 504.3(1) or 504.3(2) for Type B vents, with the maximum capacity reduced by 20 percent (0.80 x maximum capacity) and the minimum capacity as shown in IFGC Table 504.3(1) or 504.3(2). Corrugated metallic liner systems installed with bends or offsets shall have their maximum capacity further reduced in accordance with IFGC Sections 504.3.5 and 504.3.6. Approved metallic liners, other than listed corrugated metallic liner systems, installed in accordance with amended IFGC Section 501.12, shall be sized by using IFGC Table 504.3(1) or 504.3(2) for Type B vents. When IFGC Table

504.3(1) or 504.3(2) permits more than one diameter for a connector or vent of a fan-assisted appliance, the smallest permitted diameter shall be used.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5602 SECTION 602 (IFGC) DECORATIVE APPLIANCES FOR INSTALLATION IN FIREPLACES.

Subpart 1. **Section 602.1.** IFGC Section 602.1 is amended to read as follows:

602.1 General. Decorative appliances for installation in approved solid fuel burning fireplaces shall be tested in accordance with ANSI Z21.50-2000, *Vented Gas Fireplaces*, and ANSI Z21.88-2000, *Vented Gas Fireplace Heaters*, and shall be installed in accordance with the manufacturer's installation instructions. Manually lighted natural gas decorative appliances shall be tested in accordance with an approved method.

Subp. 2. **Section 602.3.** IFGC Section 602.3 is amended to read as follows:

602.3 Prohibited installations. Decorative appliances for installations in fireplaces shall not be installed where prohibited by IFGC Section 303.3. Unvented decorative appliances shall not be installed in any dwelling or occupancy.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4*

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1346.5620 [Repealed, 34 SR 537]

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1346.5621 SECTION 621 (IFGC) UNVENTED ROOM HEATERS.

IFGC Section 621 is deleted in its entirety and replaced with the following:

Unvented room heaters and unvented decorative appliances shall not be installed in any dwelling or occupancy.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

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1346.5629 [Repealed, 34 SR 537]

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1346.5630 SECTION 630 (IFGC) INFRARED RADIANT HEATERS.

Subpart 1. [Repealed, 34 SR 537]

Subp. 2. [Repealed, 34 SR 537]

Subp. 3. **Section 630.3.** IFGC section 630.3 is amended to read as follows:

630.3 Combustion and ventilation air. Where unvented infrared heaters are installed, mechanical ventilation shall be provided to exhaust at least 4 cubic feet per minute (cfm) (0.0203 m^3/s) per 1,000 Btu/hr (0.292 kW) input rating and it shall be electrically interlocked with the heater. Makeup air shall be provided to the space to be heated.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.5631 SECTION 631 (IFGC) BOILERS.

IFGC Section 631.1 is amended to read as follows:

631.1 Standards. Boilers with an input rating below 400,000 Btu/hr (3,660 kW) shall be listed in accordance with the requirements of ANSI Z21.13/CSA 4.9 or UL 795. Boilers with an input rating of 400,000 Btu/hr (3,660 kW) or greater shall be designed and constructed in accordance with the BPVC-2007 *ASME Boiler and Pressure Vessel Code*, Sections I, II, IV, V, VIII, and IX, and amended IFGC Section 301.3, as applicable. Boilers with an input rating above 400,000 Btu/hr (117 kW) and less than 12,500,000 Btu/hr (3,660 kW) shall comply with ASME CSD-1-2006, and boilers with an input rating of 12,500,000 Btu/hr (3,660 kW) or greater shall comply with NFPA 85-2007, *Boiler and Combustion Systems Hazards Code*.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

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1346.5800 CHAPTER 8 REFERENCED STANDARDS.

Subpart 1. [Repealed, 39 SR 690]

Subp. 2. **Supplemental standards.** The standards listed in this part shall supplement the list of referenced standards in chapter 8 of the 2012 IFGC. The standards referenced in this rule shall be considered part of the requirements of this rule to the extent prescribed in each rule or reference.

