

1.1 **Department of Labor and Industry**

1.2 **Adopted Permanent Rules Relating to Mechanical and Fuel Gas Codes**

1.3 **1346.0050 TITLE; INCORPORATION BY REFERENCE.**

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

1.6 Chapters 2 to 15 of the 2006 edition of the International Mechanical Code,  
1.7 promulgated by the International Code Council, Inc., ~~5203 Leesburg Pike, Suite 600, Falls~~  
1.8 ~~Church, Virginia 22041-3401~~ 500 New Jersey Avenue NW, 6th Floor, Washington, DC  
1.9 20001-2070, are incorporated by reference as part of the Minnesota Mechanical Code  
1.10 as amended in this chapter. Portions of this chapter reproduce text and tables from the  
1.11 International Mechanical Code. The International Mechanical Code is copyright 2006 by  
1.12 the International Code Council, Inc. All rights reserved. As used in this chapter, "IMC"  
1.13 means the International Mechanical Code incorporated in this part.

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

1.16 Chapters 1 to 15 of the ~~2004~~ 2008 edition of NFPA 96 Standard for Ventilation  
1.17 Control and Fire Protection of Commercial Cooking Operations, promulgated by the  
1.18 National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471, are  
1.19 incorporated by reference as part of the Minnesota Mechanical Code as amended in this  
1.20 chapter. Portions of this chapter reproduce text and tables for the NFPA 96. The NFPA 96  
1.21 is copyright ~~2004~~ 2008 by the National Fire Protection Association. All rights reserved.  
1.22 As used in this chapter, "NFPA 96" means the NFPA 96 Standard for Ventilation Control  
1.23 and Fire Protection of Commercial Cooking Operations incorporated into this part.

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

2.1 **1346.0060 REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL**  
2.2 **(ICC) CODES.**

2.3 [For text of ~~subps subp 1 to 10~~, see M.R.]

2.4 Subp. 2. **Building code.** References to the International Building Code in this code  
2.5 mean the Minnesota Building Code, adopted pursuant to ~~this~~ chapter 1305 and Minnesota  
2.6 Statutes, section 326B.106, subdivision 1.

2.7 [For text of subps 3 to 10, see M.R.]

2.8 Subp. 11. **Fire code.** References to the International Fire Code in this code mean  
2.9 the Minnesota State Fire Code, adopted pursuant to chapter 7511 and Minnesota Statutes,  
2.10 chapter 299F.

2.11 **1346.0101 SECTION 101 SCOPE.**

2.12 IMC Section 101 is amended to read as follows:

2.13 **101 Scope.** This code shall regulate the design, installation, maintenance, alteration, and  
2.14 inspection of mechanical systems that are permanently installed and utilized to provide  
2.15 control of environmental conditions and related processes within buildings. Fuel gas  
2.16 piping systems, fuel gas utilization equipment, and related accessories shall be regulated  
2.17 by parts 1346.5050 through 1346.6000.

2.18 This code shall also regulate those mechanical systems, system components,  
2.19 equipment, and appliances specifically addressed in the IMC and IFGC. This code shall  
2.20 also regulate process piping installed within, or in conjunction with, buildings or structures.  
2.21 For the purposes of this section, the term "process piping" includes piping or tubing which  
2.22 conveys gas, liquid, or fluidized solids and which is used directly in research, laboratory,  
2.23 or production processes. Process piping and tubing shall be installed in accordance with  
2.24 ASME B31.3-2006, Process Piping Code, or ASME B31.9-2008, Building Services  
2.25 Piping Code, as applicable. Refer to chapter 1300 for additional administrative provisions

3.1 of the Minnesota State Building Code. For purposes of this section, refer to Minnesota  
3.2 Statutes, section 13.37, subdivision 1, paragraph (b), on disclosure of nonpublic data.

3.3 **1346.0202 SECTION 202 GENERAL DEFINITIONS.**

3.4 IMC Section 202 is amended by adding or amending the following definitions:

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

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

3.15 **EXHAUST SYSTEM.** An assembly of connected ducts, plenums, fittings, registers,  
3.16 grilles and hoods, including domestic kitchen exhaust hoods, domestic kitchen and  
3.17 bathroom exhaust fans, clothes dryers, central vacuums, and radon exhaust systems  
3.18 through which air is conducted from the space or spaces and exhausted to the outside  
3.19 atmosphere or an attached residential garage.

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

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

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

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

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

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

4.7 **1346.0301 SECTION 301 GENERAL.**

4.8 IMC Section 301.4 is amended to read as follows:

4.9 **301.4 Listed and labeled.** Appliances regulated by this code shall be listed and  
4.10 labeled to an appropriate standard by a nationally recognized testing laboratory which  
4.11 is qualified to evaluate the appliance, unless otherwise approved in accordance with  
4.12 the administrative provisions of the Minnesota State Building Code, Minnesota Rules,  
4.13 chapter 1300. The approval of unlisted appliances shall be based upon engineering  
4.14 evaluation. Unlisted appliances shall be installed with clearances to combustibles in  
4.15 accordance with ~~IMC Chapter 8~~ NFPA 211-2006 Standard for Chimneys, Fireplaces,  
4.16 Vents, and Solid Fuel Burning Appliances; NFPA 31-2006 Standard for the Installation of  
4.17 Oil Burning Equipment; or NFPA 90B-2009 Standard for the Installation of Warm Air  
4.18 Heating and Air-Conditioning Systems, as applicable to the unlisted appliances. Unlisted  
4.19 appliances with a fuel input rating of less than 12,500,000 Btu/hr (3,660 kW) shall have  
4.20 fuel trains, controls, and safety devices installed in accordance with Part CF, Combustion  
4.21 Side Control, of ASME CSD-1-2006. Unlisted appliances with a fuel input rating of  
4.22 12,500,000 Btu/hr (3,660 kW) or greater shall have fuel trains, controls, and safety devices  
4.23 installed in accordance with NFPA 85-2007.

4.24 **1346.0306 SECTION 306 ACCESS AND SERVICE SPACE.**

4.25 IMC Section 306.5 is amended to read as follows:

5.1 **306.5 Mechanical equipment and appliances on roofs or elevated structures.** Where  
5.2 mechanical equipment or appliances requiring periodic inspection, service, or maintenance  
5.3 are installed on roofs or elevated structures, a permanent stair shall be provided for access.

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

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

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

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

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

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

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

5.19 6. When a roof access hatch or scuttle is located within 10 feet (3.0 m) of a roof edge,  
5.20 a guard shall be installed in accordance with IMC Section ~~304.9~~ 304.10.

5.21 7. Exterior stairs shall terminate at the roof access point or at a level landing of at  
5.22 least 8 square feet (0.74 m<sup>2</sup>) with a minimum dimension of 20 inches (508 mm). The  
5.23 landing shall have a guard installed in accordance with IMC Section 304.10.

5.24 **306.5.1 Permanent ladders.** Where a change in roof elevation greater than 30 inches  
5.25 (762 mm) but not exceeding 16 feet (4.9 m) exists, a permanent ladder shall be provided.  
5.26 The ladder may be vertical and shall be as required by relevant safety regulations, but  
5.27 shall not be less than the following:

- 6.1 1. Width shall be at least 16 inches (406 mm).
- 6.2 2. Rung spacing shall be a maximum of 14 inches (356 mm).
- 6.3 3. Toe space shall be at least 6 inches (152 mm).
- 6.4 4. Side railings shall extend at least 30 inches (762 mm) above the roof or parapet
- 6.5 wall.

6.6 **306.5.2 Electrical requirements.** A receptacle outlet shall be provided at or near the  
6.7 equipment location in accordance with the ICC Electrical Code.

6.8 **306.5.3 Sloped roofs.** Where appliances, equipment, fans, or other components that  
6.9 require service are installed on a roof having a slope of three units vertical in 12 units  
6.10 horizontal (25-percent slope) or greater and having an edge more than 30 inches (762 mm)  
6.11 above grade at such edge, a level platform shall be provided on each side of the appliance  
6.12 to which access is required for service, repair, or maintenance. The platform shall be at  
6.13 least 30 inches (762 mm) in any dimension and shall be provided with guards. The guards  
6.14 shall extend at least 42 inches (1067 mm) above the platform, shall be constructed so as to  
6.15 prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the  
6.16 loading requirements for guards specified in the International Building Code.

6.17 **1346.0401 SECTION 401 GENERAL.**

6.18 IMC Section 401.4 is amended to read as follows:

6.19 **401.4 Opening location.** Outside air exhaust and intake openings, in buildings other than  
6.20 dwellings and Group R-3 occupancies, shall be located a minimum of 10 feet (3048 mm)  
6.21 from lot lines or buildings on the same lot. Where openings front on a street or public  
6.22 way, the distance shall be measured to the centerline of the street or public way.

6.23 **401.4.1 Intake openings.** Mechanical outside air intake openings shall be located a  
6.24 minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as  
6.25 chimneys, plumbing vents, streets, alleys, parking lots, and loading docks, except as  
6.26 otherwise specified in this code. Where a source of contaminant is located within 10 feet  
6.27 (3048 mm) of an intake opening, the intake opening shall be located a minimum of 3 feet

7.1 (914 mm) below the contaminant source, unless the intake opening is a combustion air  
7.2 intake of a direct-vent appliance.

7.3 **401.4.2 Exhaust openings.** Outside exhaust openings, including bathroom exhaust, toilet  
7.4 exhaust, domestic kitchen range exhaust, and domestic clothes dryer exhaust, shall be  
7.5 located at least 3 feet (914 mm) from doors, operable windows, and nonmechanical intake  
7.6 openings. Exhaust air shall not be directed onto public walkways.

7.7 **401.4.3 Flood hazard.** For structures located in flood hazard areas, outdoor exhaust  
7.8 openings shall be at or above the design flood elevation.

7.9 **401.4.4 Venting system terminations.** Venting system terminations shall comply with  
7.10 IMC Section 804 and IFGC Section 503.8.

7.11 **1346.0403 SECTION 403 MECHANICAL VENTILATION.**

7.12 [For text of subpart 1, see M.R.]

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

7.14 **403.2 Outdoor air required.** The minimum ventilation rate of required outdoor air shall  
7.15 be determined in accordance with the Ventilation Rate Procedure, Section 6.2 of ASHRAE  
7.16 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004.

7.17 **Exceptions:**

- 7.18 1. Enclosed parking garages shall comply with amended IMC Section 404.
- 7.19 2. Dwellings that are required to comply with Minnesota Rules, chapter 1322.
- 7.20 3. Buildings or portions of buildings that are not intended for normal human  
7.21 occupancy, or where the primary purpose is not associated with human comfort.

7.22 **403.2.1 Recirculation of air.** The air required by the Ventilation Rate Procedure, Section  
7.23 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE  
7.24 62.1-2004, shall not be recirculated. Air in excess of that required shall not be prohibited  
7.25 from being recirculated as a component of supply air to building spaces, except that:

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

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

8.6 3. Where mechanical exhaust is required by the Ventilation Rate Procedure, Section  
8.7 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE  
8.8 62.1-2004, recirculation of air from such spaces shall be prohibited. All air supplied to  
8.9 such spaces shall be exhausted, including any air in excess of that required.

8.10 **403.2.2 Transfer air.** Except where recirculation from such spaces is prohibited by the  
8.11 Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality  
8.12 Procedure, Section 6.3 of ASHRAE 62.1-2004, air transferred from occupied spaces is  
8.13 not prohibited from serving as makeup air for required exhaust systems in such spaces as  
8.14 kitchens, baths, toilet rooms, elevators, and smoking lounges. The amount of transfer air  
8.15 and exhaust air shall be sufficient to provide the flow rates as specified in the Ventilation  
8.16 Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure,  
8.17 Section 6.3 of ASHRAE 62.1-2004. The required outdoor air rates shall be introduced  
8.18 directly into such spaces or into the occupied spaces from which air is transferred, or a  
8.19 combination of both.

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

8.21 **403.3 Ventilation rate.** Ventilation systems shall be designed to have the capacity to  
8.22 supply the minimum outdoor airflow rate determined in accordance with the Ventilation  
8.23 Rate Procedure, Section 6.2 of ASHRAE 62.1-2004 or the Indoor Air Quality Procedure,  
8.24 Section 6.3 of ASHRAE 62.1-2004, based on the occupancy of the space and the occupant  
8.25 load or other parameters as stated therein. The occupant load utilized for design of the  
8.26 ventilation system shall not be less than the number determined from the estimated  
8.27 maximum occupant load rate indicated in the Ventilation Rate Procedure, Section 6.2

9.1 of ASHRAE 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE  
9.2 62.1-2004. Ventilation rates for occupancies not represented shall be determined by an  
9.3 approved engineering analysis. The ventilation system shall be designed to supply the  
9.4 required rate of ventilation air continuously during the period the building is occupied,  
9.5 except as otherwise stated in other provisions of the code.

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

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

9.10 **403.3.1 System operation.** The minimum flow rate of outdoor air that the ventilation  
9.11 system must be capable of supplying during its operation shall be permitted to be based on  
9.12 the rate per person indicated in the Ventilation Rate Procedure, Section 6.2 of ASHRAE  
9.13 62.1-2004, or the Indoor Air Quality Procedure, Section 6.3 of ASHRAE 62.1-2004, and  
9.14 the actual number of occupants present.

9.15 [For text of subp 5, see M.R.]

9.16 **1346.0404 SECTION 404 GARAGES.**

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

9.18 **404.1 Enclosed parking garages.** Mechanical ventilation systems for enclosed parking  
9.19 garages shall provide a minimum exhaust rate of 0.75 cfm per square foot (0.228  
9.20 m<sup>3</sup> per minute per square meter) of floor area. Mechanical ventilation systems are not  
9.21 required to operate continuously where the system is arranged to operate automatically  
9.22 upon detection of a concentration of carbon monoxide of 25 parts per million (ppm)  
9.23 by approved automatic detection devices.

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

10.1 **404.2 Motor vehicle repair garages.** Mechanical ventilation systems for motor vehicle  
10.2 repair garages shall provide a minimum exhaust rate of 0.75 cfm per square foot (0.228  
10.3 m<sup>3</sup> per minute per square meter) of floor area.

