

1.1 **Department of Labor and Industry**

1.2 **Proposed Permanent Rules Adopting Changes to the Mechanical and Fuel Code**

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

1.4 Parts 1346.0050 to ~~1346.1500~~ 1346.1606 are known and may be cited as the "Minnesota  
1.5 Mechanical Code."

1.6 Chapters 2 to 15 of the ~~2012~~ 2018 edition of the International Mechanical Code ("IMC"),  
1.7 promulgated by the International Code Council, Inc., Washington, DC, are incorporated by  
1.8 reference as part of the Minnesota Mechanical Code except as qualified by the applicable  
1.9 provisions in Minnesota Rules, chapter 1300, and as amended in this chapter. Portions of  
1.10 this chapter reproduce excerpts from the ~~2012~~ 2018 IMC, International Code Council, Inc.,  
1.11 Washington, DC, copyright ~~2012~~ 2017, reproduced with permission, all rights reserved.

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

1.14 Chapters 1 to 10 and 12 to 15 of the ~~2014~~ 2017 edition of NFPA 96 Standard for  
1.15 Ventilation Control and Fire Protection of Commercial Cooking Operations, promulgated  
1.16 by the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471,  
1.17 are incorporated by reference as part of the Minnesota Mechanical Code as amended in this  
1.18 chapter. As used in this code, "NFPA 96" means the NFPA 96 Standard for Ventilation  
1.19 Control and Fire Protection of Commercial Cooking Operations chapters that are incorporated  
1.20 into this code. Portions of this chapter reproduce text and tables from the NFPA 96. The  
1.21 NFPA 96 is copyrighted, ~~2014~~ 2017, by the National Fire Protection Association. All rights  
1.22 reserved.

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

2.1 The 2016 edition of ANSI/ASHRAE 62.2 Ventilation and Acceptable Indoor Air  
2.2 Quality in Residential Buildings, promulgated by the American Society of Heating,  
2.3 Refrigerating and Air-Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, GA 30329,  
2.4 and the American National Standards Institute is incorporated by reference as part of the  
2.5 Minnesota Mechanical Code.

2.6 The ASHRAE 62.2 is not subject to frequent change, and a copy of the ASHRAE 62.2  
2.7 is available in the office of the commissioner of labor and industry.

2.8 Chapters 1 to 9 of the 2016 edition of ANSI/ASHRAE 154 Ventilation for Commercial  
2.9 Cooking Operations, promulgated by the American Society of Heating, Refrigerating and  
2.10 Air-Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, GA 30329, and the American  
2.11 National Standards Institute is incorporated by reference as part of the Minnesota Mechanical  
2.12 Code, as amended in this chapter. As used in this code, "ASHRAE 154" means the  
2.13 ANSI/ASHRAE 154 Ventilation for Commercial Cooking Operations chapters that are  
2.14 incorporated into this code.

2.15 The ASHRAE 154 is not subject to frequent change, and a copy of the ASHRAE 154  
2.16 is available in the office of the commissioner of labor and industry.

2.17 **1346.0202 SECTION 202 GENERAL DEFINITIONS.**

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

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

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

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

3.7 **COMMERCIAL COOKING APPLIANCE.** An appliance specifically designed to be  
3.8 used in a food-service-establishment kitchen, including but not limited to a restaurant or  
3.9 cafeteria kitchen. Appliances designed for residential use shall be treated as commercial  
3.10 appliances when installed in commercial food-service establishments.

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 is in  
3.14 operation.

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

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

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

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

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

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

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

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

4.12 *[For text of subpart 2, see Minnesota Rules]*

4.13 **1346.0303 SECTION 303 EQUIPMENT AND APPLIANCE LOCATION.**

4.14 IMC section 303.8 is deleted in its entirety.

4.15 **1346.0306 SECTION 306 ACCESS AND SERVICE SPACE.**

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

4.18 **306.5 Mechanical equipment and appliances on roofs or elevated structures.** Where  
4.19 mechanical equipment or appliances requiring periodic inspection, service, or maintenance  
4.20 are installed on roofs or elevated structures, a permanent stair shall be provided for access.

4.21 **Exception:** A portable ladder may be used for dwellings, replacement equipment and  
4.22 appliances, on existing buildings, and exterior roof access points not exceeding 16 feet  
4.23 (4.9 m) above grade, unless the building official determines that the unique shape of  
4.24 the roof does not allow safe access with a portable ladder.

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

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

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

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

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

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

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

5.13 7. Exterior stairs shall terminate at the roof access point or at a level landing of at least  
5.14 8 square feet (0.74 m<sup>2</sup>) with a minimum dimension of 20 inches (508 mm). The landing  
5.15 shall have a guard installed in accordance with IMC section 304.11.

5.16 ~~306.5.3~~ **306.5.1 Sloped roofs.** Where appliances, equipment, fans, or components that  
5.17 require service are installed on a roof having a slope of 3 units vertical in 12 units horizontal  
5.18 (25-percent slope) or greater and having an edge more than 30 inches (762 mm) above grade  
5.19 at such edge, a level platform shall be provided on each side of the appliance to which access  
5.20 is required for service, repair, or maintenance. The platform shall be at least 30 inches (762  
5.21 mm) in any dimension and shall be provided with guards. The guards shall extend at least  
5.22 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage  
5.23 of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for  
5.24 guards specified in Minnesota Rules, chapter 1305.

6.1 **306.5.2 Electrical requirements.** A receptacle outlet shall be provided at or near the  
6.2 equipment or appliance location in accordance with the Minnesota Electrical Code.

6.3 ~~306.5.1~~ **306.5.3 Permanent ladders.** Where a change in roof elevation greater than 30  
6.4 inches (762 mm) but not exceeding 16 feet (4.9 m) exists, a permanent ladder shall be  
6.5 provided. The ladder ~~may~~ shall be vertical. The ladder must, at a minimum, meet the  
6.6 following:

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

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

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

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

6.11 Subp. 2. [Renumbered as part of subpart 1]

6.12 Subp. 3. [Renumbered as part of subpart 1]

6.13 **1346.0307 SECTION 307 CONDENSATE DISPOSAL.**

6.14 IMC section 307.3 is deleted in its entirety.

6.15 **1346.0313 SECTION 313 CARBON MONOXIDE ALARMS.**

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

6.17 **313.1 General.** Carbon monoxide alarms shall be installed in new and existing rooms  
6.18 containing a fuel-burning appliance that is utilized to control environmental conditions and  
6.19 produces carbon monoxide during operation.

6.20 **Exceptions:**

6.21 1. Rooms containing a boiler that is regulated by Minnesota Rules, chapter 5225, shall  
6.22 be provided with carbon monoxide alarms in accordance with that chapter.

7.1 2. Where the room containing the fuel-burning appliance is located in a building  
7.2 regulated by the International Residential Code, carbon monoxide alarms shall be provided  
7.3 in accordance with Minnesota Rules, chapter 1309.

7.4 **313.2 Carbon monoxide alarms.** Carbon monoxide alarms under section 313.1 shall comply  
7.5 with sections 313.2.1 to 313.2.1.4.