A. NFPA 54-2012 *National Fuel Gas Code*.

B. ANSI LC-4-2012 *Press-Connect Metallic Fittings for Use In Fuel Gas Distribution Systems.*

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *34 SR 537; 36 SR 1479; 39 SR 690*

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CHAPTER 8

INSTALLATION AND TESTING OF FUEL GAS-FIRED EQUIPMENT

1346.5801 [Renumbered 1346.5901]

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1346.5807 [Renumbered 1346.5907

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1346.5900 [Renumbered 1346.6000]

1346.5900 CHAPTER 9, INSTALLATION AND TESTING OF FUEL GAS-FIRED EQUIPMENT.

Subpart 1. **Chapter 9.** The IFGC is amended by adding a chapter to read as follows:

CHAPTER 9

Subp. 2. **Installation and testing of fuel gas-fired equipment; general.** Chapter 9 shall regulate the installation and testing or repair of gas or fuel burning systems, gas or fuel burners, and gas or fuel burning equipment installed within, or in conjunction with, building or structures. The requirements of this chapter shall apply to the following equipment:

1. Equipment utilized to provide control of environmental conditions.

Exception: Equipment and appliances listed and labeled to an appropriate standard by a nationally recognized testing laboratory, which is qualified to evaluate the equipment or appliance, when installed and tested according to the manufacturer's installation instructions.

2. Equipment with a fuel input of 1,000,000 Btu/hr or greater.

3. Unlisted equipment.

4. Miscellaneous equipment when required by the building official.

Subp. 3. **Placing equipment in operation.** After completion of the installation, all safety and operating controls and venting shall be tested before placing the burner in service. The correct input of fuel shall be determined and the fuel-to-air ratio set. Each gas or fuel burner shall be adjusted to its proper input according to the manufacturer's instructions. Overrating the burners or appliance is prohibited. Btu/hr input range shall be appropriate to the appliance.

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

2. For conversion burners installed in hot water (liquid) boilers or warm air furnaces, the rate of flow of the gas or fuel in Btu/hr shall be adjusted to within plus or minus five percent of the calculated Btu/hr heat loss of the building in which it is installed, or the design load, and shall not exceed the design rate of the appliance.

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

Subp. 4. **Pilot operation.** Pilot flames shall ignite the gas or fuel at the main burner or burners and shall be adequately protected from drafts. Pilot flames shall not become extinguished during pilot cycle when the main burner or burners are turned on or off in a normal manner, either manually or by automatic controls.

Subp. 5. **Burner operation.** When testing to determine compliance with this section, care shall 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 shall 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 of the fuel gas or fuel rate.

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

4. Main burner flames shall ignite freely from each pilot when the main control valve is regulated to one-third the full gas or fuel rate and 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 shall not flash outside the appliance.

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

7. Burners shall have proper fuel air mixture to ensure smooth ignition of the main burner.

8. Dual fuel burners may have controls common or independent to both fuels. Transfer from one fuel to the other shall be by a manual interlock switching system to prevent the gas and other fuel being used simultaneously except by special permission from the building official. The building official shall consider

whether an exception will provide equivalent safety. The transfer switch shall have a center off position and shall not pass through the center off position without stopping in the center off position.

Subp. 6. **Method of test.** 1. **Operational checking.** The flue gas, venting, safety and operating controls of the appliance shall be checked to ensure proper and safe operation.

2. **Method of test - atmospheric type/induced draft type/fan-assisted type.** The appliance shall be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products shall be taken from the appliance flue outlet. The sample taken shall be analyzed for carbon monoxide, carbon dioxide and oxygen. Stack temperature shall be noted.

Note: Appliance designs incorporating induced draft assemblies may require a flue gas sample to be taken after the draft regulator or induced draft fan.