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

10.5 **404.3 Occupied spaces accessory to public garages.** Connecting offices, waiting rooms,  
10.6 ticket booths, and similar uses that are accessory to a public garage shall be maintained  
10.7 at a positive pressure and shall be provided with ventilation in accordance with the  
10.8 Ventilation Rate Procedure, Section 6.2 of ASHRAE 62.1-2004, or the Indoor Air Quality  
10.9 Procedure, Section 6.3 of ASHRAE 62.1-2004.

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

10.12 **404.4 Prohibition of heated commercial parking garages.** Commercial parking garages  
10.13 shall comply with the Minnesota Commercial Energy Code, chapter 1323.

10.14 **1346.0501 SECTION 501 GENERAL.**

10.15 Subpart 1. **Section 501.2.** IMC Section 501.2 is amended to read as follows:

10.16 **501.2 Exhaust discharge.** The air removed by every mechanical exhaust system shall  
10.17 be discharged outdoors at a point where it will not cause a nuisance and not less than  
10.18 the distances specified in Section 501.2.1. The air shall be discharged to a location  
10.19 from which it cannot again be readily drawn in by a ventilating system. Air shall not be  
10.20 exhausted into an attic or crawl space and the exhaust system shall be equipped with a  
10.21 backdraft damper at the point of discharge.

10.22 **Exception:**

10.23 1. Commercial cooking recirculating systems.

10.24 Subp. 2. **Section 501.3.** IMC Section 501.3 is amended to read as follows:

10.25 **501.3 Pressure equalization.** Mechanical exhaust systems shall be sized and operated to  
10.26 remove the quantity of air required by this chapter. If a greater quantity of air is supplied by

11.1 a mechanical ventilating supply system than is removed by a mechanical exhaust system  
11.2 for a room, adequate means shall be provided for the natural exit of the excess air supplied.

11.3 **501.3.1 Makeup air in new dwellings.** Makeup air quantity for new dwellings shall  
11.4 be determined by using Table 501.3.1 and shall be supplied in accordance with IMC  
11.5 Section 501.3.2.

11.6 **Exception.** Makeup air provisions of IMC Section 501.3.1 are not required when  
11.7 any of the following are demonstrated:

11.8 1. A test is performed according to ASTM Standard E1998-02 (2007), *Standard*  
11.9 *Guide for Assessing Depressurization-Induced Backdrafting and Spillage from Vented*  
11.10 *Combustion Appliances*, and documentation is provided that the vented combustion  
11.11 appliances continue to operate within established parameters of the test.

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

11.14 **501.3.2 Makeup air supply.** Makeup air shall be provided by one of the following  
11.15 methods:

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

11.18 1.1 Passive makeup air openings from the outdoors shall be sized according to  
11.19 Table 501.3.2.

11.20 1.2 Barometric dampers are prohibited in passive makeup air openings when  
11.21 any atmospherically vented appliance is installed.

11.22 1.3 Single passive openings larger than 8 inches (204 mm) diameter, or  
11.23 equivalent, shall be provided with a motorized damper that is electrically interlocked  
11.24 with the largest exhaust system.

12.1 2. Powered makeup air shall be provided if the size of a single opening or multiple  
12.2 openings exceeds 11 inches (280 mm) diameter, or equivalent, when sized according to  
12.3 Table 501.3.2. Powered makeup air shall comply with the following:

12.4 2.1 Powered makeup air shall be electrically interlocked with the largest exhaust  
12.5 system.

12.6 2.2 Powered makeup air shall be matched to the airflow of the largest exhaust  
12.7 system.

12.8 3. Makeup air shall be provided by a combination of passive openings and powered  
12.9 means according to Table 501.3.2 and the following:

12.10 3.1 Passive makeup air openings shall comply with Item 1.

12.11 3.2 Powered makeup air shall be supplied for the quantity of airflow in excess  
12.12 of the passive makeup air opening provided, and it shall be electrically interlocked with  
12.13 the exhaust system.

12.14 **501.3.2.1 Makeup air ducts.** Makeup air ducts shall be constructed and installed  
12.15 according to IMC Chapter 6 and Section 501.3.2.

12.16 **501.3.2.2 Makeup air intake.** Makeup air intake openings shall be located to avoid  
12.17 intake of exhaust air in accordance with IMC Section 401.5.2 and IFGC Section 503.8,  
12.18 and shall be covered with corrosion resistant screen of not less than 1/4 inch (6.4 mm)  
12.19 mesh. Makeup air intake openings shall be located at least 12 inches (305 mm) above  
12.20 adjoining grade level.

12.21 **501.3.2.3 Makeup air location.** Makeup air requirements of 175 cubic feet per minute  
12.22 (cfm) (0.084 m<sup>3</sup>/s) and greater shall be introduced to the dwelling in one of the following  
12.23 locations:

12.24 1. In the space containing the vented combustion appliances.

12.25 2. In the space containing the exhaust system.

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

13.3 **501.3.2.4 Makeup air termination restriction.** A makeup air opening shall not terminate  
13.4 in the return air plenum of a forced air heating system unless it is installed according to the  
13.5 heating equipment manufacturer's installation instructions.

13.6 **501.3.2.5 Separate makeup air and combustion air openings.** When both makeup  
13.7 air and combustion air openings are required, they shall be provided through separate  
13.8 openings to the outdoors. Refer to IFGC Section 304, to determine requirements for air  
13.9 for combustion and ventilation.

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

13.13 **501.3.2.6 Makeup air effectiveness.** The makeup air shall not reduce the effectiveness of  
13.14 exhaust systems or performance of vented combustion appliances, and makeup air shall  
13.15 not adversely affect the heating or cooling capability of the mechanical equipment.

13.16 **501.3.3 Additions, alterations, or installations of mechanical systems in existing**  
13.17 **dwelling.** Makeup air shall be supplied to existing dwellings when any of the following  
13.18 conditions occur:

13.19 1. If a dwelling was constructed after 2003 using the makeup air provisions of IMC  
13.20 Section 501.3.2, makeup air quantity shall be determined by using Table 501.3.1 and shall  
13.21 be supplied according to IMC Section 501.3.2 when any of the following conditions occur:

13.22 1.1 A vented combustion appliance, including a solid fuel appliance, is installed  
13.23 or replaced.

13.24 1.2 An exhaust system is installed or replaced.

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

14.1 2. If a dwelling was constructed after 1999 using the provisions of the Minnesota  
14.2 Energy Code, Minnesota Rules, chapter 7672, makeup air quantity shall be determined by  
14.3 using IMC Table 501.3.1 and shall be supplied in accordance with IMC Section 501.3.2  
14.4 when any of the following conditions occur:

14.5 2.1 A vented combustion appliance, including a solid fuel appliance, is installed  
14.6 or replaced.

14.7 2.2 An exhaust system is installed or replaced.

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

14.10 3. When a solid fuel appliance is installed in a dwelling constructed during or after  
14.11 1994 under the Minnesota Energy Code, Minnesota Rules, chapter 7670, makeup air  
14.12 quantity shall be determined by using IMC Table 501.3.1 and shall be supplied according  
14.13 to IMC Section 501.3.2.

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

14.17 4. When an exhaust system with a rated capacity greater than 300 cfm ( $0.144 \text{ m}^3/\text{s}$ ) is  
14.18 installed in a dwelling constructed during or after 1994 under the Minnesota Energy Code,  
14.19 Minnesota Rules, chapter 7670, makeup air quantity shall be determined by using IMC  
14.20 Table 501.3.3(1) and shall be supplied according to IMC Section 501.3.2.

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

14.23 5. When an exhaust system with a rated capacity greater than 300 cfm ( $0.144 \text{ m}^3/\text{s}$ ) is  
14.24 installed in a dwelling constructed prior to 1994, makeup air quantity shall be determined  
14.25 by using IMC Table 501.3.3(2) and shall be supplied according to IMC Section 501.3.2.

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

15.1 6. When a solid fuel appliance is installed in a dwelling constructed prior to 1994,  
 15.2 makeup air quantity shall be determined by using IMC Table 501.3.3(3) and shall be  
 15.3 supplied according to IMC Section 501.3.2.

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

15.7 **Exception:** Makeup air is not required in Items 1 to 6 when any of the following  
 15.8 are demonstrated:

15.9 1. A test is performed according to ASTM Standard E1998-02 (2007), *Standard*  
 15.10 *Guide for Assessing Depressurization-Induced Backdrafting and Spillage from Vented*  
 15.11 *Combustion Appliances*, and documentation is provided that the vented combustion  
 15.12 appliances continue to operate within established parameters of the test.

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

15.15 Table 501.3.1

15.16 Procedure to Determine Makeup Air Quantity for Exhaust Equipment in Dwellings

	One or multiple power vent or direct vent appliances or no combustion appliances <sup>A</sup>	One or multiple fan-assisted appliances and power vent or direct vent appliances <sup>B</sup>	One atmospherically vented gas or oil appliance or one solid fuel appliance <sup>C</sup>	Multiple atmospherically vented gas or oil appliances or solid fuel appliances <sup>D</sup>
15.17				
15.18				
15.19				
15.20				
15.21				
15.22				
15.23	1. Use the Appropriate Column to Estimate House Infiltration			
15.24	a) pressure factor			
15.25	(cfm/sf) 0.15	0.09	0.06	0.03
15.26	b) conditioned			
15.27	floor area (sf) _____	_____	_____	_____
15.28	(including unfinished basements)			
15.29	Estimated House			
15.30	Infiltration (cfm):			
15.31	[1a x 1b] _____	_____	_____	_____

16.1	2. Exhaust Capacity			
16.2	a) continuous			
16.3	exhaust-only			
16.4	ventilation			
16.5	system (cfm):	_____	_____	_____
16.6	(not applicable to balanced ventilation systems such as HRV)			
16.7	b) clothes dryer	135	135	135
16.8	c) 80% of largest			
16.9	exhaust rating			
16.10	(cfm):	_____	_____	_____
16.11	(not applicable if recirculating system or if powered makeup air is electrically interlocked			
16.12	and matched to exhaust)			
16.13	d) 80% of next			
16.14	largest exhaust	not		
16.15	rating (cfm):	applicable	_____	_____
16.16	(not applicable if recirculating system or if powered makeup air is electrically interlocked			
16.17	and matched to exhaust)			
16.18	Total Exhaust			
16.19	Capacity (cfm):			
16.20	[2a+2b+2c+2d]	_____	_____	_____
16.21	3. Makeup Air Requirement			
16.22	a) Total Exhaust			
16.23	Capacity (from			
16.24	above)			
16.25	b) Estimated			
16.26	House Infiltration			
16.27	(from above)			
16.28	Makeup Air			
16.29	Quantity (cfm):			
16.30	[3a - 3b]	_____	_____	_____
16.31	(if value is negative, no makeup air is needed)			

16.32 4. For Makeup Air Opening Sizing, refer to Table 501.3.2

16.33 <sup>A</sup>Use this column if there are other than fan-assisted or atmospherically vented gas or  
16.34 oil appliances or if there are no combustion appliances.

17.1 <sup>B</sup>Use this column if there is one fan-assisted appliance per venting system. Other  
 17.2 than atmospherically vented appliances may also be included.

17.3 <sup>C</sup>Use this column if there is one atmospherically vented (other than fan-assisted) gas  
 17.4 or oil appliance per venting system or one solid fuel appliance.

17.5 <sup>D</sup>Use this column if there are multiple atmospherically vented gas or oil appliances  
 17.6 using a common vent or if there are atmospherically vented gas or oil appliances and  
 17.7 solid fuel appliances.

17.8 Table 501.3.2

17.9 Makeup Air Opening Sizing Table for New and Existing Dwellings

17.10	17.11	17.12	17.13	17.14	17.15	17.16
	One or multiple power vent or direct vent appliances or no combustion appliances <sup>A</sup>	One or multiple fan-assisted appliances and power vent or direct vent appliances <sup>B</sup>	One atmospherically vented gas or oil appliance or one solid fuel appliance <sup>C</sup>	Multiple atmospherically vented gas or oil appliances or solid fuel appliances <sup>D</sup>	Passive makeup air opening duct diameter <sup>E,F,G</sup>	
17.17	Type of opening or system	(cfm)	(cfm)	(cfm)	(cfm)	(inches)
17.18	Passive Opening	1-36	1-22	1-15	1-9	3
17.19	Passive Opening	37-66	23-41	16-28	10-17	4
17.20	Passive Opening	67-109	42-66	29-46	18-28	5
17.21	Passive Opening	110-163	67-100	47-69	29-42	6
17.22	Passive Opening	164-232	101-143	70-99	43-61	7
17.23	Passive Opening	233-317	144-195	100-135	62-83	8
17.24	Passive Opening with Motorized Damper	318-419	196-258	136-179	84-110	9
17.25	Passive Opening with Motorized Damper	420-539	259-332	180-230	111-142	10

18.1	Passive Opening					
18.2	with Motorized					
18.3	Damper	540-679	333-419	231-290	143-179	11
18.4	Powered Makeup					Not
18.5	Air <sup>H</sup>	>679	>419	>290	>179	Applicable

18.6 <sup>A</sup>Use this column if there are other than fan-assisted or atmospherically vented gas or  
18.7 oil appliances or if there are no combustion appliances.

18.8 <sup>B</sup>Use this column if there is one fan-assisted appliance per venting system. Other  
18.9 than atmospherically vented appliances may also be included.

18.10 <sup>C</sup>Use this column if there is one atmospherically vented (other than fan-assisted) gas  
18.11 or oil appliance per venting system or one solid fuel appliance.

18.12 <sup>D</sup>Use this column if there are multiple atmospherically vented gas or oil appliances  
18.13 using a common vent or if there are atmospherically vented gas or oil appliances and  
18.14 solid fuel appliance(s).

18.15 <sup>E</sup>An equivalent length of 100 feet of round smooth metal duct is assumed. Subtract  
18.16 40 feet for the exterior hood and ten feet for each 90-degree elbow to determine the  
18.17 remaining length of straight duct allowable.

18.18 <sup>F</sup>If flexible duct is used, increase the duct diameter by one inch. Flexible duct shall  
18.19 be stretched with minimal sags.

18.20 <sup>G</sup>Barometric dampers are prohibited in passive makeup air openings when any  
18.21 atmospherically vented appliance is installed.

18.22 <sup>H</sup>Powered makeup air shall be electrically interlocked with the largest exhaust system.