7.6 **313.2.1 Power source.** Carbon monoxide alarms shall receive their primary power from  
7.7 the building wiring where such wiring is served from a commercial source, and when primary  
7.8 power is interrupted, receive power from a battery. Wiring shall be permanent and without  
7.9 a disconnecting switch other than that required for overcurrent protection.

7.10 **Exceptions:**

7.11 1. Where installed in buildings without commercial power, battery-powered carbon  
7.12 monoxide alarms are permitted.

7.13 2. Where installed in the room of an existing building containing a fuel-burning  
7.14 appliance, battery-powered carbon monoxide alarms are permitted.

7.15 **313.2.1.2 Listings.** Carbon monoxide alarms shall be listed in accordance with UL 2034.

7.16 **313.2.1.3 Combination alarms.** Combination carbon monoxide and smoke alarms shall  
7.17 be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide  
7.18 and smoke alarms shall be listed in accordance with UL 2034 and UL 217.

7.19 **313.2.1.4 Carbon monoxide detection systems.** Carbon monoxide detection systems that  
7.20 comply with NFPA 720 and are listed in accordance with UL 2075 shall be an acceptable  
7.21 alternative to carbon monoxide alarms listed in sections 313.2.1.2 and 313.2.1.3.

7.22 **1346.0401 SECTION 401 GENERAL.**

7.23 Subpart 1. ~~Section 401.1~~ **401.2.** IMC section ~~401.1~~ 401.2, ~~Scope~~ Ventilation required,  
7.24 is amended by adding the following exception to the end of the section to read as follows:

8.1 **401.2 Ventilation required.** Every occupied space other than residential buildings and  
8.2 dwelling units shall be ventilated by natural means in accordance with section 402 or by  
8.3 mechanical ventilation in accordance with section 403. Ambulatory care facilities and Group  
8.4 I-2 occupancies shall be ventilated by mechanical means in accordance with section 407.

8.5 **Exception:** ~~Residential buildings complying with the ventilation requirements in~~  
8.6 ~~Minnesota Rules, chapter 1322~~ Ventilation in dwelling units and residential buildings  
8.7 shall comply with ASHRAE 62.2 Ventilation and Acceptable Indoor Air Quality in  
8.8 Low-Rise Residential Buildings or Minnesota Rules, chapter 1322.

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

8.10 Air intake openings shall comply with all of the following:

8.11 *[For text of item A, see Minnesota Rules]*

8.12 B. Mechanical outdoor air intake openings shall be located a minimum of 10 feet  
8.13 (3,048 mm) from any hazardous or noxious contaminant, such as chimneys, plumbing vents,  
8.14 streets, alleys, parking lots, and loading docks, except as specified in item C or section  
8.15 ~~501.2.1~~ 501.3.1. Outdoor air intake openings shall be permitted to be located less than 10  
8.16 feet (3,048 mm) horizontally from streets, alleys, parking lots, and loading docks provided  
8.17 that the openings are located not less than 25 feet (7,620 mm) vertically above such locations.  
8.18 Where openings front on a street or public way, the distance shall be measured to the  
8.19 centerline of the street or public way.

8.20 *[For text of item C, see Minnesota Rules]*

8.21 **1346.0404 SECTION 404 GARAGES.**

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

8.23 **404.1 Enclosed parking garages.** Mechanical ventilation systems for enclosed parking  
8.24 garages shall operate automatically upon detection of certain gas concentrations. ~~If the~~

9.1 ~~parking garage will house vehicles that emit carbon monoxide (CO), the Enclosed parking~~  
9.2 ~~garage must~~ garages shall be equipped with a ~~CO detection device that will trigger carbon~~  
9.3 ~~monoxide (CO) detector and a nitrogen dioxide (NO<sub>2</sub>) detector.~~ The mechanical ventilation  
9.4 ~~system to operate automatically~~ shall activate upon detection of a CO level of 25 parts per  
9.5 million (ppm). ~~If the parking garage will house vehicles that emit nitrogen dioxide (NO<sub>2</sub>),~~  
9.6 ~~the parking garage shall be equipped with a NO<sub>2</sub> detection device that triggers the mechanical~~  
9.7 ~~system to operate automatically upon detection of a~~ or greater, a NO<sub>2</sub> level of 3 ppm or  
9.8 greater, or both. ~~If the parking garage will house vehicles that emit both CO and NO<sub>2</sub>, the~~  
9.9 ~~parking garage shall be equipped with both types of detection devices.~~ Such detectors shall  
9.10 be listed in accordance with UL 2075 and installed in accordance with their listing and  
9.11 manufacturers' instructions.

9.12 Subp. ~~3.~~ 2. **Section ~~404.3~~ 404.2.** IMC section ~~404.3~~ 404.2 is amended to read as  
9.13 follows:

9.14 **~~404.3~~ 404.2 Occupied spaces accessory to public garages.** Connecting offices, waiting  
9.15 rooms, ticket booths, elevator lobbies, and similar uses that are accessory to a public garage  
9.16 shall be maintained at a positive pressure and shall be provided with ventilation in accordance  
9.17 with IMC section 403.3.

9.18 Subp. ~~2.~~ 3. **Section ~~404.2~~ 404.3.** IMC section ~~404.2~~ 404 is amended by adding a  
9.19 subsection 404.3 to read as follows:

9.20 **~~404.2~~ 404.3 Minimum exhaust.** The mechanical ventilation system shall be capable of  
9.21 producing a minimum exhaust rate of 0.75 cfm per square foot (0.0038 m<sup>3</sup>/s·m<sup>2</sup>) of floor  
9.22 area.

9.23 *[For text of subpart 4, see Minnesota Rules]*

9.24 **1346.0501 SECTION 501 GENERAL.**

9.25 *[For text of subpart 1, see Minnesota Rules]*

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

10.3 **501.4 Pressure equalization.** Mechanical exhaust systems shall be sized and operated to  
10.4 remove the quantity of air required by this chapter. If a greater quantity of air is supplied  
10.5 by a mechanical ventilating supply system than is removed by a mechanical exhaust system  
10.6 for a room, adequate means shall be provided for the natural exit of the excess air supplied.

10.7 **501.4.1 Makeup air in new ~~dwelling units~~ dwellings.** Makeup air quantity for new ~~dwelling~~  
10.8 ~~units~~ dwellings shall be determined by using ~~IMC~~ Table 501.4.1 and shall be supplied in  
10.9 accordance with ~~IMC~~ section 501.4.2.

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

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

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

10.18 **501.4.2 Makeup air supply.** Makeup air shall be provided by one of the following methods:

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

10.20 1.1 Passive makeup air openings from the outdoors shall be sized according to  
10.21 ~~IMC~~ Table 501.4.2.

10.22 1.2 Barometric dampers are prohibited in passive makeup air openings when any  
10.23 atmospherically vented appliance is installed.

11.1 1.3 Single passive openings larger than 8 inches (204 mm) diameter, or equivalent,  
11.2 shall be provided with a motorized damper that is electrically interlocked with the  
11.3 largest exhaust system.

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

11.7 2.1 Powered makeup air shall be electrically interlocked with the largest exhaust  
11.8 system.

11.9 2.2 Powered makeup air shall be matched to the airflow of the largest exhaust  
11.10 system.

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

11.13 3.1 Passive makeup air openings shall comply with item 1.