3.1. **Performance standards for atmospheric type.**

a. Minimum of 75 percent efficiency as determined by flue gas analysis method at appliance flue outlet.

b. Carbon monoxide concentration in flue gas not greater than 0.04 percent on an air-free basis.

c. Stack temperature not greater than 480°F, plus ambient.

d. Carbon dioxide concentration between 6 and 9 percent, inclusive.

e. Oxygen concentration between 4 and 10 percent, inclusive.

3.2. **Performance standards for induced draft type/fan-assisted type.**

a. Minimum of 75 percent efficiency as determined by flue gas analysis method at appliance flue outlet.

b. Carbon monoxide concentration in flue gas not greater than 0.04 percent on an air free basis.

c. Stack temperature not greater than 480°F, plus ambient.

d. Oxygen concentration between 4 and 10 percent, inclusive, with carbon dioxide concentration between 6 and 9 percent, inclusive.

Note: Induced draft type and fan-assisted type appliances may require a sample to be taken after the induced draft fan, which may cause oxygen figures in excess of limits stated. In such cases, safe fuel combustion ratios shall be maintained and be consistent with appliance listing.

4. **Method of test - power type.** The appliance shall be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products shall be taken from the appliance flue outlet. The sample shall be analyzed for carbon monoxide, carbon dioxide and oxygen. Stack temperature shall be recorded.

5. **Performance standards for power type.**

a. Minimum of 80 percent efficiency as determined by flue gas analysis method method at appliance flue outlet.

b. Carbon monoxide concentration in flue gas not greater than 0.04 percent.

c. Stack temperature not greater than 480°F plus ambient, or 125°F in excess of fluid temperature plus ambient.

d. Carbon dioxide concentration between 6 and 9 percent, inclusive.

e. Oxygen concentration between 3 and 10 percent, inclusive.

6. After completion of the test of newly installed gas or fuel burner equipment as provided in this section, complete test records shall be filed with the building official on an approved form. The tag stating the date of the test and the name of the installer shall be attached to the appliance at the main valve.

7. **Oxygen concentration.**

a. The concentration of oxygen in the undiluted flue products of gas or fuel burners shall in no case be less than 3 percent nor more than 10 percent, shall be in conformance with applicable performance standards and shall be consistent with the appliance listing.

b. The allowable limit of carbon monoxide shall not exceed 0.04 percent.

c. The flue gas temperature of a gas appliance, as taken on the appliance side of the draft regulator, shall not exceed applicable performance standards and shall be consistent with the appliance listing.

8. **Approved oxygen trim system.** The oxygen figures may not apply when there is an approved oxygen trim system on the burner that is designed for that use, including a low oxygen interlock when approved by the building official. The building official shall consider whether an exception will provide equivalent safety.

9. **Supervised start-up.**

a. Supervised start-up may be required to verify safe operation of gas or fuel burner and to provide documentation that operation is consistent with this code, listing and approval. Supervised start-up is required for all fuel burners in b, c, and d. Supervised start-up requires that fuel burners shall be tested in the presence of the building official in an approved manner. Testing shall include safety and operating controls, input, flue gas analysis, and venting. Flue gas shall be tested at high, medium and low fires. Provisions shall be made in the system to allow firing test in warm weather. After completion of the test of newly installed gas or fuel burner equipment as provided in this section, complete test records shall be filed with the building official on an approved form. The tag stating the date of the test and the name of the installer shall be attached to the appliance at the main valve.

b. Gas and fuel burners of 1,000,000 Btu/hr input or more require a supervised start-up as in a.

c. Installation of oxygen trim systems, modulating dampers, or other draft control or combustion devices require a supervised start-up as in a.

d. All direct fired heaters require a supervised start-up as in a.

10. A complete control diagram of the installation and suitable operating instructions shall be supplied to the building official.

Subp. 7. **Pressure regulators.** (a) General.