18.23 Table 501.3.3(1)

18.24 Procedure to Determine Makeup Air Quantity for Exhaust Equipment in Existing  
18.25 Dwellings

18.26 (Refer to Item 4 in Section 501.3.3 to determine applicability of this table)

19.1		One or multiple	One or multiple	One	Multiple
19.2		power vent	fan-assisted	atmospherically	atmospherically
19.3		or direct vent	appliances and	vented gas or	vented gas or
19.4		appliances or	power vent	oil appliance or	oil appliances
19.5		no combustion	or direct vent	one solid fuel	or solid fuel
19.6		appliances <sup>A</sup>	appliances <sup>B</sup>	appliance <sup>C</sup>	appliances <sup>D</sup>

19.7 1. Use the Appropriate Column to Estimate House Infiltration

19.8 a) pressure factor

19.9 (cfm/sf)	0.15	0.09	0.06	0.03
---------------	------	------	------	------

19.10 b) conditioned

19.11 floor area (sf)	_____	_____	_____	_____
-----------------------	-------	-------	-------	-------

19.12 Estimated House

19.13 Infiltration (cfm):

19.14 [1a x 1b]	_____	_____	_____	_____
-----------------	-------	-------	-------	-------

19.15 2. Exhaust Capacity

19.16 80% of exhaust

19.17 rating = Exhaust

19.18 Capacity (cfm):	_____	_____	_____	_____
-----------------------	-------	-------	-------	-------

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

19.21 3. Makeup Air Requirement

19.22 a) Exhaust

19.23 Capacity (from

19.24 above)	_____	_____	_____	_____
--------------	-------	-------	-------	-------

19.25 b) Estimated

19.26 House Infiltration

19.27 (from above)	_____	_____	_____	_____
--------------------	-------	-------	-------	-------

19.28 Makeup Air

19.29 Quantity (cfm):

19.30 [3a - 3b]	_____	_____	_____	_____
-----------------	-------	-------	-------	-------

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

19.32 4. For Makeup Air Opening Sizing, refer to Table 501.3.2

19.33 <sup>A</sup>Use this column if there are other than fan-assisted or atmospherically vented gas or  
19.34 oil appliances or if there are no combustion appliances.

20.1 <sup>B</sup>Use this column if there is one fan-assisted appliance per venting system. Other  
 20.2 than atmospherically vented appliances may also be included.

20.3 <sup>C</sup>Use this column if there is one atmospherically vented (other than fan-assisted) gas  
 20.4 or oil appliance per venting system or one solid fuel appliance.

20.5 <sup>D</sup>Use this column if there are multiple atmospherically vented gas or oil appliances  
 20.6 using a common vent or if there are atmospherically vented gas or oil appliances and  
 20.7 solid fuel appliances.

20.8 Table 501.3.3(2)

20.9 Procedure to Determine Makeup Air Quantity for Exhaust Equipment in Existing  
 20.10 Dwellings

20.11 (Refer to Item 5 in Section 501.3.3 to determine applicability of this table)

	One or multiple power vent or direct vent appliances or no combustion appliances <sup>A</sup>	One or multiple fan-assisted appliances and power vent or direct vent appliances <sup>B</sup>	One atmospherically vented gas or oil appliance or one solid fuel appliance <sup>C</sup>	Multiple atmospherically vented gas or oil appliances or solid fuel appliances <sup>D</sup>
--	---	---	--	---

20.18 1. Use the Appropriate Column to Estimate House Infiltration

20.19 a) pressure factor  
 20.20 (cfm/sf)

0.25	0.15	0.10	0.05
------	------	------	------

20.21 b) conditioned  
 20.22 floor area (sf)

_____	_____	_____	_____
-------	-------	-------	-------

20.23 (including unfinished basements)

20.24 Estimated House  
 20.25 Infiltration (cfm):  
 20.26 [1a x 1b]

_____	_____	_____	_____
-------	-------	-------	-------

20.27 or  
 20.28 Alternative  
 20.29 Calculation (by  
 20.30 using blower door  
 20.31 test)<sup>E</sup>

20.32 c) conversion  
 20.33 factor

0.75	0.45	0.30	0.15
------	------	------	------

21.1	d) CFM50 value				
21.2	(from blower				
21.3	door test)	_____	_____	_____	_____
21.4	Estimated House				
21.5	Infiltration (cfm):				
21.6	[1c x 1d]	_____	_____	_____	_____
21.7	2. Exhaust Capacity				
21.8	80% of exhaust				
21.9	rating = Exhaust				
21.10	Capacity (cfm):	_____	_____	_____	_____
21.11	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
21.12	with exhaust)				
21.13	3. Makeup Air Requirement				
21.14	a) Exhaust				
21.15	Capacity (from				
21.16	above)	_____	_____	_____	_____
21.17	b) Estimated				
21.18	House Infiltration				
21.19	(from above)	_____	_____	_____	_____
21.20	Makeup Air				
21.21	Quantity (cfm):				
21.22	[3a - 3b]	_____	_____	_____	_____
21.23	(if value is negative, no makeup air is needed)				
21.24	4. For Makeup Air Opening Sizing, refer to Table 501.3.2				
21.25	<sup>A</sup> Use this column if there are other than fan-assisted or atmospherically vented gas or				
21.26	oil appliances or if there are no combustion appliances.				
21.27	<sup>B</sup> Use this column if there is one fan-assisted appliance per venting system. Other				
21.28	than atmospherically vented appliances may also be included.				
21.29	<sup>C</sup> Use this column if there is one atmospherically vented (other than fan-assisted) gas				
21.30	or oil appliance per venting system or one solid fuel appliance.				

22.1 <sup>D</sup>Use this column if there are multiple atmospherically vented gas or oil appliances  
 22.2 using a common vent or if there are atmospherically vented gas or oil appliances and  
 22.3 solid fuel appliances.

22.4 <sup>E</sup>As an alternative, the Estimated House Infiltration may be calculated by performing  
 22.5 a blower door test and multiplying the conversion factor by the CFM50 value.

22.6 Table 501.3.3(3)

22.7 Procedure to Determine Makeup Air Quantity for Exhaust Equipment in Existing  
 22.8 Dwellings

22.9 (Refer to Item 6 in Section 501.3.3 to determine applicability of this table)

	One or multiple power vent or direct vent appliances or no combustion appliances <sup>A</sup>	One or multiple fan-assisted appliances and power vent or direct vent appliances <sup>B</sup>	One atmospherically vented gas or oil appliance or one solid fuel appliance <sup>C</sup>	Multiple atmospherically vented gas or oil appliances or solid fuel appliances <sup>D</sup>
--	--	--	---	--

22.16 1. Use the Appropriate Column to Estimate House Infiltration

22.17 a) pressure factor

22.18 (cfm/sf)	0.25	0.15	0.10	0.05
----------------	------	------	------	------

22.19 b) conditioned

22.20 floor area (sf)	_____	_____	_____	_____
-----------------------	-------	-------	-------	-------

22.21 (including unfinished basements)

22.22 Estimated House  
 22.23 Infiltration (cfm):

22.24 [1a x 1b]	_____	_____	_____	_____
-----------------	-------	-------	-------	-------

22.25 or

22.26 Alternative  
 22.27 Calculation (by  
 22.28 using blower door  
 22.29 test)<sup>E</sup>

22.30 c) conversion

22.31 factor	0.75	0.45	0.30	0.15
--------------	------	------	------	------

22.32 d) CFM50 value

22.33 (from blower 22.34 door test)	_____	_____	_____	_____
--	-------	-------	-------	-------

23.1	Estimated House				
23.2	Infiltration (cfm):				
23.3	[1c x 1d]	_____	_____	_____	_____
23.4	2. Exhaust Capacity				
23.5	a) continuous				
23.6	exhaust-only				
23.7	ventilation				
23.8	system (cfm)	_____	_____	_____	_____
23.9	(not applicable to balanced ventilation systems)				
23.10	b) clothes dryer				
23.11	(cfm)	135	135	135	135
23.12	c) 80% of largest				
23.13	exhaust rating				
23.14	(cfm):	_____	_____	_____	_____
23.15	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
23.16	and with exhaust)				
23.17	d) 80% of next				
23.18	largest exhaust	Not			
23.19	rating (cfm)	applicable	_____	_____	_____
23.20	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
23.21	with exhaust)				
23.22	Total Exhaust				
23.23	Capacity (cfm):				
23.24	[2a+2b+2c+2d]	_____	_____	_____	_____
23.25	3. Makeup Air Requirement				
23.26	a) Total Exhaust				
23.27	Capacity (from				
23.28	above)	_____	_____	_____	_____
23.29	b) Estimated				
23.30	House Infiltration				
23.31	(from above)	_____	_____	_____	_____
23.32	Makeup Air				
23.33	Quantity (cfm):				
23.34	[3a - 3b]	_____	_____	_____	_____
23.35	(if value is negative, no makeup air is needed)				

24.1 4. For Makeup Air Opening Sizing, refer to Table 501.3.2

24.2 <sup>A</sup>Use this column if there are other than fan-assisted or atmospherically vented gas or  
24.3 oil appliances or if there are no combustion appliances.

24.4 <sup>B</sup>Use this column if there is one fan-assisted appliance per venting system. Other  
24.5 than atmospherically vented appliances may also be included.

24.6 <sup>C</sup>Use this column if there is one atmospherically vented (other than fan-assisted) gas  
24.7 or oil appliance per venting system or one solid fuel appliance.

24.8 <sup>D</sup>Use this column if there are multiple atmospherically vented gas or oil appliances  
24.9 using a common vent or if there are atmospherically vented gas or oil appliances and  
24.10 solid fuel appliances.

24.11 <sup>E</sup>As an alternative, the Estimated House Infiltration may be calculated by performing  
24.12 a blower door test and multiplying the conversion factor by the CFM50 value.

24.13 **1346.0504 SECTION 504 CLOTHES DRYER EXHAUST.**

24.14 IMC Section 504.1 is amended to read as follows:

24.15 **504.1 Installation.** Clothes dryers shall be exhausted in accordance with the  
24.16 manufacturer's instructions. Dryer exhaust systems shall be independent of all other  
24.17 systems and shall convey the moisture and any products of combustion to the outside  
24.18 of the building.

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

24.24 **1346.0505 SECTION 505 DOMESTIC KITCHEN EXHAUST EQUIPMENT.**

24.25 IMC Section 505.1 is amended to read as follows:

25.1 **505.1 Domestic systems.** Where domestic range hoods and domestic appliances equipped  
25.2 with downdraft exhaust are located within dwellings, the hoods and appliances shall

25.3 discharge to the outdoors through ducts constructed of galvanized steel, stainless steel,  
25.4 aluminum, or copper. The ducts shall have smooth inner walls and shall be air tight and  
25.5 equipped with a backdraft damper. Domestic kitchen exhaust hoods ducted to the outdoors  
25.6 shall have makeup air provided according to part 1346.0501. Refer to Appendix C for  
25.7 Table C-1, "Recommended Capacities for Domestic Kitchen Exhaust Hoods."

25.8 **Exceptions:**

25.9 1. Where installed according to the manufacturer's installation instructions and where  
25.10 mechanical or natural ventilation is otherwise provided according to IMC Chapter  
25.11 4, listed and labeled ductless range hoods shall not be required to discharge to the  
25.12 outdoors.

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

25.16 2.1. The duct shall be installed under a concrete slab poured on grade.

25.17 2.2. The underfloor trench in which the duct is installed shall be completely backfilled  
25.18 with sand or gravel.

25.19 2.3. The PVC duct shall extend not greater than 1 inch (25 mm) above the indoor  
25.20 concrete floor surface.

25.21 2.4. The PVC duct shall extend not greater than 1 inch (25 mm) above grade outside  
25.22 of the building.

25.23 2.5. The PVC ducts shall be primed and solvent cemented in accordance with ASTM  
25.24 D2564.

25.25 **1346.0506 SECTION 506 COMMERCIAL KITCHEN HOOD VENTILATION**  
25.26 **SYSTEM DUCTS AND EXHAUST EQUIPMENT.**

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

26.1 **506.3 Ducts serving Type I hoods.** Commercial kitchen exhaust systems serving Type  
26.2 I hoods shall be designed, constructed and installed in accordance with NFPA 96-2004.

26.3 96-2008, *Standard for Ventilation Control and Fire Protection of Commercial Cooking*  
26.4 *Operations*.

26.5 Subp. 2. **Sections 506.3.1 to 506. 3.12.3.** IMC Sections 506.3.1 to 506.3.12.3 are  
26.6 deleted and replaced with NFPA ~~96-2004~~ 96-2008, sections 5.1.1 and 7.5.2, with the  
26.7 following amendments:

26.8 **5.1.1** The hood or that portion of a primary collection means designed for collecting  
26.9 cooking vapors and residues shall be constructed of stainless steel not less than 0.94 mm  
26.10 (0.037 in.) (No. 20 MSG) in thickness or other approved material of equivalent strength  
26.11 and fire and corrosion resistance. Refer to the Minnesota Food Code, Minnesota Rules,  
26.12 chapter 4626, for additional requirements for commercial kitchen hoods licensed and  
26.13 inspected by the Department of Agriculture, Department of Health, or local authorities  
26.14 that conduct inspections of food establishments.

26.15 **7.5.2.1** All seams, joints, penetrations, and duct-to-hood collar connections shall have a  
26.16 liquid tight continuous external weld. Listed grease ducts and ducts complying with  
26.17 7.5.1 through 7.5.5.5 that are installed within a concealed enclosure shall maintain an air  
26.18 pressure test of ~~0.10 inches~~ at least 1.0 inch water column positive pressure for a minimum  
26.19 of 20 minutes, unless an equivalent alternate test is specified by the building official.

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

26.21 **506.4.2 Ducts.** Ducts and plenums serving Type II hoods shall be constructed of rigid  
26.22 metallic materials. Duct construction, installation, bracing, and supports shall comply with  
26.23 IMC Chapter 6. Ducts conveying moisture-laden or waste heat-laden air shall comply  
26.24 with the following requirements:

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

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

26.28 3. Horizontal ducts exceeding 75 feet (22,860 mm) in length shall slope not less than  
26.29 one unit vertical in 12 units horizontal (8.3 percent slope).

27.3 4. Ducts subject to positive pressure shall maintain an air pressure test of ~~0.10~~  
27.4 ~~inches~~ 1.0 inch water column positive pressure for a minimum of 20 minutes, unless an  
27.5 equivalent alternate test is specified by the building official.