11.14 3.2 Powered makeup air shall be supplied for the quantity of airflow in excess of  
11.15 the passive makeup air opening provided, and it shall be electrically interlocked  
11.16 with the exhaust system.

11.17 **501.4.2.1 Makeup air ducts.** Makeup air ducts shall be constructed and installed according  
11.18 to IMC chapter 6 and section 501.4.2.

11.19 **501.4.2.2 Makeup air intake.** Makeup air intake openings shall be located to avoid intake  
11.20 of exhaust air in accordance with IMC section 401.4 and IFGC section 503.8, and shall be  
11.21 covered with corrosion resistant screen of not less than 1/4 inch (6.4 mm) mesh. Makeup  
11.22 air intake openings shall be located at least 12 inches (305 mm) above adjoining grade level.

12.1 **501.4.2.3 Makeup air location.** Makeup air requirements of 175 cubic feet per minute  
12.2 (cfm) (0.084 m<sup>3</sup>/s) and greater shall be introduced to the dwelling in one of the following  
12.3 locations:

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

12.5 2. In the space containing the exhaust system.

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

12.8 **501.4.2.4 Makeup air termination restriction.** A makeup air opening shall not terminate  
12.9 in the return air plenum of a forced air heating system unless it is installed according to the  
12.10 heating appliance manufacturer's installation instructions.

12.11 **501.4.2.5 Separate makeup air and combustion air openings.** When both makeup air  
12.12 and combustion air openings are required, they shall be provided through separate openings  
12.13 to the outdoors, subject to IFGC section 304, to determine requirements for air for combustion  
12.14 and ventilation:

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

12.18 **501.4.2.6 Makeup air effectiveness.** The makeup air shall not reduce the effectiveness of  
12.19 exhaust systems or performance of vented combustion appliances, and makeup air shall not  
12.20 adversely affect the heating or cooling capability of the mechanical appliances.

12.21 **501.4.3 Additions, alterations, or installations of mechanical systems in existing ~~dwelling~~**  
12.22 **units dwellings.** Makeup air shall be supplied to existing ~~dwelling units~~ dwellings when  
12.23 any of the following conditions occur:

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

13.5 1.1 A vented combustion appliance, including a solid fuel appliance, is installed  
13.6 or replaced.

13.7 1.2 An exhaust system is installed or replaced.

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

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

13.14 2.1 A vented combustion appliance, including a solid fuel appliance, is installed  
13.15 or replaced.

13.16 2.2 An exhaust system is installed or replaced.

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

13.19 3. When a solid fuel appliance is installed in a dwelling ~~unit~~ constructed during or after  
13.20 1994 under the Minnesota Energy Code, Minnesota Rules, chapter 7670, makeup air  
13.21 quantity shall be determined by using Table 501.4.1 and shall be supplied according  
13.22 to section 501.4.2.

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

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

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

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

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

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

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

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

14.23 1. A test is performed according to ASTM Standard E1998-02, Standard Guide for  
14.24 Assessing Depressurization-Induced Backdrafting and Spillage from Vented Combustion

15.1 Appliances, and documentation is provided that the vented combustion appliances  
 15.2 continue to operate within established parameters of the test.

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

15.5 Table 501.4.1

15.6 Procedure to Determine Makeup Air Quantity for Exhaust Appliances in ~~Dwelling Units~~  
 15.7 Dwellings

15.8				Multiple
15.9				appliances that
15.10	One or multiple	One or multiple	One	are
15.11	power vent or	fan-assisted	atmospherically	atmospherically
15.12	direct vent	appliances and	vented gas or oil	vented gas or oil
15.13	appliances or no	power vent or	appliance or one	appliances or
15.14	combustion	direct vent	solid fuel	solid fuel
15.15	appliances <sup>A</sup>	appliances <sup>B</sup>	appliance <sup>C</sup>	appliances <sup>D</sup>

15.16 1. Use the Appropriate Column to Estimate House Infiltration

15.17 a) pressure factor

15.18 (cfm/sf)	0.15	0.09	0.06	0.03
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15.19 b) conditioned

15.20 floor area (sf)	_____	_____	_____	_____
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15.21 (including unfinished basements)

15.22 Estimated House

15.23 Infiltration (cfm):

15.24 [1a x 1b]	_____	_____	_____	_____
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15.25 2. Exhaust Capacity

15.26 a) clothes dryer	135	135	135	135
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15.27 b) 80% of largest

15.28 exhaust rating

15.29 (cfm):	_____	_____	_____	_____
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15.30 (not applicable if recirculating system or if powered makeup air is electrically interlocked  
 15.31 and matched to exhaust)

16.1	c) 80% of next				
16.2	largest exhaust	not			
16.3	rating (cfm):	applicable	_____	_____	_____
16.4	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
16.5	and matched to exhaust)				
16.6	Total Exhaust				
16.7	Capacity (cfm):				
16.8	[2a+2b+2c]	_____	_____	_____	_____
16.9	3. Makeup Air Requirement				
16.10	a) Total Exhaust				
16.11	Capacity (from				
16.12	above)	_____	_____	_____	_____
16.13	b) Estimated				
16.14	House Infiltration				
16.15	(from above)	_____	_____	_____	_____
16.16	Makeup Air				
16.17	Quantity (cfm):				
16.18	[3a - 3b]	_____	_____	_____	_____
16.19	(if value is negative, no makeup air is needed)				

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

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

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

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

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

16.30 Table 501.4.2

17.1 Makeup Air Opening Sizing Table for New and Existing <del>Dwelling Units</del> <u>Dwellings</u>						
		One			Multiple	
		One or multiple			appliances that	
		fan-assisted			are atmospher-	
		appliance or			ically vented	
		power vent or			gas or oil	
		direct vent			gas or oil	
		appliances <sup>A</sup>			appliances or	
		appliances <sup>B</sup>			solid fuel	
					solid fuel	
					appliances <sup>D</sup>	
					duct	
					diameter <sup>E,F,G</sup>	
17.10 Type of opening						
17.11 or system						
		(cfm)	(cfm)	(cfm)	(cfm)	(inches)
17.12	Passive Opening	1-36	1-22	1-15	1-9	3
17.13	Passive Opening	37-66	23-41	16-28	10-17	4
17.14	Passive Opening	67-109	42-66	29-46	18-28	5
17.15	Passive Opening	110-163	67-100	47-69	29-42	6
17.16	Passive Opening	164-232	101-143	70-99	43-61	7
17.17	Passive Opening	233-317	144-195	100-135	62-83	8
17.18	Passive Opening					
17.19	with Motorized					
17.20	Damper	318-419	196-258	136-179	84-110	9
17.21	Passive Opening					
17.22	with Motorized					
17.23	Damper	420-539	259-332	180-230	111-142	10
17.24	Passive Opening					
17.25	with Motorized					
17.26	Damper	540-679	333-419	231-290	143-179	11
17.27	Powered Makeup					Not Ap-
17.28	Air <sup>H</sup>	>679	>419	>290	>179	licable