1. Regulators shall be provided with access for servicing.

2. Regulators shall be provided with a shutoff valve, union and test taps (both upstream and downstream of the regulator) for servicing.

3. All regulators with inlet gas pressure exceeding 14 inches water column pressure or used on an appliance having an input exceeding 400,000 Btu/hr shall have an approved high pressure manual gas valve in the supply piping upstream of the regulator.

4. All regulators with inlet gas pressure exceeding 14 inches water column pressure or used on an appliance having an input exceeding 400,000 Btu/hr shall be vented to the outdoors in separate vents sized according to the manufacturer's specifications.

Exception: Regulators equipped with limiting orifices installed in accordance with amended IFGC Section 410.3.

5. Regulators may not be vented into a combustion chamber or an appliance vent.

6. Regulator vents shall terminate at least 3 feet (914 mm) from doors, operable windows, nonmechanical intake openings, and openings into direct-vent appliances. The vent termination shall be located at least 12 inches (305 mm) above grade and shall be suitably screened and hooded to prevent accidental closure of the vent pipe.

7. All pounds-to-pounds and pounds-to-inches regulators used as appliance regulators where downstream controls are not rated for upstream pressure shall be of the full lock-up type.

(b) Appliance.

1. Appliance regulators shall be installed consistent with the listing and approval of the equipment and the listing and approval of the regulator manufacturer.

2. Each gas burner or appliance shall have its own gas pressure regulator. This appliance regulator is in addition to any pounds-to-pounds or pounds-to-inches regulators in the system.

Subp. 8. **Equipment information.** A. All installations of gas or fuel burners with input above 400,000 Btu/hr and all combination gas or fuel burners shall be approved before installation. The following information shall be supplied if 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 the furnace or boiler that the burner will be installed in if not part of a complete package.

5. A 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.

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 with input above 400,000 Btu/hr 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, shall include the following information in addition to that required in item A, subitems 1 to 6.

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.

3. A floor plan drawn to scale showing all relevant equipment. Plans and specifications shall be approved before proceeding with an installation.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13;*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.6000 CHAPTER 10, MANUFACTURED HOME PARK/COMMUNITY FUEL GAS EQUIPMENT AND APPLIANCE INSTALLATION.

Subpart 1. **Chapter 10.** The IFGC is amended by adding a chapter to read as follows:

CHAPTER 10

MANUFACTURED HOME PARK/COMMUNITY FUEL GAS

EQUIPMENT AND APPLIANCE INSTALLATION

Subp. 2. **General.** Except as otherwise permitted or required by this chapter, all fuel gas equipment and appliance installations in manufactured home parks and communities shall comply with the provisions of this code. The provisions of this chapter shall not apply to manufactured home gas piping, appliances, and equipment.

Subp. 3. **Required gas supply.** The minimum hourly volume of gas required at each manufactured home lot outlet or any section of the manufactured home gas piping system shall be calculated as shown

in Table 1002. Required gas supply for buildings or other fuel gas utilization equipment and appliances connected to the manufactured home gas piping system shall be calculated as provided in this code.

Table 1002

Demand Factors for Calculating Gas Piping Systems in Manufactured Home Parks and Communities

Number of Manufactured Home Sites	Demand Factor (Btu/hr) per Manufactured Home Site	Demand Factor (Watts) per Manufactured Home Site
1	125,000	36,638
2	117,000	34,293
3	104,000	30,482
4	96,000	28,138
5	92,000	26,965
6	87,000	25,500
7	83,000	24,327
8	81,000	23,741
9	79,000	23,155
10	77,000	22,569
11-20	66,000	19,345
21-30	62,000	18,172
31-40	58,000	17,000
41-60	55,000	16,121
Over 60	50,000	14,655

Subp. 4. **Installation.** Gas piping shall not be installed underground beneath buildings or that portion of the manufactured home lot reserved for the location of manufactured homes, manufactured home accessory buildings or structures, concrete slabs, or automobile parking, unless installed in a gas-tight conduit complying with the following:

1. The conduit shall be of material approved for installation underground beneath buildings and not less than Schedule 40 pipe. The interior diameter of the conduit shall be not less than 0.5 inch (15 mm) larger than the outside diameter of the gas piping.