27.6 **1346.0507 SECTION 507 COMMERCIAL KITCHEN HOODS.**

27.7 Subpart 1. **Section 507.1.** IMC Section 507.1 is amended by adding subsection  
27.8 507.1.1 after the exceptions to read as follows:

27.9 ~~Commercial kitchen exhaust hoods shall comply with the requirements of this section.~~  
27.10 ~~Hoods shall be Type I or Type II and shall be designed to capture and confine cooking~~  
27.11 ~~vapors and residues.~~

27.12 **507.1.1 Factory built systems with exhaust or recovery.** Where factory built  
27.13 commercial cooking recirculating systems or dishwashers and potwashers equipped with  
27.14 heat and vapor exhaust or recovery systems are installed, the sensible and latent heat  
27.15 from the systems shall be included in the HVAC design calculations of the kitchen. A  
27.16 mechanical HVAC system shall be provided to maintain maximum relative humidity of  
27.17 65 percent in the space.

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

27.19 **507.2 Where required.** A Type I or Type II hood shall be installed at or above all  
27.20 commercial cooking appliances in accordance with Sections 507.2.1 and 507.2.2. Where  
27.21 any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be  
27.22 installed. Where a Type II hood is required, a Type I or Type II hood shall be installed.

27.23 **507.2.1 Type I hoods.** Type I hoods shall be installed where cooking appliances produce  
27.24 grease or smoke, such as occurs with griddles, fryers, broilers, ovens, ranges, and wok  
27.25 ranges.

28.1 **507.2.1.1 Operation.** Type I hood systems shall be designed and installed to automatically  
28.2 activate the exhaust fan whenever cooking operations occur. The activation of the exhaust

28.3 fan shall occur through an interlock with the cooking appliances, by means of heat sensors  
28.4 or by means of other approved methods.

28.5 **507.2.2 Type II hoods.** Type II hoods shall be installed where cooking or dishwashing  
28.6 appliances produce heat, steam, or products of combustion and do not produce grease or  
28.7 smoke, such as steamers, kettles, pasta cookers, and dishwashing machines.

28.8 **Exceptions:**

28.9 1. Under-counter-type commercial dishwashing machines.

28.10 2. A Type II hood is not required for dishwashers and potwashers that are provided  
28.11 with heat and water vapor exhaust or recovery systems that are supplied by the  
28.12 appliance manufacturer and are installed in accordance with the manufacturer's  
28.13 instructions. The additional heat and moisture loads generated by such appliances  
28.14 shall be accounted for in the design of the HVAC system. The HVAC system shall  
28.15 maintain a maximum relative humidity of 65 percent in the space.

28.16 3. A single light-duty electric convection, bread, retherm, or microwave oven that are  
28.17 rated at 3.7 kW or less. The additional heat and moisture loads generated by such  
28.18 appliances shall be accounted for in the design of the HVAC system. The HVAC  
28.19 system shall maintain a maximum relative humidity of 65 percent in the space.

28.20 4. A Type II hood is not required for the following electrically heated appliances:  
28.21 toasters, steam tables, popcorn poppers, hot dog cookers, coffee makers, rice cookers,  
28.22 egg cookers, and holding/warming ovens that are rated at 3.7 kW or less. The  
28.23 additional heat and moisture loads generated by such appliances shall be accounted  
28.24 for in the design of the HVAC system. The HVAC system shall maintain a maximum  
28.25 relative humidity of 65 percent in the space.

28.26 Subp. 3. [See repealer.]

28.27 Subp. 4. **Section 507.2.3.** IMC Section 507.2.3 is amended to read as follows:

28.28 **507.2.3 Domestic cooking appliances used for commercial purposes.** Domestic  
28.29 cooking appliances utilized for commercial purposes shall be provided with Type I or II  
28.30

29.3 hoods as required for the type of appliances and processes in accordance with amended  
29.4 IMC Section 507.2. Refer to the Minnesota Food Code, Minnesota Rules, chapter 4626,  
29.5 for additional requirements for commercial kitchen hoods licensed and inspected by  
29.6 the Department of Agriculture, Department of Health, or local authorities that conduct  
29.7 inspections of food establishments.

29.8 Subp. 5. [See repealer.]

29.9 [For text of subps 6 to 8, see M.R.]

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

29.11 **507.7.1 Type I hoods.** Type I hoods shall be designed, constructed, and installed in  
29.12 accordance with Chapter 5 of NFPA ~~96-2004~~ 96-2008.

29.13 [For text of subp 10, see M.R.]

29.14 Subp. 11. [See repealer.]

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

29.16 Subp. 13. [See repealer.]

29.17 **1346.0508 SECTION 508 COMMERCIAL KITCHEN MAKEUP AIR.**

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

29.19 **508.1 Makeup air.** Makeup air shall be supplied during the operation of commercial  
29.20 kitchen exhaust systems that are provided for commercial food heat-processing appliances.  
29.21 The amount of makeup air supplied shall be approximately equal to the exhaust air. A  
29.22 minimum of 80 percent of the makeup air shall be supplied into the space where the  
29.23 exhaust hood is located. The makeup air shall not reduce the effectiveness of the exhaust  
29.24 system. Makeup air shall be provided by mechanical means and the exhaust and makeup  
29.25 air systems shall be electrically interlocked to insure that makeup air is provided whenever  
30.1 the exhaust system is in operation. Makeup air intake openings shall comply with IMC  
30.2 Section 401.4 and amended IMC Section 401.4.1.

30.3 **Exception:** This section shall not apply to dwelling units.

30.4 **508.1.1 Makeup air temperature.** Makeup air shall be not less than 50°F (10°C),  
30.5 measured at the flow of air from the supply diffuser into the space.

30.6 **508.1.2 Makeup and ventilation air distribution.** Makeup and ventilation air supply  
30.7 diffusers located within 12 feet (3.7 m) of an exhaust hood shall be directed away from  
30.8 the hood.

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

30.11 [For text of subp 2, see M.R.]

30.12 **1346.0510 SECTION 510 HAZARDOUS EXHAUST SYSTEMS.**

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

30.15 **Exception:** Other than sections 510.4 and 510.7, this section shall not apply to  
30.16 laboratory ventilation systems that comply with NFPA 45-2004.

30.17 Subp. 2. [See repealer.]

30.18 Subp. 3. [See repealer.]

30.19 **1346.0601 SECTION 601 GENERAL.**

30.20 IMC Section 601.1 is amended to read as follows:

30.21 **601.1 Scope.** Duct systems used for the movement of air in air-conditioning, heating,  
30.22 ventilating, and exhaust systems shall conform to the provisions of this chapter except as  
30.23 otherwise specified in chapters 5 and 7.

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

31.3 **1346.0602 SECTION 602 PLENUMS.**

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

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

31.8 **1346.0603 SECTION 603 DUCT CONSTRUCTION AND INSTALLATION.**

31.9 Subpart 1. [See repealer.]

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

31.11 **603.4 Metallic ducts.** All metallic ducts shall be constructed as specified in the *SMACNA*  
31.12 *HVAC Duct Construction Standards - Metal and Flexible*.

31.13 **Exception:** Ducts installed within a single dwelling unit shall have a minimum  
31.14 thickness as specified in Table 603.4.

31.15 **603.4.1 Elbows.** Radius elbows with velocities exceeding 1,000 feet per minute (fpm)  
31.16 (76.2 m/min) shall have an inside radius not less than the width of the duct or shall have  
31.17 turning vanes. Square throat elbows with velocities exceeding 1,000 feet per minute  
31.18 (fpm) (76.2 m/min) shall have turning vanes.

31.19 **Exception:** Ducts installed within a single dwelling unit.

31.20 **603.4.2 Transition fittings.** Transition fittings shall be constructed with a maximum  
31.21 slope of 45 degrees.

31.22 **603.4.3 Obstructions.** Where a pipe or other obstruction passes through a duct, a  
31.23 streamlined sleeve must be constructed equal in type and gage to the duct. The area of  
31.24 the duct, at the point of obstruction, must be increased by an amount equal to the area  
31.25 of the streamlined sleeve.

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

32.1 **603.7 Rigid duct penetrations.** Duct system penetrations of walls, floors, ceilings, and  
32.2 roofs and air transfer openings in any of those building components shall be protected

32.3 as required by IMC Section 607. Ducts in a private garage and ducts penetrating the  
32.4 walls or ceilings separating a dwelling from a private garage shall be continuous and  
32.5 constructed of minimum 26 gage (0.48 mm) galvanized sheet metal and shall have no  
32.6 openings into the garage. Fire and smoke dampers are not required in such ducts passing  
32.7 through the wall or ceiling separating a dwelling from a private garage, unless required  
32.8 by International Building Code Chapter 7.

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

32.10 **603.8 Underground ducts.** Ducts shall be approved for underground installation.  
32.11 Metallic ducts not having an approved protective coating shall be completely encased in a  
32.12 minimum of 2 inches (51 mm) of concrete.

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

32.14 **603.8.1 Slope.** Ducts shall slope to allow drainage to a point provided with access for  
32.15 inspection and cleaning at each low point of the duct system.

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

32.17 **603.8.2 Sealing.** Ducts shall have a polyethylene vapor retarder of at least 4 mils (0.102  
32.18 mm) thickness installed around the outside. Where encased in concrete, the ducts shall be  
32.19 sealed and secured prior to pouring the concrete encasement.

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

32.21 **603.8.3 Plastic ducts and fittings.** Plastic ducts shall be constructed of PVC or  
32.22 high-density polyethylene having a minimum pipe stiffness of 8 psi (55 kPa) at 5-percent  
32.23 deflection when tested in accordance with ASTM D2412. Plastic duct fittings shall be  
32.24 constructed of either PVC or high-density polyethylene. Plastic duct and fittings shall be  
32.25 utilized in underground installations only. The maximum design temperature for systems  
32.26 utilizing plastic duct and fittings shall be 150°F (66°C).

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



34.1 All locations Greater than 0.50 to 3.0 All transverse joints and duct  
 34.2 inches (125 to 750 Pa) water wall penetrations shall be  
 34.3 gauge sealed.

34.4 All locations 0.50 inches (125 Pa) water All transverse joints,  
 34.5 gauge and less longitudinal seams, and  
 34.6 duct wall penetrations shall  
 34.7 have no visible gaps and  
 34.8 shall be sufficiently airtight  
 34.9 in accordance with Section  
 34.10 1.7 of the *SMACNA HVAC*  
 34.11 *Duct Construction Standards*  
 34.12 *- Metal & Flexible*

34.13 \*Representative sections totaling no less than 25 percent of the total installed duct area for  
 34.14 the designated pressure class shall be tested. Duct systems with pressure ratings in excess  
 34.15 of three inches water column shall be identified in the construction documents.

34.16 Subp. 10. **Section 603.17.** IMC Section 603.17 is amended by adding a subsection  
 34.17 to read as follows:

34.18 **603.17.3 Adjustment of volume dampers.** Volume dampers shall be adjusted to the  
 34.19 required airflow of the system and locked in place. In finished or inaccessible locations,  
 34.20 a friction-type register box may be used.

34.21 **1346.0604 SECTION 604 INSULATION.**

34.22 IMC Section 604.1 is amended to read as follows:

34.23 **604.1 General.** Duct insulation shall conform to the thickness required by this section and  
 34.24 Sections 604.2 through 604.13.

34.25 **Exception:** Except as required to prevent condensation, ducts for which heat gain or  
 34.26 loss, without insulation, will not increase the energy requirements of the building.

34.27 **Minimum Required Duct Insulation** (see notes for explanations)

34.28 <b>Duct Location</b>	<b>Requirements</b>
34.29 Attics, garages, and ventilated crawl spaces	R-8 and V
35.1 Exterior of building	R-8, V and W

35.2	Inside of building and in unconditioned spaces	
35.3	TD less than or equal to 15°F	None required
35.4	TD greater than 15°F and less than or equal to 40°F	R-3.3 and V
35.5	TD greater than 40°F	R-5 and V
35.6	Within conditioned spaces, in basements with insulated walls, and in	
35.7	plenums within conditioned spaces	None required
35.8	Intake and exhaust ducts within conditioned spaces*	R-3.3 and V
35.9	Within cement slab or within ground (also see IMC Section 603.7)	R-3.5

35.10 Notes:

35.11 \*Insulation required for a distance of 3 feet (914 mm) from the exterior.

35.12 TD = Design temperature differential between the air in the duct and the ambient  
35.13 temperature outside of the duct.

35.14 V = Vapor retarder required in accordance with IMC Section 604.11. When a vapor  
35.15 retarder is required, duct insulation required by this section shall be installed without  
35.16 respect to other building envelope insulation.

35.17 W = Approved weatherproof barrier.

### 35.18 **1346.0703 SECTION 703 OUTDOOR AIR.**

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

35.20 **703.1 All air from the outdoors.** Where all combustion and dilution air is to be provided  
35.21 by outdoor air, the required combustion and dilution air shall be obtained by opening the  
35.22 room to the outdoors. Openings connecting the room to the outdoor air shall comply with  
35.23 IMC Sections 703.1.1 through 703.1.2.2.

35.24 **703.1.1 One permanent opening method.** When any natural draft equipment is installed,  
35.25 one permanent opening, commencing within 12 inches (300 mm) of the bottom of the  
35.26 enclosure, shall be provided. When other than natural draft equipment is installed, one  
35.27 permanent opening, commencing within 12 inches (300 mm) of the top of the enclosure,  
36.1 shall be provided. The opening shall directly communicate with the outdoors or shall  
36.2 communicate through a vertical or horizontal duct to the outdoors or spaces that freely

36.3 communicate with the outdoors and shall have a minimum free area of 1 inch<sup>2</sup>/3,000  
36.4 Btu/hr (700 mm<sup>2</sup>/kW/hr) of the total input rating of all equipment located in the enclosure.

36.5 **703.1.2 Two permanent openings method.** Two openings shall be provided, one within  
36.6 1 foot (305 mm) of the ceiling of the room and one within 1 foot (305 mm) of the floor.

36.7 **703.1.2.1 Size of horizontal openings.** The net free area of each opening, calculated in  
36.8 accordance with IMC Chapter 709 and connected to the outdoors through a horizontal  
36.9 duct, shall be a minimum of 1 square inch per 2,000 Btu/h (1,100 mm<sup>2</sup>/kW) of combined  
36.10 input rating of the fuel-burning appliances drawing combustion and dilution air from the  
36.11 room. The cross-sectional area of the duct shall be equal to or greater than the required  
36.12 size of the opening.