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

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

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

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

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

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

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

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

18.14 Table 501.4.3(1)

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

18.16 ~~Units~~ Dwellings

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

18.18				Multiple
18.19				appliances that
18.20	One or multiple	One or multiple	One	are
18.21	power vent or	fan-assisted	atmospherically	atmospherically
18.22	direct vent	appliances and	vented gas or oil	vented gas or oil
18.23	appliances or no	power vent or	appliance or one	appliances or
18.24	combustion	direct vent	solid fuel	solid fuel
18.25	appliances <sup>A</sup>	appliances <sup>B</sup>	appliance <sup>C</sup>	appliances <sup>D</sup>

18.26 1. Use the Appropriate Column to Estimate House Infiltration

18.27 a) pressure factor

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

19.1 b) conditioned  
 19.2 floor area (sf) \_\_\_\_\_

19.3 Estimated House  
 19.4 Infiltration (cfm):  
 19.5 [1a x 1b] \_\_\_\_\_

19.6 2. Exhaust Capacity  
 19.7 80% of exhaust  
 19.8 rating = Exhaust  
 19.9 Capacity (cfm): \_\_\_\_\_

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

19.12 3. Makeup Air Requirement

19.13 a) Exhaust  
 19.14 Capacity (from  
 19.15 above) \_\_\_\_\_

19.16 b) Estimated  
 19.17 House Infiltration  
 19.18 (from above) \_\_\_\_\_

19.19 Makeup Air  
 19.20 Quantity (cfm):  
 19.21 [3a - 3b] \_\_\_\_\_

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

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

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

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

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

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

20.4 Table 501.4.3(2)

20.5 Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing ~~Dwelling~~  
 20.6 ~~Units~~ Dwellings

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

20.8				Multiple
20.9				appliances that
20.10	One or multiple	One or multiple	One	are
20.11	power vent or	fan-assisted	atmospherically	atmospherically
20.12	direct vent	appliances and	vented gas or oil	vented gas or oil
20.13	appliances or no	power vent or	appliance or one	appliances or
20.14	combustion	direct vent	solid fuel	solid fuel
20.15	appliances <sup>A</sup>	appliances <sup>B</sup>	appliance <sup>C</sup>	appliances <sup>D</sup>

20.16 1. Use the Appropriate Column to Estimate House Infiltration

20.17 a) pressure factor  
 20.18 (cfm/sf)      0.25                      0.15                      0.10                      0.05

20.19 b) conditioned  
 20.20 floor area (sf)      \_\_\_\_\_                      \_\_\_\_\_                      \_\_\_\_\_                      \_\_\_\_\_

20.21 (including unfinished basements)

20.22 Estimated House  
 20.23 Infiltration (cfm):  
 20.24 [1a x 1b]      \_\_\_\_\_                      \_\_\_\_\_                      \_\_\_\_\_                      \_\_\_\_\_

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

20.30 c) conversion  
 20.31 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 501.4.2

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 than  
 21.28 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 solid  
 22.3 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 501.4.3(3)

22.7 Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing ~~Dwelling~~  
 22.8 ~~Units~~ Dwellings

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

	One or multiple power vent or direct vent appliances or no combustion appliances <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 appliances that are atmospherically vented gas or oil appliances or solid fuel appliances <sup>D</sup>
22.10				
22.11				
22.12				
22.13				
22.14				
22.15				
22.16				
22.17				
22.18	1. Use the Appropriate Column to Estimate House Infiltration			
22.19	a) pressure factor (cfm/sf) 0.25	0.15	0.10	0.05
22.20	b) conditioned floor area (sf) _____	_____	_____	_____
22.21	(including unfinished basements)			
22.22	Estimated House Infiltration			
22.23	(cfm): [1a x 1b] _____	_____	_____	_____
22.24	or			
22.25	Alternative Calculation (by			
22.26	using blower door test) <sup>E</sup>			
22.27	c) conversion factor 0.75	0.45	0.30	0.15
22.28	d) CFM50 value (from blower			
22.29	door test) _____	_____	_____	_____
22.30	Estimated House Infiltration			
22.31	(cfm): [1c x 1d] _____	_____	_____	_____

23.1	2. Exhaust Capacity				
23.2	a) clothes dryer (cfm)	135	135	135	135
23.3	b) 80% of largest exhaust				
23.4	rating (cfm):	_____	_____	_____	_____
23.5	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
23.6	and with exhaust)				
23.7	c) 80% of next largest exhaust				
23.8	rating (cfm)	Not applicable	_____	_____	_____
23.9	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
23.10	with exhaust)				
23.11	Total Exhaust Capacity (cfm):				
23.12	[2a+2b+2c]	_____	_____	_____	_____
23.13	3. Makeup Air Requirement				
23.14	a) Total Exhaust Capacity				
23.15	(from above)	_____	_____	_____	_____
23.16	b) Estimated House				
23.17	Infiltration (from above)	_____	_____	_____	_____
23.18	Makeup Air Quantity (cfm):				
23.19	[3a - 3b]	_____	_____	_____	_____
23.20	(if value is negative, no makeup air is needed)				

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

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

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

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

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

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

24.6 **1346.0505 SECTION 505 DOMESTIC KITCHEN EXHAUST APPLIANCES.**

24.7 IMC section ~~505.1~~ 505.2 is amended to read as follows:

24.8 ~~**505.1**~~ **505.2 Domestic systems cooking exhaust.** ~~Where domestic range hoods and domestic~~  
24.9 ~~appliances equipped with downdraft exhaust are located within dwellings, the hoods and~~  
24.10 ~~appliances shall discharge to the outdoors through ducts constructed of galvanized steel,~~  
24.11 ~~stainless steel, aluminum, or copper. The ducts shall have smooth inner walls and shall be~~  
24.12 ~~air tight and equipped with a backdraft damper. Domestic kitchen exhaust hoods ducted to~~  
24.13 ~~the outdoors shall have makeup air provided according to Minnesota Rules, part 1346.0501.~~  
24.14 ~~Refer to part 1346.6010 for Table C-1, "Recommended Capacities for Domestic Kitchen~~  
24.15 ~~Exhaust Hoods."~~ Where domestic cooking exhaust equipment is provided, it shall comply  
24.16 with the following as applicable:

24.17 **Exceptions:**

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

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

24.24 ~~2.1. The duct shall be installed under a concrete slab poured on grade.~~

25.1 ~~2.2. The underfloor trench in which the duct is installed shall be completely~~  
25.2 ~~backfilled with sand or gravel.~~

25.3 ~~2.3. The PVC duct shall extend not greater than 1 inch (25 mm) above the indoor~~  
25.4 ~~concrete floor surface.~~

25.5 ~~2.4. The PVC duct shall extend not greater than 1 inch (25 mm) above grade outside~~  
25.6 ~~of the building.~~

25.7 ~~2.5. The PVC ducts shall be primed and solvent cemented in accordance with~~  
25.8 ~~ASTM D2564.~~

25.9 1. The fan for overhead range hoods and downdraft exhaust equipment not integral  
25.10 with the cooking appliance shall be listed and labeled in accordance with UL 507.

25.11 2. Overhead range hoods and downdraft exhaust equipment with integral fans shall  
25.12 comply with UL 507.

25.13 3. Domestic cooking appliances with integral downdraft exhaust equipment shall be  
25.14 listed and labeled in accordance with UL 858 or ANSI Z21.1.

25.15 4. Microwave ovens with integral exhaust for installation over the cooking surface  
25.16 shall be listed and labeled in accordance with UL 923.