2. The conduit shall extend to a point not less than 12 inches (305 mm) beyond any area where it is required to be installed, or the outside wall of a building, and the outer ends shall not be sealed. Where the conduit terminates within a building, it shall be provided with access, and the space between the conduit and the gas piping shall be sealed to prevent leakage of gas into the building.

Exception: A gas piping lateral terminating in a manufactured home lot riser surrounded by a concrete slab shall not be required to be installed in a conduit, provided the concrete slab is entirely outside the wall line of the manufactured home, and is used for stabilizing other utility connections.

Subp. 5. **Manufactured home lot shutoff valve.** Each manufactured home lot shall have an approved gas shutoff valve installed upstream of the manufactured home lot gas outlet and located on the outlet riser at a height at least 6 inches (152 mm) above grade. Such valve shall not be located under a manufactured home. When the manufactured home lot is not in use, the outlet shall be equipped with an approved cap or plug to prevent accidental discharge of gas.

Subp. 6. **Manufactured home lot gas outlet.** Each manufactured home lot piped for gas shall be provided with an individual outlet riser at the manufactured home lot. The manufactured home lot gas outlet shall terminate with the point of delivery in the rear third section and within 4 feet (1,219 mm) of the proposed location of the manufactured home.

Subp. 7. **Mechanical protection.** All gas outlet risers, regulators, meters, valves, or other exposed equipment shall be protected from mechanical damage. Atmospherically controlled regulators shall be installed in such a manner that moisture cannot enter the regulator vent and accumulate above the diaphragm. Where the regulator vent may be obstructed due to snow and icing conditions, shields, hoods, or other suitable devices shall be provided to guard against closing the vent opening.

Subp. 8. **Meters.** Meters shall not be installed in unvented or inaccessible locations or closer than 3 feet (914 mm) from sources of ignition. When meters are installed, they shall not depend on the gas outlet riser for support, but shall be adequately supported by a post or bracket placed on a firm footing, or other means providing equivalent support.

Subp. 9. **Meter shutoff valve.** All meter installations shall be provided with a shutoff valve located adjacent to and on the inlet side of the meter. For installations utilizing a liquefied petroleum gas container, the container service valve shall serve as the shutoff valve.

Subp. 10. **Gas pipe sizing.** The size of each section of natural gas or liquefied petroleum gas piping systems shall be determined as specified in this code.

Subp. 11. **Maintenance.** The manufactured home park/community operator shall be responsible for maintaining all gas piping installations and equipment in good working condition.

Statutory Authority: *MS s 16B.59; 16B.61; 16B.64; 326B.02; 326B.101; 326B.106; 326B.13*

History: *29 SR 299; L 2007 c 140 art 4 s 61; art 13 s 4; 34 SR 537; 39 SR 690*

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1346.6010 APPENDIX C, TABLE C-1.

Appendix C, Table C-1

Recommended Capacities for Domestic Kitchen Exhaust Hoods

Hood Size	Equipment with Grills or Deep Fryers (Number of Exposed Sides)		Ranges and Ovens (Number of Exposed Sides)	
Area (Sq. Ft.)	Four (CFM)	Three (CFM)	Four (CFM)	Three (CFM)
Up to 4	Up to 400	Up to 300	Up to 300	Up to 200
4	400	300	300	200
4.5	450	338	338	225
5	500	375	375	250
5.5	550	413	413	275
6	600	450	450	300
6.5	650	488	488	325
7	700	525	525	350
7.5	750	563	563	375
8	800	600	600	400
8.5	850	638	638	425
9	900	675	675	450
9.5	950	713	713	475
10	1,000	750	750	500
10.5	1,050	788	788	525
11	1,100	825	825	550
11.5	1,150	863	863	575
12	1,200	900	900	600
12.5	1,250	938	938	625
13	1,300	975	975	650
13.5	1,350	1,013	1,013	675
14	1,400	1,050	1,050	700
14.5	1,450	1,088	1,088	725
15	1,500	1,125	1,125	750
15.5	1,550	1,163	1,163	775
16	1,600	1,200	1,200	800