36.13 **703.1.2.2 Size of vertical openings.** The net free area of each opening, calculated in  
36.14 accordance with IMC Chapter 709 and connected to the outdoors through a vertical  
36.15 duct, shall be a minimum of 1 square inch per 4,000 Btu/h (550 mm<sup>2</sup>/kW) of combined  
36.16 input rating of the fuel-burning appliances drawing combustion and dilution air from the  
36.17 room. The cross-sectional area of the duct shall be equal to or greater than the required  
36.18 size of the opening.

36.19 **1346.1001 SECTION 1001 GENERAL.**

36.20 Subpart 1. Department of Labor and Industry boilers. Pursuant to chapter 5225  
36.21 and Minnesota Statutes, sections 326B.952 to 326B.998, the installation, inspection,  
36.22 alteration, and repair of pressure vessels and individual boilers or boilers connected to a  
36.23 common circulation manifold shall be regulated by the Department of Labor and Industry  
36.24 if the individual or combined BTU input exceeds:

36.25 A. 100,000 BTUs for steam boilers;

36.26 B. 500,000 BTUs for hot water supply boilers; or

37.1 C. 750,000 BTUs for hot water heating boilers.

37.2 **Exceptions:**

- 37.3 1. Boilers in buildings occupied solely for residential purposes with accommodations  
37.4 for not more than five families.
- 37.5 2. Any boiler or pressure vessel under the direct jurisdiction of the United States.
- 37.6 3. Boiler or pressure vessels located on farms used solely for agricultural or  
37.7 horticultural purposes; for the purposes of this section, boilers used for mint oil  
37.8 extraction are considered used for agricultural or horticultural purposes, provided  
37.9 that the owner or lessee complies with the inspection requirements contained in  
37.10 Minnesota Statutes, section 326B.958.

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

37.14 A. Steam systems operating over 15 psi; or

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

37.16 Subp. 3. **IMC Section 1001.** IMC Section 1001.1 is amended to read as follows:

37.17 **1001.1 Scope.** This chapter rule shall govern the installation, alteration and repair of  
37.18 system piping with pressures of 15 psi or less, boilers, water heaters, heat exchangers,  
37.19 and pressure vessels that are not regulated by the Department of Labor and Industry's  
37.20 Boiler and High Pressure Piping Sections.

37.21 **Exceptions:**

- 37.22 1. Pressure vessels used for unheated water supply.
- 37.23 2. Portable unfired pressure vessels and Interstate Commerce Commission containers.
- 37.24 3. Containers for bulk oxygen and medical gas.
- 37.25 4. Unfired pressure vessels having a volume of 5 cubic feet (0.14 m<sup>3</sup>) or less operating
- 37.26 at pressures not exceeding 100 pounds per square inch (psi) (1724 kPa) that are
- 38.1 equipped with an ASME code stamped safety valve set at a maximum of 100 pounds
- 38.2 per square inch and located within occupancies of Groups B, F, H, M, R, S and U.

38.3 5. Pressure vessels used in refrigeration systems that are regulated by Chapter 11  
38.4 of this code.

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

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

38.8 ~~Refer to Minnesota Statutes, sections 326B.952 to 326B.998, and Minnesota Rules,~~  
38.9 ~~chapter 5225, for additional requirements for boilers and pressure vessels under the~~  
38.10 ~~jurisdiction of the Department of Labor and Industry. Refer to Minnesota Statutes, chapter~~  
38.11 ~~326, and Minnesota Rules, chapter 5230, for additional requirements for high pressure~~  
38.12 ~~pipng under the jurisdiction of the Department of Labor and Industry.~~

38.13 **1346.1004 SECTION 1004 BOILERS.**

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

38.15 **1004.1 Standards.** Oil-fired boilers and their control systems shall be listed and labeled in  
38.16 accordance with UL 726 or shall utilize burner assemblies and control systems listed and  
38.17 labeled in accordance with UL 296 and shall be installed in accordance with NFPA 31  
38.18 and the manufacturer's installation instructions. Electric boilers and their control systems  
38.19 shall be listed and labeled in accordance with UL 834. Boilers with an input rating above  
38.20 400,000 Btu/hr (3,660 kW) shall be designed and constructed in accordance with the  
38.21 requirements of the BPVC-2007 *ASME Boiler and Pressure Vessel Code*, Sections I, II,  
38.22 IV, V, VIII and IX, as applicable. Boilers with an input rating above 400,000 Btu/hr (117  
38.23 kW) and less than 12,500,000 Btu/hr (3,660 kW) shall comply with ASME CSD-1-2006,  
38.24 and boilers with an input rating of 12,500,000 Btu/hr (3,660 kW) or greater shall comply  
38.25 with NFPA 85-2007, *Boiler and Combustion Systems Hazards Code*.

38.26 [For text of subp 2, see M.R.]

39.1 **1346.1006 SECTION 1006 SAFETY AND PRESSURE RELIEF VALVES AND**  
39.2 **CONTROLS.**

39.3 [For text of subps 1 and 2, see M.R.]

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

39.6 **1006.9 Boiler shutdown switch.** A manually operated remote shutdown switch shall be  
39.7 located as required by ASME CSD-1-~~2004~~ 2006.

39.8 **Exception:** A single hot water boiler with a rated input of less than 400,000 Btu/hr  
39.9 (117 kW).

39.10 **1346.1205 SECTION 1205 VALVES.**

39.11 IMC Section 1205.1.6 is amended to read as follows:

39.12 **1205.1.6 Expansion tanks.** Shutoff valves shall be installed at connections to  
39.13 nondiaphragm-type expansion tanks. The pipe between the boilers or mains and the  
39.14 expansion tank shall be a minimum of 1/2" nominal size. The valve between boilers or  
39.15 mains and an expansion tank shall have permanently attached thereto a metal tag that  
39.16 contains the following language stamped or etched thereon: "This valve must be open at  
39.17 all times, except when draining expansion tank."

39.18 **1346.1206 SECTION 1206 PIPING INSTALLATION.**

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

39.20 **1206.1.1 Prohibited tee applications.** Fluid in the supply side of a hydronic system  
39.21 shall not enter a tee fitting through the branch opening. Fluid from two returns shall not  
39.22 enter on the run of the same tee.

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

39.25 **1206.12 Mixing of radiation.** Mixing radiation with different rates of heat transfer shall  
39.26 not be permitted in the same heating zone.

40.1 **Exception:** Engineered design installations.

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

40.4 **1206.13 Draining and venting.** Hydronic pipes shall be installed so that the pipes can be  
40.5 drained and so that air can be completely removed from the system during filling.

40.6 **1346.1500 CHAPTER 15, REFERENCED STANDARDS.**

40.7 Subpart 1. **Modifications to chapter 15.** The list of referenced standards in IMC  
40.8 Chapter 15 is modified as follows:

40.9 A. References to NFPA 211-2003 shall be deleted and replaced with references  
40.10 to NFPA 211-2006.

40.11 B. References to NFPA 31-2001 shall be deleted and replaced with references  
40.12 to NFPA 31-2006.

40.13 Subp. 2. **Supplemental standards.** The standards listed in this part shall supplement  
40.14 the list of referenced documents in chapter 15 of the 2006 IMC. The standards referenced  
40.15 in this rule shall be considered part of the requirements of this rule shall be considered part  
40.16 of the requirements of this rule to the extent prescribed in each rule or reference.

40.17 A. *ASHRAE 2005 Handbook - Fundamentals;*

40.18 B. *ASHRAE 15-2007 Safety Standard for Refrigeration Systems;*

40.19 C. *ASHRAE 34-2007 Designation and Safety Classification of Refrigerants;*

40.20 D. *ASHRAE 62.1-2004 Ventilation for Acceptable Indoor Air Quality;*

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

40.23 F. *ASME CSD-1-2006 Controls and Safety Devices for Automatically Fired*  
40.24 *Boilers;*

- 41.1 G. ASME B31.3-2006 *Process Piping Code*;
- 41.2 H. ASME B31.9-2008 *Building Services Piping Code*;
- 41.3 I. ASTM E1998-02 2007 *Standard Guide for Assessing*
- 41.4 *Depressurization-Induced Backdrafting and Spillage from Vented Combustion Appliances*;
- 41.5 J. NFPA 58-2008 *Liquefied Petroleum Gas Code*;
- 41.6 K. NFPA ~~96-2004~~ 96-2008 *Standard for Ventilation Control and Fire Protection*
- 41.7 *of Commercial Cooking Operations*;
- 41.8 L. NFPA 85-2007 *Boiler and Combustion Systems Hazards Code*;
- 41.9 M. ~~UL 197-2003 including revisions through March 26, 2007, Standard for~~
- 41.10 ~~Commercial Electric Cooking Appliances~~;
- 41.11 ~~N. M.~~ UL 555-2006 Standard for Fire Dampers;
- 41.12 ~~Ø. N.~~ UL 555C-2006 Standard for Ceiling Dampers;
- 41.13 ~~P. O.~~ UL 555S-1999 Standard for Smoke Dampers; and
- 41.14 ~~Q. P.~~ NFPA 45-2004 Standard on Fire Protection for Laboratories Using
- 41.15 Chemicals;
- 41.16 Q. NFPA 211-2006 Standard for Chimneys, Fireplaces, Vents, and Solid
- 41.17 Fuel-Burning Appliances;
- 41.18 R. NFPA 31-2006 Standard for the Installation of Oil Burning Appliances;
- 41.19 S. NFPA 90B-2006 Standard for the Installation of Warm Air Heating and
- 41.20 Air Conditioning Systems;
- 41.21 T. NFPA 85-2007 Boiler and Combustion Systems Hazards Code; and
- 41.22 U. NFPA 54-2009 National Fuel Gas Code.

41.23 **1346.5050 TITLE; INCORPORATION BY REFERENCE.**

42.1 This section is known and may be cited as the "Minnesota Fuel Gas Code." As used  
42.2 in this section, "the code" and "this code" refer to this section.

42.3 Chapters 2 to 8 of the 2006 edition of the International Fuel Gas Code, promulgated  
42.4 by the International Code Council, Inc., ~~5203 Leesburg Pike, Suite 600, Falls Church,~~  
42.5 ~~Virginia 22041-3401~~ 500 New Jersey Avenue NW, 6th Floor, Washington, DC  
42.6 20001-2070, are incorporated by reference as part of the Minnesota Fuel Gas Code with  
42.7 the amendments in this section. Portions of this chapter reproduce text and tables from  
42.8 the International Fuel Gas Code. The International Fuel Gas Code is copyright 2006 by  
42.9 the International Code Council, Inc. All rights reserved. As used in this section, "IFGC"  
42.10 means the International Fuel Gas Code incorporated in this part.

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

42.13 **1346.5101 SECTION 101 (IFGC) GENERAL.**

42.14 IFGC Section 101 is amended to read as follows:

42.15 **101 Scope.** The Minnesota Fuel Gas Code shall apply to the installation of fuel gas  
42.16 piping systems, fuel gas utilization equipment, gaseous hydrogen systems, and related  
42.17 accessories in accordance with this part.

42.18 **101.1 Gaseous hydrogen systems.** Gaseous hydrogen systems shall be regulated by  
42.19 IFGC Chapter 7.

42.20 **101.2 Piping systems.** These regulations cover piping systems for natural gas with an  
42.21 operating pressure of 125 pounds per square inch gauge (psig) (862 kPa gauge) or less,  
42.22 and for LP-gas with an operating pressure of 20 psig (140 kPa gauge) or less, except as  
42.23 provided in IFGC Section 402.6.1. Coverage shall extend from the point of delivery to  
42.24 the outlet of the equipment shutoff valves. Piping system requirements shall include  
42.25 design, materials, components, fabrication, assembly, installation, testing, inspection,  
42.26 operation, and maintenance.

43.1 **101.3 Gas utilization equipment.** Requirements for gas utilization equipment and  
43.2 related accessories on the side of the meter that supplies gas to the building piping system  
43.3 shall include installation, combustion, and ventilation air and venting and connections  
43.4 to piping systems.

43.5 **101.4 Systems and equipment outside the scope.** This code shall not apply to the  
43.6 following:

- 43.7 1. Portable LP-gas equipment of all types that is not connected to a fixed fuel piping  
43.8 system.
- 43.9 2. Installation of farm equipment such as brooders, dehydrators, dryers, and irrigation  
43.10 equipment.
- 43.11 3. Raw material (feedstock) applications except for piping to special atmosphere  
43.12 generators.
- 43.13 4. Oxygen-fuel gas cutting and welding systems.
- 43.14 5. Industrial gas applications using gases such as acetylene and acetylenic  
43.15 compounds, hydrogen, ammonia, carbon monoxide, oxygen, and nitrogen.
- 43.16 6. Petroleum refineries, pipeline compressor or pumping stations, loading terminals,  
43.17 compounding plants, refinery tank farms, and natural gas processing plants.
- 43.18 7. Integrated chemical plants or portions of such plants where flammable or  
43.19 combustible liquids or gases are produced by, or used in, chemical reactions.
- 43.20 8. LP-gas installations at utility gas plants.
- 43.21 9. Liquefied natural gas (LNG) installations.
- 43.22 10. Fuel gas piping in power and atomic energy plants.
- 43.23 11. Proprietary items of equipment, apparatus, or instruments such as gas-generating  
43.24 sets, compressors, and calorimeters.
- 43.25 12. LP-gas equipment for vaporization, gas mixing, and gas manufacturing.
- 43.26 13. Temporary LP-gas piping for buildings under construction or renovation that is  
43.27 not to become part of the permanent piping system.

- 44.1 14. Installation of LP-gas systems for railroad switch heating.
- 44.2 15. Installation of hydrogen gas, LP-gas, and compressed natural gas (CNG) systems
- 44.3 on vehicles.
- 44.4 16. Except as provided in IFGC section 401.1.1, gas piping, meters, gas pressure
- 44.5 regulators, and other appurtenances used by the serving gas supplier in the distribution
- 44.6 of gas, other than undiluted LP-gas.
- 44.7 17. Building design and construction, except as specified in this rule.
- 44.8 18. Piping systems for mixtures of gas and air within the flammable range with an
- 44.9 operating pressure greater than 10 psig (69 kPa gauge).
- 44.10 19. Portable fuel cell appliances that are neither connected to a fixed piping system
- 44.11 nor interconnected to a power grid.
- 44.12 **101.5 Other fuels.** The requirements for the design, installation, maintenance, alteration,
- 44.13 and inspection of mechanical systems operating with fuels other than fuel gas shall be
- 44.14 regulated by the Minnesota Mechanical Code, parts 1346.0050 to 1346.1500.