25.17 5. Domestic kitchen exhaust hoods ducted to the outdoors shall have makeup air  
25.18 provided according to Minnesota Rules, part 1346.0501. Refer to part 1346.6010 for  
25.19 Table C-1, "Recommended Capacities for Domestic Kitchen Exhaust Hoods."

25.20 **1346.0506 SECTION 506 COMMERCIAL KITCHEN HOOD VENTILATION**  
25.21 **SYSTEM DUCTS AND EXHAUST APPLIANCES EQUIPMENT.**

25.22 Subpart 1. **Section 506.3.** IMC section 506.3 is amended to read as follows and all  
25.23 subsections are deleted in their entirety and replaced with the following:

26.1 **506.3 Ducts serving Type I hoods.** Commercial kitchen exhaust systems serving Type I  
26.2 hoods shall be designed, constructed and installed in accordance with NFPA 96, Standard  
26.3 for Ventilation Control and Fire Protection of Commercial Cooking Operations and ASHRAE  
26.4 154 Ventilation for Commercial Cooking Operations.

26.5 Subp. 2. ~~Sections 506.3.1 to 506.3.2.4~~ **Section 506.4.** IMC sections 506.3.1 to  
26.6 ~~506.3.2.4~~ are deleted and replaced with chapters 1 to 10 and 12 to 15 of NFPA 96. section  
26.7 506.4 is amended and a subsection added to read as follows:

26.8 **506.4 Ducts serving Type II hoods.** Commercial kitchen exhaust systems serving Type II  
26.9 hoods shall comply with sections 506.4.1 and 506.4.2 and ASHRAE 154.

26.10 **506.4.1 Ducts.** Ducts and plenums serving Type II hoods shall be constructed of rigid  
26.11 metallic materials. Duct construction, installation, bracing, and supports shall comply with  
26.12 chapter 6. Ducts subject to positive pressure or conveying moisture-laden air, or both, and  
26.13 ducts conveying waste-heat-laden air shall be tested pursuant to section 506.4.1.1.

26.14 **506.4.1.1 Testing.** Ducts shall be tested in accordance with ASHRAE 154 requirements for  
26.15 duct leakage testing.

26.16 **506.4.2 Type II terminations.** Exhaust outlets serving Type II hoods shall terminate in  
26.17 accordance with the hood manufacturer's installation instructions and shall comply with all  
26.18 of the following:

26.19 1. Exhaust outlets shall terminate not less than three feet (914 mm) in any direction  
26.20 from openings into the building.

26.21 2. Outlets shall terminate not less than ten feet (3,048 mm) from property lines or  
26.22 buildings on the same lot.

26.23 3. Outlets shall terminate not less than ten feet (3,048 mm) above grade.

27.1 4. Outlets that terminate above a roof shall terminate not less than 30 inches (762 mm)  
27.2 above the roof surface.

27.3 5. Outlets shall terminate not less than 30 inches (762 mm) from exterior vertical walls.

27.4 6. Outlets shall be protected against local weather conditions.

27.5 7. Outlets shall not be directed onto walkways.

27.6 8. Outlets shall meet the provisions for exterior wall opening protectives in accordance  
27.7 with the International Building Code.

27.8 Subp. 2a. **Section ~~506.3.2.5~~ 506.5.** ~~IMC section 506.3.2.5 is 506.5 and all subsections~~  
27.9 ~~are deleted in its their entirety and replaced with the following:~~ Exhaust equipment shall  
27.10 comply with NFPA 96 and ASHRAE 154.

27.11 ~~**506.3.2.5 Grease duct leakage performance test.** Prior to the use or concealment of any~~  
27.12 ~~portion of a grease duct system, a leakage test shall be performed to determine that all~~  
27.13 ~~welded joints and seams are liquidtight. Ducts shall be considered to be concealed where~~  
27.14 ~~they are installed in shafts or covered by coatings or wraps that prevent the duct from being~~  
27.15 ~~visually inspected on all sides. It is permissible to test the duct in sections, provided that,~~  
27.16 ~~after the duct system is completely assembled, all field-assembled joints are tested, including~~  
27.17 ~~the duct to hood connection. When the testing is performed in this manner, only the~~  
27.18 ~~field-assembled joints of listed factory-built grease ducts are required to be tested. The~~  
27.19 ~~leakage test shall consist of a light, air, or water test, or an approved equivalent test. The~~  
27.20 ~~permit holder shall be responsible to provide the necessary equipment and perform the~~  
27.21 ~~grease duct leakage test.~~

27.22 ~~**506.3.2.5.1 Light test.** The light test shall be performed by passing a lamp having a power~~  
27.23 ~~rating of not less than 100 watts through the entire section of ductwork to be tested. The~~  
27.24 ~~lamp shall be open so as to emit light equally in all directions perpendicular to the duct~~  
27.25 ~~walls. No light from the duct interior shall be visible through any exterior surface.~~

28.1 ~~**506.3.2.5.2 Air test.** The air test shall be performed by sealing the entire duct system from~~  
28.2 ~~the hood exhaust opening(s) to the duct termination. The sealed duct system shall then be~~  
28.3 ~~pressurized to a minimum pressure of 1.0 inch water column and shall be required to hold~~  
28.4 ~~the initial set pressure for a minimum of 20 minutes.~~

28.5 ~~**506.3.2.5.3 Water test.** The water test shall be performed by use of a pressure washer~~  
28.6 ~~operating at a minimum of 1,500 psi, simulating cleaning operations. The water shall be~~  
28.7 ~~applied directly to all areas to be tested. No water applied to the duct interior shall be visible~~  
28.8 ~~on any exterior surface in any volume during the test.~~

28.9 Subp. 2b. [See repealer.]

28.10 Subp. 3. [See repealer.]

28.11 Subp. 4. [See repealer.]

28.12 **1346.0507 SECTION 507 COMMERCIAL KITCHEN HOODS.**

28.13 Subpart 1. **Section 507.1.** IMC section 507.1 is amended by adding subsection 507.1.1  
28.14 after the exceptions to read as follows and all subsections are deleted in their entirety and  
28.15 replaced with the following:

28.16 ~~**507.1.1 Factory built systems with exhaust or recovery.** Where factory built commercial~~  
28.17 ~~cooking recirculating systems or dishwashers and potwashers equipped with heat and vapor~~  
28.18 ~~exhaust or recovery systems are installed, the sensible and latent heat from the systems shall~~  
28.19 ~~be included in the HVAC design calculations of the kitchen. A mechanical HVAC system~~  
28.20 ~~shall be provided to maintain maximum relative humidity of 65 percent in the space.~~

28.21 **507.1 General.** Commercial kitchen exhaust hoods shall comply with the requirements of  
28.22 this section.

28.23 **507.1.1 Type I hood construction and installation.** Type I hood construction and  
28.24 installation shall comply with NFPA 96 and ASHRAE 154.

29.1 **507.1.2 Type II hood construction and installation.** Type II hood construction and  
 29.2 installation shall comply with this code and ASHRAE 154.

29.3 **507.1.2.1 Type II hood materials.** Type II hood materials shall be constructed of stainless  
 29.4 steel not less than 0.024 inch (0.61 mm) (No. 24 Gage) in thickness, copper sheets weighing  
 29.5 not less than 24 ounces per square foot (7.3 kg/m<sup>2</sup>), or of other approved material and gage.