Statutory Authority: *MS s 326B.02; 326B.101; 326B.106; 326B.13*

History: *34 SR 537; 39 SR 690*

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1346.6012 IFGC APPENDIX E, WORKSHEET E-1.

IFGC Appendix E, Worksheet E-1

Residential Combustion Air Calculation Method

(for Furnace, Boiler, and/or Water Heater in the Same Space)

Step 1: Complete vented combustion appliance information.

Furnace/Boiler:

_____ Draft Hood (Not fan assisted) _____ Fan Assisted & Power Vent _____ Direct Vent Input: _____ Btu/hr

Water Heater:

_____ Draft Hood (Not fan assisted) _____ Fan Assisted & Power Vent _____ Direct Vent Input: _____ Btu/hr

Step 2: Calculate the volume of the Combustion Appliance Space (CAS) containing combustion appliances.

The CAS includes all spaces connected to one another by code compliant openings. CAS volume:_____ft^3

Step 3: Determine Air Changes per Hour (ACH)[1]

Default ACH values have been incorporated into Table E-1 for use with Method 4b (KAIR Method). If the year of construction or ACH is not known, use method 4a (Standard Method).

Step 4: Determine Required Volume for Combustion Air.

4a. Standard Method

Total Btu/hr input of all combustion appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input: _____ Btu/hr

Use Standard Method column in Table E-1 to find Total Required Volume (TRV) TRV:_____ft^3

If CAS Volume (from Step 2) ***is greater than*** TRV then no outdoor openings are needed.

If CAS Volume (from Step 2) ***is less than*** TRV then go to **STEP 5.**

4b. Known Air Infiltration Rate (KAIR) Method

Total Btu/hr input of all fan-assisted and power vent appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input: _____ Btu/hr

Use Fan-Assisted Appliances column in Table E-1 to find Required Volume Fan Assisted (RVFA) RVFA: _____ ft^3

Total Btu/hr input of all non-fan-assisted appliances Input: _____ Btu/hr

Use Non-Fan-Assisted Appliances column in Table E-1 to find Required Volume Non-Fan-Assisted (RVNFA) RVNFA: _____ ft^3

Total Required Volume (TRV) = RVFA + RVNFA

RV = _____ + _____ = _____ ft^3

If CAS Volume (from Step 2) ***is greater than*** TRV then no outdoor openings are needed.

If CAS Volume (from Step 2) ***is less than*** TRV then go to **STEP 5.**

Step 5: Calculate the ratio of available interior volume to the total required volume.

Ratio = CAS Volume (from Step 2) ***divided by*** TRV (from Step 4a or Step 4b) Ratio = _____ / _____ = _____

Step 6: Calculate Reduction Factor (RF).

RF = 1 ***minus*** Ratio RF = 1 - _____ = _____

Step 7: Calculate single outdoor opening as if all combustion air is from outside.

Total Btu/hr input of all Combustion Appliances in the same CAS (EXCEPT DIRECT VENT) Input: _____ Btu/hr

Combustion Air Opening Area (CAOA):

Total Btu/hr ***divided by*** 3000
Btu/hr per in^2

CAOA = _____ /3000 Btu/hr per in^2 = _____ in^2

Step 8: Calculate Minimum CAOA.