44.15 **1346.5202 SECTION 202 (IFGC) GENERAL DEFINITIONS.**

44.16 Subpart 1. **Section 202.** IFGC Section 202 is amended by adding the following

44.17 definitions:

44.18 **GAS PIPING SYSTEM - LOW PRESSURE.** A system that operates at a pressure not

44.19 exceeding 14 inches of water column. LPG is a pressure not exceeding 14 inches of

44.20 water column.

44.21 **GAS PIPING SYSTEM - MEDIUM PRESSURE.** A system that operates at a pressure

44.22 exceeding 14 inches of water column but not exceeding five (5) psig. LPG is a pressure

44.23 exceeding 14 inches of water column but not exceeding twenty (20) psig.

44.24 **GAS PIPING SYSTEM - HIGH PRESSURE.** A system that operates at a pressure

44.25 exceeding five (5) psig. LPG is a pressure exceeding twenty (20) psig.

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

45.4 [For text of subp 2, see M.R.]

45.5 **1346.5301 SECTION 301 (IFGC) GENERAL.**

45.6 IFGC Section 301.3 is amended to read as follows:

45.7 **301.3 Listed and labeled.** Appliances regulated by this code shall be listed and labeled to  
45.8 an appropriate standard by a nationally recognized testing laboratory which is qualified to  
45.9 evaluate the appliance, unless otherwise approved in accordance with the administrative  
45.10 provisions of the Minnesota State Building Code, Minnesota Rules, chapter 1300. The  
45.11 approval of unlisted appliances shall be based upon engineering evaluation. Unlisted  
45.12 appliances shall be installed with clearances to combustibles in accordance with IFGC  
45.13 ~~Chapter 5~~ NFPA 54-2009. Unlisted appliances with a fuel input rating of less than  
45.14 12,500,000 Btu/hr (3,660 kW) shall have fuel gas trains, controls and safety devices  
45.15 installed in accordance with Part CF, Combustion Side Control, of ASME CSD-1-2006.  
45.16 Unlisted appliances with a fuel input rating of 12,500,000 Btu/hr (3,660 kW) or greater  
45.17 shall have fuel gas trains, controls and safety devices installed in accordance with NFPA  
45.18 85-2007.

45.19 **1346.5304 SECTION 304 (IFGC) COMBUSTION, VENTILATION AND**  
45.20 **DILUTION AIR.**

45.21 Subpart 1. **Section 304.1.** IFGC Section 304 is amended by adding language to the  
45.22 end of the first paragraph to read as follows:

45.23 **304.1 General.** Refer to IFGC Appendix E for Worksheet E-1, "Residential Combustion  
45.24 Air Calculation Method" and Table E-1, "Residential Combustion Air Required Volume."

45.25 **Exceptions:**

45.26 1. Direct vent appliances.

- 46.1 2. Type 1 clothes dryers that are provided with makeup air in accordance with the  
46.2 manufacturer's installation instructions.
- 46.3 3. Replacement of fuel gas utilization equipment that complies with all of the  
46.4 following conditions:
- 46.5 3.1 Replacement equipment has a Btu/hr (kW) input rating not greater than 30 percent  
46.6 above the original equipment input rating.
- 46.7 3.2 Combustion air provisions meet the code requirements in effect at the time of  
46.8 the original installation.
- 46.9 3.3 Replacement equipment shall not cause an existing mechanical system to become  
46.10 unsafe, hazardous, or overloaded.

46.11 Subp. 2. [See repealer.]

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

46.13 **304.6.2 One permanent opening method.** When any natural draft equipment is installed,  
46.14 one permanent opening, commencing within 12 inches (300 mm) of the bottom of the  
46.15 enclosure, shall be provided. When other than natural draft equipment is installed, one  
46.16 permanent opening, commencing within 12 inches (300) of the top of the enclosure, shall  
46.17 be provided. The equipment shall have clearances of at least 1 inch (25 mm) from the  
46.18 sides and back and 6 inches (160 mm) from the front of the appliance. The opening  
46.19 shall directly communicate with the outdoors or shall communicate through a vertical or  
46.20 horizontal duct to the outdoors or spaces that freely communicate with the outdoors and  
46.21 shall have a minimum free area of 1 inch<sup>2</sup>/3,000 Btu/hr (700 mm<sup>2</sup>/kW) of the total input  
46.22 rating of all equipment located in the enclosure.

46.23 Subp. 4. [See repealer.]

46.24 Subp. 5. [See repealer.]

46.25 Subp. 6. [See repealer.]

46.26 Subp. 7. [See repealer.]

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

47.2 **304.11 Combustion air ducts.** Combustion air ducts shall comply with the following:

47.3 1. Ducts shall be of galvanized steel or an equivalent corrosion-resistant material.

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

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

47.8 3. Ducts shall serve a single space.

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

47.12 5. Ducts shall not terminate in an attic space.

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

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

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

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

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

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

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

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

48.8 Subp. 9. [See repealer.]

48.9 **1346.5402 SECTION 402 (IFGC) PIPE SIZING.**

48.10 Subpart 1. [See repealer.]

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

48.13 **Table 402.4(2)A**

48.14 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	

49.1	80	20	44	80	168	317	651	975
49.2	100	17	39	71	149	281	577	864
49.3	125	16	34	63	132	249	511	766
49.4	150	14	31	57	120	226	463	694
49.5	175	13	29	53	110	208	426	638
49.6	200	12	27	49	102	193	396	594
49.7	250	11	24	43	91	171	351	626
49.8	300	10	21	39	82	155	318	477
49.9	350	9	20	36	76	143	293	439
49.10	400	8	18	34	70	133	272	408
49.11	450	8	17	32	66	124	256	383
49.12	500	7	16	30	62	118	241	362
49.13	Nominal	2	2-1/2	3	4	5	6	8
49.14	Actual ID	2.067	2.469	3.068	4.026	5.047	6.065	7.891
49.15	Length (ft)	Maximum Capacity in Cubic Feet of Gas per Hour						
49.16	10	5784	9218	16296	33239	60134	97370	194195
49.17	20	3975	6336	11200	22845	41330	66922	133469
49.18	30	3192	5088	8994	18345	33189	53741	107181
49.19	40	2732	4354	7698	115701	28406	45995	91733
49.20	50	2421	3859	6822	13916	25175	40765	81301
49.21	60	2194	3497	6182	12609	22811	36936	73665
49.22	80	1878	2993	5291	10791	19523	31612	63047
49.23	100	1664	2652	4689	9564	17303	28017	55878
49.24	125	1475	2351	4156	8477	15335	24831	49523
49.25	150	1336	2130	3765	7680	13895	22499	44872
49.26	175	1229	1960	3464	7066	12783	20699	41281
49.27	200	1144	1823	3223	6573	11892	19256	38404
49.28	250	1014	1616	2856	5826	10540	17066	34037
49.29	300	918	1464	2588	5279	9550	15463	30840

50.1	350	845	1347	2381	4856	8786	14226	28373
50.2	400	786	1253	2215	4518	8173	13235	26395
50.3	450	738	1176	2078	4239	7669	12418	24766
50.4	500	697	1110	1963	4004	7244	11730	23394

50.5 **1346.5403 SECTION 403 (IFGC) PIPING MATERIALS.**

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

50.7 **403.8 Protective coating.** Where in contact with material, or passing through concrete  
50.8 or other abrasive material or atmosphere exerting a corrosive action, metallic piping  
50.9 and fittings coated with a corrosion-resistant material, sleeve, or casing shall be used.  
50.10 Steel pipe exposed in exterior locations shall be galvanized or coated with approved  
50.11 corrosion-resistant material. External or internal coatings or linings used on piping or  
50.12 components shall not be considered as adding strength.

50.13 Subp. 1a. **Section 403.10.2.** IFGC Section 403.10.2 is amended to read as follows:

50.14 **403.10.2 Tubing joints.** Tubing joints shall be either made with approved gas tubing  
50.15 fittings or brazed with a material having a melting point in excess of 1,000°F (538°C), or  
50.16 made by press connect fittings complying with ANSI LC-4, Press-Connect Copper and  
50.17 Copper Alloy, Fittings for Use in Fuel Gas Distribution Systems. Brazing alloys shall not  
50.18 contain more than 0.05-percent phosphorus.

50.19 [For text of subp 2, see M.R.]

50.20 **1346.5406 SECTION 406 (IFGC) INSPECTION, TESTING AND PURGING.**

50.21 [For text of subpart 1, see M.R.]

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

50.23 [For text of subps 3 to 5, see M.R.]

50.24 **1346.5409 SECTION 409 (IFGC) SHUTOFF VALVES.**

51.1 Subpart 1. **Section 409.1.** IFGC Section 409.1 is amended by adding subsection  
51.2 409.1.4 to read as follows:

51.3 **409.1.4 Main shutoff valve.** Piping systems shall be provided with an approved main  
51.4 shutoff valve before the first branch line. The main shutoff valve shall be installed in  
51.5 the first available location inside the building that provides ready access and shall have  
51.6 a permanently attached handle.

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

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

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

51.14 **409.2 Meter valve.** Every meter shall be equipped with a shutoff valve located on the  
51.15 ~~supply~~ side of the meter that supplies gas to the building piping system. The main shutoff  
51.16 valve required in ~~amended IFGC Section 409.1.4~~ subpart 1 shall serve as the shutoff valve.

51.17 [For text of subp 3, see M.R.]

51.18 **1346.5501 SECTION 501 (IFGC) GENERAL.**

51.19 [For text of subpart 1, see M.R.]

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

51.21 **501.8 Equipment not required to be vented.** The following appliances shall not be  
51.22 required to be vented.

51.23 1. Ranges.

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

51.25 3. Hot plates and laundry stoves.

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

52.3 5. A single booster-type automatic instantaneous water heater, where designed and  
52.4 used solely for the sanitizing rinse requirements of a dishwashing machine, provided  
52.5 that the heater is installed in a commercial kitchen having a mechanical exhaust system.  
52.6 Where installed in this manner, the draft hood, if required, shall be in place and unaltered  
52.7 and the draft hood outlet shall be not less than 36 inches (914 mm) vertically and 6 inches  
52.8 (152 mm) horizontally from any surface other than the heater.

52.9 6. Refrigerators.

52.10 7. Counter appliances.

52.11 8. Direct-fired make-up air heaters.

52.12 9. Other equipment listed for unvented use and not provided with flue collars.

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

52.14 Automatically operated equipment vented with a hood or exhaust system shall comply  
52.15 with IFGC Section 503.3.4. Where the appliances and equipment listed in items 5 through  
52.16 10 are installed so that the aggregate input rating exceeds 20 Btu/hr per cubic foot (207  
52.17 watts per m<sup>3</sup>) of volume of the room or space in which such appliances and equipment are  
52.18 installed, one or more shall be provided with venting systems or other approved means  
52.19 for conveying the vent gases to the outdoor atmosphere so that the aggregate input rating  
52.20 of the remaining unvented appliances and equipment does not exceed the 20 Btu/hr per  
52.21 cubic foot (207 watts per m<sup>3</sup>) figure. Where the room or space in which the equipment is  
52.22 installed is directly connected to another room or space by a doorway, archway, or other  
52.23 opening of comparable size that cannot be closed, the volume of such adjacent room or  
52.24 space shall be permitted to be included in the calculations.

52.25 [For text of subp 3, see M.R.]

52.26 **1346.5503 SECTION 503 (IFGC) VENTING OF EQUIPMENT.**

53.1 [For text of subpart 1, see M.R.]

53.2 Subp. 2. [See repealer.]

53.3 [For text of subps 3 and 4, see M.R.]

53.4 Subp. 5. [See repealer.]

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

53.6 **503.6.9.1 Category I appliances.** The sizing of natural draft venting systems serving one  
53.7 or more listed appliances equipped with a draft hood or appliances listed for use with Type  
53.8 B gas vent, installed in a single story of a building, shall be in accordance with one of  
53.9 the following methods:

53.10 1. The provisions of Section 504.

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

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

53.18 4. Approved engineering practices.

53.19 [For text of subp 7, see M.R.]

53.20 Subp. 8. [See repealer.]

53.21 Subp. 9. **Section 503.10.7.** IFGC Section 503.10.7 is amended to read as follows:

53.22 **503.10.7 Joints.** Joints between sections of connector piping and connections to flue  
53.23 collars and hood outlets shall be fastened by one of the following methods:

- 53.24 1. Three sheet metal screws equally spaced in accessible locations on the  
53.25 circumference of the vent.
- 54.1 2. Vent connectors of listed vent material assembled and connected to flue collars or  
54.2 draft hood outlets in accordance with the manufacturers' instructions.
- 54.3 3. Other approved means.

54.4 **1346.5504 SECTION 504 (IFGC) SIZING OF CATEGORY 1 APPLIANCE**  
54.5 **VENTING SYSTEMS.**

54.6 [For text of subps 1 and 2, see M.R.]

54.7 Subp. 3. **Section 504.3.17.** IFGC Section 504.3.17 is amended to read as follows:  
54.8 **504.3.17 Vertical vent maximum size.** Where two or more appliances are connected to a  
54.9 vertical vent or chimney, the flow area of the largest section of vertical vent or chimney  
54.10 shall not exceed four times the smallest listed appliance categorized vent areas, flue collar  
54.11 area, or draft hood outlet area unless designed in accordance with approved engineering  
54.12 methods.

54.13 Subp. 4. **Section 504.3.19.** IFGC Section 504.3.19 is amended to read as follows:  
54.14 **504.3.19 Liner system sizing.** Listed corrugated metallic chimney liner systems in  
54.15 masonry chimneys shall be sized by using IFGC Table 504.3(1) or 504.3(2) for Type B  
54.16 vents, with the maximum capacity reduced by 20 percent (0.80 x maximum capacity) and  
54.17 the minimum capacity as shown in IFGC Table 504.3(1) or 504.3(2). Corrugated metallic  
54.18 liner systems installed with bends or offsets shall have their maximum capacity further  
54.19 reduced in accordance with IFGC Sections 504.3.5 and 504.3.6. Approved metallic liners,  
54.20 other than listed corrugated metallic liner systems, installed in accordance with amended  
54.21 IFGC Section 501.12, shall be sized by using IFGC Table 504.3(1) or 504.3(2) for Type  
54.22 B vents. When IFGC Table 504.3(1) or 504.3(2) permits more than one diameter for a  
54.23 connector or vent of a fan-assisted appliance, the smallest permitted diameter shall be used.