29.6 Subp. 2. ~~Section 507.2~~ **Sections 507.2 to 507.6.1.** IMC section 507.2 is amended to  
 29.7 read as follows: sections 507.2 to 507.6.1 are deleted in their entirety and replaced with  
 29.8 NFPA 96 and ASHRAE 154.

29.9 **507.2 Where required.** A Type I or Type II hood shall be installed at or above all  
 29.10 ~~commercial cooking appliances in accordance with ASHRAE standard 154. Where any~~  
 29.11 ~~cooking appliance under a single hood requires a Type I hood, a Type I hood shall be~~  
 29.12 ~~installed. Where a Type II hood is required, a Type I or Type II hood shall be installed.~~

29.13 **507.2.1 Type I hoods.** Type I hoods shall be installed where cooking appliances produce  
 29.14 ~~grease or smoke as a result of the cooking process. Type I hoods shall be installed over~~  
 29.15 ~~medium-duty, heavy-duty, and extra-heavy-duty cooking appliances. Type I hoods shall be~~  
 29.16 ~~installed over light-duty cooking appliances that produce grease or smoke. The duty~~  
 29.17 ~~classifications of cooking appliances served by Type I hoods shall be in accordance with~~  
 29.18 ~~Table 507.2.1.~~

29.19 **Exception:** A Type I hood shall not be required for an electric cooking appliance where  
 29.20 ~~an approved testing agency provides documentation that the appliance effluent contains~~  
 29.21 ~~5 mg/m<sup>3</sup> or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m<sup>3</sup>/s)~~  
 29.22 ~~in accordance with Section 17 of UL 710B.~~

29.23 Table 507.2.1

29.24 Appliance Duty Classifications by Appliance Type

30.1	Appliance Description	Size	Type I Hoods			
			Light Duty	Medium Duty	Heavy Duty	Extra-Heavy Duty
30.4	<del>Braising pan/tilting skillet,</del>	All	●			
30.5	<del>electric</del>					
30.6	<del>Oven, rotisserie, electric and</del>	All	●			
30.7	<del>gas</del>					
30.8	<del>Oven, combi, electric and gas</del>	All	●			
30.9	<del>Oven, convection, full-size,</del>	All	●			
30.10	<del>electric and gas</del>					
30.11	<del>Oven, convection, half-size,</del>	All	●			
30.12	<del>electric and gas (protein</del>					
30.13	<del>cooking)</del>					
30.14	<del>Oven, deck, electric and gas</del>	All	●			
30.15	<del>Oven, mini-revolving rack,</del>	All	●			
30.16	<del>electric and gas</del>					
30.17	<del>Oven, rapid cook, electric</del>	All	●			
30.18	<del>Oven, rotisserie, electric and</del>	All	●			
30.19	<del>gas</del>					
30.20	<del>Range, discrete element,</del>	All	●			
30.21	<del>electric (with or without</del>					
30.22	<del>oven)</del>					
30.23	<del>Salamander, electric and gas</del>	All	●			
30.24	<del>Braising pan/tilting skillet,</del>	All		●		
30.25	<del>gas</del>					
30.26	<del>Broiler, chain conveyor,</del>	All		●		
30.27	<del>electric</del>					
30.28	<del>Broiler, electric, under-fired</del>	All		●		
30.29		6 kW or				
30.30	<del>Conveyor oven, electric</del>	larger		●		
30.31	<del>Conveyor oven, gas</del>	All		●		
30.32	<del>Fryer, doughnut, electric and</del>	All		●		
30.33	<del>gas</del>					
30.34	<del>Fryer, kettle, electric and gas</del>	All		●		

31.1	<del>Fryer, open deep-fat, electric</del>			
31.2	<del>and gas</del>	All	●	
31.3	<del>Fryer, pressure, electric and</del>			
31.4	<del>gas</del>	All	●	
31.5	<del>Griddle, double-sided,</del>			
31.6	<del>electric and gas</del>	All	●	
31.7	<del>Griddle, flat, electric and gas</del>	All	●	
31.8	<del>Range, cook-top, induction</del>	All	●	
31.9	<del>Range, open-burner, gas (with</del>			
31.10	<del>or without oven)</del>	All	●	
31.11	<del>Range, hot top, electric and</del>			
31.12	<del>gas</del>	All	●	
31.13	<del>Broiler, chain conveyor, gas</del>	All		●
31.14	<del>Broiler, electric and gas,</del>			
31.15	<del>over-fired (upright)</del>	All		●
31.16	<del>Broiler, gas, under-fired</del>	All		●
31.17	<del>Range, wok, gas and electric</del>	All		●
31.18	<del>Appliances using solid fuel</del>			
31.19	<del>(wood, charcoal, briquettes,</del>			
31.20	<del>and mesquite) to provide all</del>			
31.21	<del>or part of the heat source for</del>			
31.22	<del>cooking</del>			●
31.23	<del><b>Exception:</b> Appliances</del>			
31.24	<del>complying with Section</del>			
31.25	<del>14.3.4 of NFPA Standard 96</del>	All		
31.26	<del><b>507.2.1.1 Operation.</b> Type I hood systems shall be designed and installed to automatically</del>			
31.27	<del>activate the exhaust fan whenever cooking operations occur. The activation of the exhaust</del>			
31.28	<del>fan shall occur through an interlock with the cooking appliances, by means of heat sensors</del>			
31.29	<del>or by means of other approved methods. A method of interlock between an exhaust hood</del>			
31.30	<del>system and appliances equipped with standing pilot burners shall not cause the pilot burners</del>			
31.31	<del>to be extinguished. A method of interlock between an exhaust hood system and cooking</del>			
31.32	<del>appliances shall not involve or depend upon any component of a fire extinguishing system.</del>			

32.1 ~~**507.2.2 Type II hoods.** Type II hoods shall be installed above dishwashers and appliances~~  
 32.2 ~~as required by Table 507.2.2. The duty classifications of cooking appliances served by Type~~  
 32.3 ~~II hoods shall be in accordance with Table 507.2.2. Type II hoods shall be installed above~~  
 32.4 ~~all appliances that produce products of combustion and do not produce grease or smoke as~~  
 32.5 ~~a result of the cooking process. Where hoods are not required, the additional heat and~~  
 32.6 ~~moisture loads generated by such appliances shall be accounted for in the sensible and latent~~  
 32.7 ~~loads for the HVAC system.~~

32.8 Table 507.2.2

32.9 Type II Hood Requirements by Appliance Description

32.10	Appliance Description	Size	Hood Not Required <sup>a,b</sup>	Type II Hoods <sup>a</sup>	
32.11				Light Duty	Medium Duty
32.12					
32.13					
32.14	<del>Cabinet, holding, electric</del>	All	●		
32.15	<del>Cabinet, proofing, electric</del>	All	●		
32.16	<del>Cheese melter, electric</del>	All	●		
32.17	<del>Coffee maker, electric</del>	All	●		
32.18	<del>Cooktop, induction, electric</del>	All	●		
32.19	<del>Dishwasher, under-counter,</del>				
32.20	<del>electric</del>	All	●		
32.21	<del>Dishwasher, powered sink, electric</del>	All	●		
32.22	<del>Drawer warmer, 2 drawer, electric</del>	All	●		
32.23	<del>Egg cooker, electric</del>	All	●		
32.24	<del>Espresso machine, electric</del>	All	●		
32.25	<del>Grill, panini, electric</del>	All	●		
32.26	<del>Hot dog cooker, electric</del>	All	●		
32.27	<del>Hot plate, countertop, electric</del>	All	●		
32.28	<del>Ovens, conveyor, electric</del>	<6 kW	●		