Minimum CAOA = CAOA ***multiplied by*** RF

Minimum CAOA = _____ x _____ = _____ in^2

Step 9: Calculate Combustion Air Opening Diameter (CAOD)

CAOD = 1.13 ***multiplied by the square root of*** Minimum CAOA

CAOD = 1.13 Minimum CAOA = _____ in

[1]If desired, ACH can be determined using ASHRAE calculation or blower door test. Follow procedures in Section G304.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

Published Electronically: *October 23, 2009*

1346.6014 IFGC APPENDIX E, TABLE E-1.

IFGC Appendix E, Table E-1

Residential Combustion Air Required Volume

(Required Interior Volume Based on Input Rating of Appliances)

		Known Air Infiltration Rate (KAIR) Method (ft^3)			
		Fan Assisted		Non-Fan-Assisted	
Input Rating (Btu/hr)	Standard Method (ft^3)	1994[1] to Present	Pre 1994[2]	1994[1] to Present	Pre 1994[2]
5,000	250	375	188	525	263
10,000	500	750	375	1,050	525

15,000	750	1,125	563	1,575	788
20,000	1,000	1,500	750	2,100	1,050
25,000	1,250	1,875	938	2,625	1,313
30,000	1,500	2,250	1,125	3,150	1,575
35,000	1,750	2,625	1,313	3,675	1,838
40,000	2,000	3,000	1,500	4,200	2,100
45,000	2,250	3,375	1,688	4,725	2,363
50,000	2,500	3,750	1,875	5,250	2,625
55,000	2,750	4,125	2,063	5,775	2,888
60,000	3,000	4,500	2,250	6,300	3,150
65,000	3,250	4,875	2,438	6,825	3,413
70,000	3,500	5,250	2,625	7,350	3,675
75,000	3,750	5,625	2,813	7,875	3,938
80,000	4,000	6,000	3,000	8,400	4,200
85,000	4,250	6,375	3,188	8,925	4,463
90,000	4,500	6,750	3,375	9,450	4,725
95,000	4,750	7,125	3,563	9,975	4,988
100,000	5,000	7,500	3,750	10,500	5,250
105,000	5,250	7,875	3,938	11,025	5,513
110,000	5,500	8,250	4,125	11,550	5,775
115,000	5,750	8,625	4,313	12,075	6,038
120,000	6,000	9,000	4,500	12,600	6,300
125,000	6,250	9,375	4,688	13,125	6,563
130,000	6,500	9,750	4,875	13,650	6,825
135,000	6,750	10,125	5,063	14,175	7,088
140,000	7,000	10,500	5,250	14,700	7,350
145,000	7,250	10,875	5,438	15,225	7,613
150,000	7,500	11,250	5,625	15,750	7,875
155,000	7,750	11,625	5,813	16,275	8,138
160,000	8,000	12,000	6,000	16,800	8,400
165,000	8,250	12,375	6,188	17,325	8,663
170,000	8,500	12,750	6,375	17,850	8,925
175,000	8,750	13,125	6,563	18,375	9,188
180,000	9,000	13,500	6,750	18,900	9,450

185,000	9,250	13,875	6,938	19,425	9,713
190,000	9,500	14,250	7,125	19,950	9,975
195,000	9,750	14,625	7,313	20,475	10,238
200,000	10,000	15,000	7,500	21,000	10,500
205,000	10,250	15,375	7,688	21,525	10,763
210,000	10,500	15,750	7,875	22,050	11,025
215,000	10,750	16,125	8,063	22,575	11,288
220,000	11,000	16,500	8,250	23,100	11,550
225,000	11,250	16,875	8,438	23,625	11,813
230,000	11,500	17,250	8,625	24,150	12,075

[1]The 1994 date refers to dwellings constructed under the 1994 Minnesota Energy Code. The default KAIR used in this section of the table is 0.20 ACH.

[2]This section of the table is to be used for dwellings constructed prior to 1994. The default KAIR used in this section of the table is 0.40 ACH.

Statutory Authority: *MS s 326B.101; 326B.106; 326B.13*

History: *34 SR 537*

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