54.24 **1346.5621 SECTION 621 (IFGC) UNVENTED ROOM HEATERS.**

54.25 IFGC Section 621 is deleted in its entirety and replaced with the following:

55.1 Unvented room heaters and unvented decorative appliances shall not be installed in any  
55.2 dwelling or occupancy.

55.3 **1346.5630 SECTION 630 (IFGC) INFRARED RADIANT HEATERS.**

55.4 Subpart 1. [See repealer.]

55.5 Subp. 2. [See repealer.]

55.6 Subp. 3. **Section 630.** IFGC Section 630 is amended by adding a subsection to  
55.7 read as follows:

55.8 **630.3 Ventilation air.** Where unvented infrared heaters are installed, mechanical  
55.9 ventilation shall be provided to exhaust at least 4 cubic feet per minute (cfm) (0.0203  
55.10 m<sup>3</sup>/s) per 1,000 Btu/hr (0.292 kW) input rating and it shall be electrically interlocked with  
55.11 the heater. Makeup air shall be provided to the space to be heated.

55.12 **1346.5631 SECTION 631 (IFGC) BOILERS.**

55.13 IFGC Section 631.1 is amended to read as follows:

55.14 **631.1 Standards.** Boilers with an input rating below 400,000 Btu/hr (3,660 kW) shall  
55.15 be listed in accordance with the requirements of ANSI Z21.13/CSA 4.9 or UL 795.

55.16 Boilers with an input rating of 400,000 Btu/hr (3,660 kW) or greater shall be designed  
55.17 and constructed in accordance with the BPVC-2007 *ASME Boiler and Pressure Vessel*  
55.18 *Code*, Sections I, II, IV, V, VIII, and IX, and amended IFGC Section 301.3, as applicable.  
55.19 Boilers with an input rating above 400,000 Btu/hr (117 kW) and less than 12,500,000  
55.20 Btu/hr (3,660 kW) shall comply with ASME CSD-1-2006, and boilers with an input rating  
55.21 of 12,500,000 Btu/hr (3,660 kW) or greater shall comply with NFPA 85-2007, *Boiler*  
55.22 *and Combustion Systems Hazards Code*.

55.23 **1346.5800 CHAPTER 8 REFERENCED STANDARDS.**

55.24 **Supplemental standards.** The standards listed in this part shall supplement the list  
 55.25 of referenced documents in chapter 8 of the 2006 IFGC. The standards referenced in this  
 56.1 rule shall be considered part of the requirements of this rule to the extent prescribed  
 56.2 in each rule or reference.

56.3 A. NFPA 54-2009 National Fuel Gas Code;

56.4 B. NFPA 85-2007 Boiler and Combustion Systems Hazards Code; and

56.5 C. ASME CSD-1 2006 Controls and Safety Devices for Automatic Boilers.

56.6 **1346.5901 SECTION 901 (IFGC) GENERAL.**

56.7 The IFGC is amended by adding a chapter to read as follows:

56.8 SECTION 901

56.9 GENERAL

56.10 **901.1 General.** Chapter 9 shall regulate the installation and testing or repair of gas or  
 56.11 fuel burning systems, gas or fuel burners, and gas or fuel burning equipment installed  
 56.12 within, or in conjunction with, building or structures. The requirements of this chapter  
 56.13 shall apply to the following equipment:

56.14 1. Equipment utilized to provide control of environmental conditions.

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

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

56.20 3. Unlisted equipment.

56.21 4. Miscellaneous equipment when required by the building official.

56.22 **1346.5902 SECTION 902 (IFGC) EQUIPMENT PLACEMENT.**

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

## SECTION 902

## EQUIPMENT PLACEMENT

56.24  
56.25  
57.1 **902.1 Placing equipment in operation.** After completion of the installation, all safety  
57.2 and operating controls and venting shall be tested before placing the burner in service.  
57.3 The correct input of fuel shall be determined and the fuel-to-air ratio set. Each gas or fuel  
57.4 burner shall be adjusted to its proper input according to the manufacturer's instructions.  
57.5 Overrating the burners or appliance is prohibited. Btu/hr input range shall be appropriate  
57.6 to the appliance.

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

57.11 2. For conversion burners installed in hot water (liquid) boilers or warm air furnaces,  
57.12 the rate of flow of the gas or fuel in Btu/hr shall be adjusted to within plus or minus five  
57.13 percent of the calculated Btu/hr heat loss of the building in which it is installed, or the  
57.14 design load, and shall not exceed the design rate of the appliance.

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

57.19 **1346.5903 SECTION 903 (IFGC) PILOT OPERATION.**

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

## 57.21 SECTION 903

## 57.22 PILOT OPERATION

57.23 **903.1 Pilot operation.** Pilot flames shall ignite the gas or fuel at the main burner or  
57.24 burners and shall be adequately protected from drafts. Pilot flames shall not become

57.25 extinguished during pilot cycle when the main burner or burners are turned on or off in a  
57.26 normal manner, either manually or by automatic controls.

58.1 **1346.5904 SECTION 904 (IFGC) BURNER OPERATION.**

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

58.3 SECTION 904

58.4 BURNER OPERATION

58.5 **904.1 Burner operation.** When testing to determine compliance with this section, care  
58.6 shall be exercised to prevent the accumulation of unburned gas or fuel in the appliance or  
58.7 flues that might result in explosion or fire.

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

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

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

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

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

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

58.22 7. Burners shall have proper fuel air mixture to ensure smooth ignition of the main  
58.23 burner.

58.24 8. Dual fuel burners may have controls common or independent to both fuels.  
58.25 Transfer from one fuel to the other shall be by a manual interlock switching system to

58.26 prevent the gas and other fuel being used simultaneously except by special permission  
58.27 from the building official. The building official shall consider whether an exception will  
59.1 provide equivalent safety. The transfer switch shall have a center off position and shall not  
59.2 pass through the center off position without stopping in the center off position.

59.3 **1346.5905 SECTION 905 (IFGC) METHOD OF TEST.**

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

59.5 SECTION 905

59.6 METHOD OF TEST

59.7 **905.1 Method of test.**

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

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

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

59.17 3.1. **Performance standards for atmospheric type.**

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

59.20 b. Carbon monoxide concentration in flue gas not greater than 0.04 percent on an  
59.21 air-free basis.

59.22 c. Stack temperature not greater than 480°F, plus ambient.

59.23 d. Carbon dioxide concentration between 6 and 9 percent, inclusive.

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

59.25 3.2. **Performance standards for induced draft type/fan-assisted type.**

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

60.1 b. Carbon monoxide concentration in flue gas not greater than 0.04 percent on an  
60.2 air free basis.

60.3 c. Stack temperature not greater than 480°F, plus ambient.

60.4 d. Oxygen concentration between 4 and 10 percent, inclusive, with carbon dioxide  
60.5 concentration between 6 and 9 percent, inclusive.

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

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

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

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

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

60.18 c. Stack temperature not greater than 480°F plus ambient, or 125°F in excess of  
60.19 fluid temperature plus ambient.

60.20 d. Carbon dioxide concentration between 6 and 9 percent, inclusive.

60.21 e. Oxygen concentration between 3 and 10 percent, inclusive.

60.22 6. After completion of the test of newly installed gas or fuel burner equipment as  
60.23 provided in this section, complete test records shall be filed with the building official on an  
60.24 approved form. The tag stating the date of the test and the name of the installer shall be  
60.25 attached to the appliance at the main valve.

60.26        **7. Oxygen concentration.**

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

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

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

61.8            **8. Approved oxygen trim system.** The oxygen figures may not apply when there is  
61.9 an approved oxygen trim system on the burner that is designed for that use, including a  
61.10 low oxygen interlock when approved by the building official. The building official shall  
61.11 consider whether an exception will provide equivalent safety.

61.12        **9. Supervised start-up.**

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

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

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

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

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

62.4 **1346.5906 SECTION 906 (IFGC) PRESSURE REGULATORS.**

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

62.6 SECTION 906

62.7 PRESSURE REGULATORS

62.8 **906.1 Pressure regulators.**

62.9 (a) General.

62.10 1. Regulators shall be provided with access for servicing.

62.11 2. Regulators shall be provided with a shutoff valve, union and test taps (both  
 62.12 upstream and downstream of the regulator) for servicing.

62.13 3. All regulators with inlet gas pressure exceeding 14 inches water column pressure  
 62.14 or used on an appliance having an input exceeding 400,000 Btu/hr shall have an approved  
 62.15 high pressure manual gas valve in the supply piping upstream of the regulator.

62.16 4. All regulators with inlet gas pressure exceeding 14 inches water column pressure  
 62.17 or used on an appliance having an input exceeding 400,000 Btu/hr shall be vented to the  
 62.18 outdoors in separate vents sized according to the manufacturer's specifications.

62.19 **Exception:** Regulators equipped with limiting orifices installed in accordance with  
 62.20 amended IFGC Section 410.3.

62.21 5. Regulators may not be vented into a combustion chamber or an appliance vent.

62.22 6. Regulator vents shall terminate at least 3 feet (914 mm) from doors, operable  
 62.23 windows, nonmechanical intake openings, and openings into direct-vent appliances. The  
 62.24 vent termination shall be located at least 12 inches (305 mm) above grade and shall be  
 62.25 suitably screened and hooded to prevent accidental closure of the vent pipe.

63.1 7. All pounds-to-pounds and pounds-to-inches regulators used as appliance regulators  
63.2 where downstream controls are not rated for upstream pressure shall be of the full lock-up  
63.3 type.

63.4 (b) Appliance.

63.5 1. Appliance regulators shall be installed consistent with the listing and approval of  
63.6 the equipment and the listing and approval of the regulator manufacturer.

63.7 2. Each gas burner or appliance shall have its own gas pressure regulator. This  
63.8 appliance regulator is in addition to any pounds-to-pounds or pounds-to-inches regulators  
63.9 in the system.

63.10 **1346.5907 SECTION 907 (IFGC) EQUIPMENT INFORMATION.**

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

63.12 SECTION 907

63.13 EQUIPMENT INFORMATION

63.14 **907.1 Equipment information.**

63.15 A. All installations of gas or fuel burners with input above 400,000 Btu/hr and all  
63.16 combination gas or fuel burners shall be approved before installation. The following  
63.17 information shall be supplied if required by the building official.

63.18 1. Name, model, and serial number of the burner.

63.19 2. Input rating and type of fuel.

63.20 3. Name of the nationally recognized testing laboratory that tested and listed the unit.

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

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

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

64.1 B. All installations of gas or fuel burners with input above 400,000 Btu/hr and all  
 64.2 combination gas and oil or other combination fuel burners that are installed in new or  
 64.3 renovated boiler or equipment rooms, or are installed in a package with the boiler or  
 64.4 furnace, shall include the following information in addition to that required in item A,  
 64.5 subitems 1 to 6.

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

64.8 2. Detailed provisions for combustion air, venting, and stacks.

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

64.11 **1346.6000 SECTION 1000 MANUFACTURED HOME PARK/COMMUNITY**  
 64.12 **FUEL GAS EQUIPMENT AND INSTALLATION.**

64.13 The IFGC is amended by adding a chapter to read as follows:

64.14 CHAPTER 10

64.15 MANUFACTURED HOME PARK/COMMUNITY FUEL GAS

64.16 EQUIPMENT AND INSTALLATION

64.17 **1001 General.** Except as otherwise permitted or required by this chapter, all fuel gas  
 64.18 equipment and installations in manufactured home parks and communities shall comply  
 64.19 with the provisions of this code. The provisions of this chapter shall not apply to  
 64.20 manufactured home gas piping and equipment.

64.21 **1002 Required gas supply.** The minimum hourly volume of gas required at each  
 64.22 manufactured home lot outlet or any section of the manufactured home gas piping system  
 64.23 shall be calculated as shown in IFGC Table 1002. Required gas supply for buildings or  
 64.24 other fuel gas utilization equipment connected to the manufactured home gas piping  
 64.25 system shall be calculated as provided in this code.

64.26 Table 1002

64.27 Demand Factors for Calculating Gas Piping Systems in Manufactured Home Parks and  
 64.28 Communities

65.1	Number of Manufactured Home Sites	Demand Factor (Btu/hr) per Manufactured Home Site	Demand Factor (Watts) per Manufactured Home Site
65.2			
65.3			
65.4			
65.5	1	125,000	36,638
65.6	2	117,000	34,293
65.7	3	104,000	30,482
65.8	4	96,000	28,138
65.9	5	92,000	26,965
65.10	6	87,000	25,500
65.11	7	83,000	24,327
65.12	8	81,000	23,741
65.13	9	79,000	23,155
65.14	10	77,000	22,569
65.15	11-20	66,000	19,345
65.16	21-30	62,000	18,172
65.17	31-40	58,000	17,000
65.18	41-60	55,000	16,121
65.19	Over 60	50,000	14,655

65.20 **1003 Installation.** Gas piping shall not be installed underground beneath buildings or that  
65.21 portion of the manufactured home lot reserved for the location of manufactured homes,  
65.22 manufactured home accessory buildings or structures, concrete slabs, or automobile  
65.23 parking, unless installed in a gas-tight conduit complying with the following:

65.24 1. The conduit shall be of material approved for installation underground beneath  
65.25 buildings and not less than Schedule 40 pipe. The interior diameter of the conduit shall be  
65.26 not less than 0.5 inch (15 mm) larger than the outside diameter of the gas piping.

65.27 2. The conduit shall extend to a point not less than 12 inches (305 mm) beyond  
65.28 any area where it is required to be installed, or the outside wall of a building, and the  
65.29 outer ends shall not be sealed. Where the conduit terminates within a building, it shall be

66.1 provided with access, and the space between the conduit and the gas piping shall be sealed  
66.2 to prevent leakage of gas into the building.

66.3 **Exception:** A gas piping lateral terminating in a manufactured home lot riser  
66.4 surrounded by a concrete slab shall not be required to be installed in a conduit,  
66.5 provided the concrete slab is entirely outside the wall line of the manufactured home,  
66.6 and is used for stabilizing other utility connections.