33.1	<del>Ovens, microwave, electric</del>	All	●	
33.2	<del>Ovens, warming, electric</del>	All	●	
33.3	<del>Popcorn machine, electric</del>	All	●	
33.4	<del>Rethermalizer, electric</del>	All	●	
33.5	<del>Rice cooker, electric</del>	All	●	
33.6	<del>Steam table, electric</del>	All	●	
33.7	<del>Steamers, bun, electric</del>	All	●	
33.8	<del>Steamer, compartment</del>			
33.9	<del>atmospheric, countertop, electric</del>	All	●	
33.10	<del>Steamer, compartment</del>			
33.11	<del>pressurized, countertop, electric</del>	All	●	
33.12	<del>Table, hot food, electric</del>	All	●	
33.13	<del>Toaster, electric</del>	All	●	
33.14	<del>Waffle iron, electric</del>	All	●	
33.15	<del>Cheese melter, gas</del>	All		●
33.16	<del>Dishwasher, conveyor rack,</del>			
33.17	<del>chemical sanitizing</del>	All		●
33.18	<del>Dishwasher, conveyor rack, hot</del>			
33.19	<del>water sanitizing</del>	All		●
33.20	<del>Dishwasher, door-type rack,</del>			
33.21	<del>chemical sanitizing</del>	All		●
33.22	<del>Dishwasher, door-type rack, hot</del>			
33.23	<del>water sanitizing</del>	All		●
33.24	<del>Kettle, steam jacketed, tabletop,</del>			
33.25	<del>electric, gas and direct steam</del>	<20 gallons		●
33.26	<del>Oven, convection, half-size,</del>			
33.27	<del>electric and gas (nonprotein</del>			
33.28	<del>cooking)</del>	All		●
33.29	<del>Pasta cooker, electric</del>	All		●
33.30	<del>Rethermalizer, gas</del>	All		●
33.31	<del>Rice cooker, gas</del>	All		●
33.32	<del>Steamer, atmospheric, gas</del>	All		●

34.1	<del>Steamer, pressurized, gas</del>	All	●
34.2	<del>Steamer, atmospheric,</del>		
34.3	<del>floor-mounted, electric</del>	All	●
34.4	<del>Steamer, pressurized,</del>		
34.5	<del>floor-mounted, electric</del>	All	●
34.6	<del>Kettle, steam-jacketed</del>		
34.7	<del>floor-mounted, electric, gas and</del>		
34.8	<del>direct steam</del>	< 20 gallons	●
34.9	<del>Pasta cooker, gas</del>	All	●
34.10	<del>Smoker, electric and gas,</del>		
34.11	<del>pressurized</del>	All	●
34.12	<del>Steam-jacketed kettle,</del>	20 gallons or	
34.13	<del>floor-mounted, electric and gas</del>	larger	●

34.14 <sup>a</sup>A hood shall be provided for an electric appliance if it produces  $3.1 \times 10^{-7}$  lb/ft<sup>3</sup> (5  
34.15 mg/m<sup>3</sup>) of grease or more when measured at 500 cfm (236 L/s).

34.16 <sup>b</sup>Where hoods are not required, the additional heat and moisture loads generated by  
34.17 such appliances shall be accounted for in the sensible and latent loads for the HVAC system.

34.18 ~~**507.2.2.1. Type II hood exhaust flow rates.** The net exhaust flow rate for Type II hoods~~  
34.19 ~~shall comply with Table 507.2.2.1. The duty level for the hood shall be the duty level of~~  
34.20 ~~the appliance that has the highest (heaviest) duty level of all of the appliances that are~~  
34.21 ~~installed underneath the hood according to Table 507.2.2.~~

34.22 ~~Table 507.2.2.1~~

34.23 ~~Type II Hood Minimum Net Exhaust Airflow Rates~~

34.24		<del>Minimum Net Exhaust Flow Rate per Linear Hood Length</del>	
34.25		<del>in cfm/ft (L/s/m)</del>	
34.26	<del>Type of Hood</del>	<del>Light-Duty Equipment</del>	<del>Medium-Duty Equipment</del>
34.27	<del>Wall-mounted canopy</del>	<del>200 (310)</del>	<del>300 (465)</del>
34.28	<del>Single island</del>	<del>400 (620)</del>	<del>500 (775)</del>
34.29	<del>Double island (per side)</del>	<del>250 (388)</del>	<del>300 (465)</del>

35.1	<del>Eyebrow</del>	<del>250 (388)</del>	<del>250 (388)</del>
35.2	<del>Backshelf/Pass-over</del>	<del>200 (310)</del>	<del>300 (465)</del>

35.3 ~~**507.2.2.2 Type II hood overhang.** Type II hoods shall overhang the appliances and~~  
 35.4 ~~equipment served in accordance with Table 507.2.2.2.~~

35.5 ~~Table 507.2.2.2~~

35.6 ~~Minimum Overhang Requirements for Type II Hoods~~

35.7	Type of Hood	End Overhang	Front Overhang	Rear Overhang
35.8	<del>Wall-mounted canopy</del>	<del>6 in. (154 mm)</del>	<del>12 in. (154 mm)</del>	<del>N/A</del>
35.9				<del>12 in. (154</del>
35.10	<del>Single-island canopy</del>	<del>12 in. (154 mm)</del>	<del>12 in. (154 mm)</del>	<del>mm)</del>
35.11	<del>Double-island canopy</del>	<del>12 in. (154 mm)</del>	<del>12 in. (154 mm)</del>	<del>N/A</del>
35.12	<del>Eyebrow</del>	<del>N/A</del>	<del>12 in. (154 mm)</del>	<del>N/A</del>
35.13	<del>Backshelf/Proximity/</del>		<del>10 in. (254 mm)</del>	
35.14	<del>Pass-over</del>	<del>6 in. (154 mm)</del>	<del>(setback)</del>	<del>N/A</del>

35.15 ~~N/A = not applicable~~

35.16 ~~Subp. 3. [Repealed, 34 SR 537]~~

35.17 ~~Subp. 4. [Repealed, 39 SR 690]~~

35.18 ~~Subp. 5. [Repealed, 34 SR 537]~~

35.19 ~~Subp. 6. [See repealer.]~~

35.20 ~~Subp. 7. [See repealer.]~~

35.21 ~~Subp. 8. [See repealer.]~~

35.22 ~~Subp. 9. [See repealer.]~~

35.23 ~~Subp. 10. [See repealer.]~~

35.24 ~~Subp. 11. [Repealed, 34 SR 537]~~

36.1 Subp. 12. [See repealer.]

36.2 Subp. 13. [Repealed, 34 SR 537]

36.3 **1346.0508 SECTION 508 COMMERCIAL KITCHEN MAKEUP AIR.**

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

36.5 **508.1 Makeup air.** Makeup air shall be supplied during the operation of commercial kitchen  
36.6 exhaust systems that are provided for commercial ~~food heat-processing~~ kitchen appliances.  
36.7 The amount of makeup air supplied to the building from all sources shall be approximately  
36.8 equal to the exhaust air for all exhaust systems for the building. The makeup air shall not  
36.9 reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or  
36.10 mechanical means ~~and the exhaust and makeup air systems shall be electrically interlocked~~  
36.11 ~~to insure that makeup air is provided whenever the exhaust system is in operation~~ or both.  
36.12 Mechanical makeup air systems shall be automatically controlled to start and operate  
36.13 simultaneously with the exhaust system. Makeup air intake openings shall comply with  
36.14 IMC ~~sections~~ section 401.4 ~~and 401.5~~.