66.7 **1004 Manufactured home lot shutoff valve.** Each manufactured home lot shall have an  
66.8 approved gas shutoff valve installed upstream of the manufactured home lot gas outlet  
66.9 and located on the outlet riser at a height at least 6 inches (152 mm) above grade. Such  
66.10 valve shall not be located under a manufactured home. When the manufactured home  
66.11 lot is not in use, the outlet shall be equipped with an approved cap or plug to prevent  
66.12 accidental discharge of gas.

66.13 **1005 Manufactured home lot gas outlet.** Each manufactured home lot piped for gas  
66.14 shall be provided with an individual outlet riser at the manufactured home lot. The  
66.15 manufactured home lot gas outlet shall terminate with the point of delivery in the rear third  
66.16 section and within 4 feet (1,219 mm) of the proposed location of the manufactured home.

66.17 ~~**1006 Manufactured home gas connector.** Each manufactured home shall be connected~~  
66.18 ~~to the lot outlet by an approved or listed gas connector, a maximum of 6 feet (1,829 mm)~~  
66.19 ~~in length. Approved pipe and fittings may be used between the flexible connector and the~~  
66.20 ~~lot gas outlet when the distance exceeds that required to make a safe installation with only~~  
66.21 ~~an approved or listed gas connector. Gas connectors shall be of a size to adequately supply~~  
66.22 ~~the total demand of the connected manufactured home.~~

66.23 **1007 Mechanical protection.** All gas outlet risers, regulators, meters, valves, or other  
66.24 exposed equipment shall be protected from mechanical damage. Atmospherically  
66.25 controlled regulators shall be installed in such a manner that moisture cannot enter the  
66.26 regulator vent and accumulate above the diaphragm. Where the regulator vent may be

67.1 obstructed due to snow and icing conditions, shields, hoods, or other suitable devices shall  
67.2 be provided to guard against closing the vent opening.

67.3 **1008 Meters.** Meters shall not be installed in unvented or inaccessible locations or closer  
67.4 than 3 feet (914 mm) from sources of ignition. When meters are installed, they shall not  
67.5 depend on the gas outlet riser for support, but shall be adequately supported by a post or  
67.6 bracket placed on a firm footing, or other means providing equivalent support.

67.7 **1009 Meter shutoff valve.** All meter installations shall be provided with a shutoff valve  
67.8 located adjacent to and on the inlet side of the meter. For installations utilizing a liquefied  
67.9 petroleum gas container, the container service valve shall serve as the shutoff valve.

67.10 **1010 Gas pipe sizing.** The size of each section of natural gas or liquefied petroleum gas  
67.11 piping systems shall be determined as specified in this code.

67.12 **1011 Maintenance.** The manufactured home park/community operator shall be  
67.13 responsible for maintaining all gas piping installations and equipment in good working  
67.14 condition.

67.15 **1346.6010 IMC APPENDIX C, TABLE C-1.**

67.16 IMC Appendix C, Table C-1

67.17 Recommended Capacities for Domestic Kitchen Exhaust Hoods

67.18 67.19 67.20 67.21 67.22	Hood Size Area (Sq. Ft.)	Equipment with Grills or Deep Fryers (Number of Exposed Sides)		Ranges and Ovens (Number of Exposed Sides)	
		Four (CFM)	Three (CFM)	Four (CFM)	Three (CFM)
67.23	Up to 4	Up to 400	Up to 300	Up to 300	Up to 200
67.24	4	400	300	300	200
67.25	4.5	450	338	338	225
67.26	5	500	375	375	250
67.27	5.5	550	413	413	275
67.28	6	600	450	450	300

68.1	6.5	650	488	488	325
68.2	7	700	525	525	350
68.3	7.5	750	563	563	375
68.4	8	800	600	600	400
68.5	8.5	850	638	638	425
68.6	9	900	675	675	450
68.7	9.5	950	713	713	475
68.8	10	1,000	750	750	500
68.9	10.5	1,050	788	788	525
68.10	11	1,100	825	825	550
68.11	11.5	1,150	863	863	575
68.12	12	1,200	900	900	600
68.13	12.5	1,250	938	938	625
68.14	13	1,300	975	975	650
68.15	13.5	1,350	1,013	1,013	675
68.16	14	1,400	1,050	1,050	700
68.17	14.5	1,450	1,088	1,088	725
68.18	15	1,500	1,125	1,125	750
68.19	15.5	1,550	1,163	1,163	775
68.20	16	1,600	1,200	1,200	800

68.21 **1346.6012 IFGC APPENDIX E, WORKSHEET E-1.**

68.22 IFGC Appendix E, Worksheet E-1  
68.23 Residential Combustion Air Calculation Method  
68.24 (for Furnace, Boiler, and/or Water Heater in the Same Space)

68.25 **Step 1:** Complete vented combustion appliance information.

68.26 Furnace/Boiler:

68.27 \_\_\_\_\_ Draft Hood      \_\_\_\_\_ Fan Assisted      \_\_\_\_\_ Direct Vent      Input:  
68.28 (Not fan assisted)      & Power Vent      \_\_\_\_\_ Btu/hr

68.29 Water Heater:

69.1 \_\_\_\_\_ Draft Hood \_\_\_\_\_ Fan Assisted \_\_\_\_\_ Direct Vent Input:  
 69.2 (Not fan assisted) & Power Vent \_\_\_\_\_ Btu/hr

69.3 **Step 2:** Calculate the volume of the Combustion Appliance Space (CAS) containing  
 69.4 combustion appliances.

69.5 The CAS includes all spaces connected to one another  
 69.6 by code compliant openings. CAS volume: \_\_\_\_\_ ft<sup>3</sup>

69.7 **Step 3:** Determine Air Changes per Hour (ACH)<sup>1</sup>

69.8 Default ACH values have been incorporated into Table E-1 for use with Method 4b (KAIR  
 69.9 Method). If the year of construction or ACH is not known, use method 4a (Standard  
 69.10 Method).

69.11 **Step 4:** Determine Required Volume for Combustion Air.

69.12 **4a. Standard Method**

69.13 Total Btu/hr input of all combustion appliances (DO  
 69.14 NOT COUNT DIRECT VENT APPLIANCES) Input: \_\_\_\_\_ Btu/hr

69.15 Use Standard Method column in Table E-1 to find Total  
 69.16 Required Volume (TRV) TRV: \_\_\_\_\_ ft<sup>3</sup>

69.17 If CAS Volume (from Step 2) *is greater than* TRV then no outdoor openings are needed.

69.18 If CAS Volume (from Step 2) *is less than* TRV then go to **STEP 5.**

69.19 **4b. Known Air Infiltration Rate (KAIR) Method**

69.20 Total Btu/hr input of all fan-assisted and power  
 69.21 vent appliances (DO NOT COUNT DIRECT VENT  
 69.22 APPLIANCES) Input: \_\_\_\_\_ Btu/hr

69.23 Use Fan-Assisted Appliances column in Table E-1 to  
 69.24 find Required Volume Fan Assisted (RVFA) RVFA: \_\_\_\_\_ ft<sup>3</sup>

69.25 Total Btu/hr input of all non-fan-assisted appliances Input: \_\_\_\_\_ Btu/hr

69.26 Use Non-Fan-Assisted Appliances column in Table E-1  
 69.27 to find Required Volume Non-Fan-Assisted (RVNFA) RVNFA: \_\_\_\_\_ ft<sup>3</sup>

69.28 Total Required Volume (TRV) = RVFA + RVNFA

69.29 RV = \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_ ft<sup>3</sup>

69.30 If CAS Volume (from Step 2) *is greater than* TRV then no outdoor openings are needed.

70.1 If CAS Volume (from Step 2) *is less than* TRV then go to **STEP 5**.

70.2 **Step 5:** Calculate the ratio of available interior volume to the total required volume.

70.3 Ratio = CAS Volume (from Step 2)

70.4 *divided by* TRV (from Step 4a or

70.5 Step 4b) Ratio = \_\_\_\_\_ / \_\_\_\_\_ = \_\_\_\_\_

70.6 **Step 6:** Calculate Reduction Factor (RF).

70.7 RF = 1 *minus* Ratio RF = 1 - \_\_\_\_\_ = \_\_\_\_\_

70.8 **Step 7:** Calculate single outdoor opening as if all combustion air is from outside.

70.9 Total Btu/hr input of all Combustion Appliances in the

70.10 same CAS (EXCEPT DIRECT VENT) Input: \_\_\_\_\_ Btu/hr

70.11 Combustion Air Opening Area (CAOA):

70.12 Total Btu/hr *divided by* 3000

70.13 Btu/hr per in<sup>2</sup>

70.14 CAOA = \_\_\_\_\_ /3000 Btu/hr per in<sup>2</sup> = \_\_\_\_\_ in<sup>2</sup>

70.15 **Step 8:** Calculate Minimum CAOA.

70.16 Minimum CAOA = CAOA *multiplied by* RF

70.17 Minimum CAOA = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_ in<sup>2</sup>

70.18 **Step 9:** Calculate Combustion Air Opening Diameter (CAOD)

70.19 CAOD = 1.13 *multiplied by the square root of* Minimum CAOA

70.20 CAOD = 1.13 Minimum CAOA = \_\_\_\_\_ in

70.21 <sup>1</sup>If desired, ACH can be determined using ASHRAE calculation or blower door test.

70.22 Follow procedures in Section G304.

70.23 **1346.6014 IFGC APPENDIX E, TABLE E-1.**

70.24 IFGC Appendix E, Table E-1

70.25 Residential Combustion Air Required Volume

70.26 (Required Interior Volume Based on Input Rating of Appliances)

		Known Air Infiltration Rate (KAIR)				
		Method (ft <sup>3</sup> )				
		Fan Assisted		Non-Fan-Assisted		
	Standard	1994 <sup>1</sup> to		1994 <sup>1</sup> to		
71.4	Method	1994 <sup>1</sup>	Pre 1994 <sup>2</sup>	1994 <sup>1</sup>	Pre 1994 <sup>2</sup>	Pre 1994 <sup>2</sup>
71.5	Input Rating	Present	Pre 1994 <sup>2</sup>	Present	Pre 1994 <sup>2</sup>	Pre 1994 <sup>2</sup>
71.6	(Btu/hr)	(ft <sup>3</sup> )				
71.7	5,000	250	375	188	525	263
71.8	10,000	500	750	375	1,050	525
71.9	15,000	750	1,125	563	1,575	788
71.10	20,000	1,000	1,500	750	2,100	1,050
71.11	25,000	1,250	1,875	938	2,625	1,313
71.12	30,000	1,500	2,250	1,125	3,150	1,575
71.13	35,000	1,750	2,625	1,313	3,675	1,838
71.14	40,000	2,000	3,000	1,500	4,200	2,100
71.15	45,000	2,250	3,375	1,688	4,725	2,363
71.16	50,000	2,500	3,750	1,875	5,250	2,625
71.17	55,000	2,750	4,125	2,063	5,775	2,888
71.18	60,000	3,000	4,500	2,250	6,300	3,150
71.19	65,000	3,250	4,875	2,438	6,825	3,413
71.20	70,000	3,500	5,250	2,625	7,350	3,675
71.21	75,000	3,750	5,625	2,813	7,875	3,938
71.22	80,000	4,000	6,000	3,000	8,400	4,200
71.23	85,000	4,250	6,375	3,188	8,925	4,463
71.24	90,000	4,500	6,750	3,375	9,450	4,725
71.25	95,000	4,750	7,125	3,563	9,975	4,988
71.26	100,000	5,000	7,500	3,750	10,500	5,250
71.27	105,000	5,250	7,875	3,938	11,025	5,513
71.28	110,000	5,500	8,250	4,125	11,550	5,775
71.29	115,000	5,750	8,625	4,313	12,075	6,038
71.30	120,000	6,000	9,000	4,500	12,600	6,300

72.1	125,000	6,250	9,375	4,688	13,125	6,563
72.2	130,000	6,500	9,750	4,875	13,650	6,825
72.3	135,000	6,750	10,125	5,063	14,175	7,088
72.4	140,000	7,000	10,500	5,250	14,700	7,350
72.5	145,000	7,250	10,875	5,438	15,225	7,613
72.6	150,000	7,500	11,250	5,625	15,750	7,875
72.7	155,000	7,750	11,625	5,813	16,275	8,138
72.8	160,000	8,000	12,000	6,000	16,800	8,400
72.9	165,000	8,250	12,375	6,188	17,325	8,663
72.10	170,000	8,500	12,750	6,375	17,850	8,925
72.11	175,000	8,750	13,125	6,563	18,375	9,188
72.12	180,000	9,000	13,500	6,750	18,900	9,450
72.13	185,000	9,250	13,875	6,938	19,425	9,713
72.14	190,000	9,500	14,250	7,125	19,950	9,975
72.15	195,000	9,750	14,625	7,313	20,475	10,238
72.16	200,000	10,000	15,000	7,500	21,000	10,500
72.17	205,000	10,250	15,375	7,688	21,525	10,763
72.18	210,000	10,500	15,750	7,875	22,050	11,025
72.19	215,000	10,750	16,125	8,063	22,575	11,288
72.20	220,000	11,000	16,500	8,250	23,100	11,550
72.21	225,000	11,250	16,875	8,438	23,625	11,813
72.22	230,000	11,500	17,250	8,625	24,150	12,075

72.23 <sup>1</sup>The 1994 date refers to dwellings constructed under the 1994 Minnesota Energy Code.  
 72.24 The default KAIR used in this section of the table is 0.20 ACH.

72.25 <sup>2</sup>This section of the table is to be used for dwellings constructed prior to 1994. The default  
 72.26 KAIR used in this section of the table is 0.40 ACH.

72.27 **REPEALER.** Minnesota Rules, parts 1346.0107; 1346.0507, subparts 3, 5, 11, and  
 72.28 13; 1346.0510, subparts 2 and 3; 1346.0603, subpart 1; 1346.0709; 1346.0801, subpart  
 72.29 2; 1346.1001; 1346.1007, subpart 2; 1346.5303; 1346.5304, subparts 2, 4, 5, 6, 7, and

73.1 9; 1346.5402, subpart 1; 1346.5404, subparts 3 and 4; 1346.5503, subparts 2, 5, and 8;  
73.2 1346.5620; 1346.5629; and 1346.5630, subparts 1 and 2, are repealed.

73.3 **EFFECTIVE DATE.** These amendments are effective June 1, 2009, or five working  
73.4 days after the notice of adoption is published in the State Register, whichever occurs later.