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

36.16 **508.1.1 Makeup air temperature.** Makeup air shall be not less than 50°F (10°C), measured  
36.17 at the flow of air from the supply diffuser into the space.

36.18 **508.1.2 Makeup and ventilation air distribution.** Makeup and ventilation air supply  
36.19 diffusers located within 12 feet (3.7 m) of an exhaust hood shall be directed away from the  
36.20 hood.

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

36.23 Subp. 2. **Section 508.2.** IMC section 508.2 ~~is amended to read as follows:~~ is deleted  
36.24 in its entirety. Compensating hoods shall comply with NFPA 96 and ASHRAE 154.

37.1 ~~**508.2 Compensating hoods.** Manufacturers of compensating hoods shall provide a label~~  
37.2 ~~indicating minimum exhaust flow and maximum makeup airflow that provides capture and~~  
37.3 ~~containment of the exhaust effluent. Short-circuit compensating hoods are prohibited.~~

37.4 **1346.0602 SECTION 602 PLENUMS.**

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

37.6 **Section ~~602.2.1.7~~ 602.2.1.9. Piping in plenums.** Piping carrying flammable or combustible  
37.7 gases or liquids in a plenum must have all connections made by welding or brazing. No  
37.8 flanges, valves, threaded fittings, unions, or connectors are permitted.

37.9 **1346.0603 SECTION 603 DUCT CONSTRUCTION AND INSTALLATION.**

37.10 Subpart 1. [Repealed, 34 SR 537]

37.11 Subp. 2. [See repealer.]

37.12 Subp. 2a. [See repealer.]

37.13 Subp. 3. [See repealer.]

37.14 Subp. 4. [See repealer.]

37.15 Subp. 5. [See repealer.]

37.16 Subp. 6. [See repealer.]

37.17 Subp. 7. [See repealer.]

37.18 *[For text of subpart 8, see Minnesota Rules]*

37.19 Subp. 9. [See repealer.]

37.20 *[For text of subpart 10, see Minnesota Rules]*

37.21 **1346.0604 SECTION 604 INSULATION.**

37.22 Subpart 1. Section 604.1. IMC section 604.1 is amended to read as follows:

38.1 **604.1 General.** Duct insulation shall conform to the requirements in Minnesota Rules,  
38.2 chapter 1322 or 1323, as applicable.

38.3 Subp. 2. Section 604.3. IMC section 604.3 is amended to read as follows:

38.4 **604.3 Coverings and linings.** Coverings and linings, including adhesives where used, shall  
38.5 have a flame-spread index of not more than 25 and a smoke-developed index of not more  
38.6 than 50, when tested in accordance with ASTM E84 or UL 723, using the specimen  
38.7 preparation and mounting procedures of ASTM E2231. Duct coverings and linings shall  
38.8 not flame, glow, smolder, or smoke when tested in accordance with ASTM C411 at the  
38.9 temperature to which they are exposed in service. The test temperature shall not fall below  
38.10 250°F (121°C). Coverings and linings shall be listed and labeled.

38.11 **Exception:** Spray polyurethane foam without additional ignition barrier or thermal  
38.12 barrier protection shall be permitted as a duct covering where duct construction in  
38.13 compliance with Table 603.4 is installed in a floor assembly over an unconditioned  
38.14 space in IRC-1, IRC-2, or IRC-3 occupancies, as defined in Minnesota Rules, part  
38.15 1300.0070, subpart 12b, provided the spray polyurethane foam meets all of the following  
38.16 requirements:

38.17 1. Spray polyurethane foam shall have a medium density classification (2 lbs./cubic  
38.18 ft., closed cell foam);

38.19 2. Spray polyurethane foam shall have an R-value of not less than R-8; and

38.20 3. Spray polyurethane foam shall have a flame-spread index of 25 or less and a  
38.21 smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL  
38.22 723.

38.23 **1346.1206 SECTION 1206 PIPING INSTALLATION.**

38.24 *[For text of subpart 1, see Minnesota Rules]*

39.1 Subp. 2. [See repealer.]

39.2 Subp. 3. ~~Section 1206.13~~ 1206.12. IMC Section 1206 is amended by adding a new  
39.3 subsection to the end of the section to read as follows:

39.4 ~~1206.13~~ 1206.12 **Draining and venting**. Hydronic pipes shall be installed so that the pipes  
39.5 can be drained and so that air can be completely removed from the system during filling.

39.6 **1346.1500 CHAPTER 15, REFERENCED STANDARDS.**

39.7 Subpart 1. [Repealed, 39 SR 690]

39.8 Subp. 2. **Supplemental standards**. The standards listed in this part shall supplement  
39.9 the list of referenced standards in chapter 15 of the ~~2012~~ 2018 IMC. The standards referenced  
39.10 in this rule shall be considered part of the requirements of this rule to the extent prescribed  
39.11 in each rule or reference.

39.12 A. ASHRAE 62.2-2016 *Ventilation and Acceptable Indoor Air Quality in*  
39.13 *Residential Buildings.*

39.14 ~~A. B.~~ ASHRAE ~~154-2011~~ 154-2016 *Ventilation for Commercial Cooking*  
39.15 *Operations;*

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

39.18 ~~C. D.~~ ASME ~~B31.3-2008~~ B31.3-2016 *Process Piping Code;*

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

39.21 ~~E. F.~~ NFPA ~~96-2014~~ 96-2017 *Standard for Ventilation Control and Fire Protection*  
39.22 *of Commercial Cooking Operations;*

39.23 ~~F. G.~~ NFPA ~~85-2011~~ 85-2015 *Boiler and Combustion Systems Hazards Code;*

40.1 ~~G. H.~~ NFPA 45-2011 45-2015 *Standard on Fire Protection for Laboratories*

40.2 *Using Chemicals;*

40.3 ~~H. I.~~ NFPA 90B-2012 90B-2018 *Standard for the Installation of Warm Air Heating*

40.4 *and Air-Conditioning Systems; and*

40.5 ~~I. J.~~ NFPA 54-2012 54-2018 *National Fuel Gas Code;*

40.6 K. UL 217; and

40.7 L. UL 2034.

40.8 **1346.5050 TITLE; INCORPORATION BY REFERENCE.**

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

40.11 Chapters 2 to 8 of the ~~2012~~ 2018 edition of the International Fuel Gas Code ("IFGC"),  
40.12 as promulgated by the International Code Council, Inc., Washington, DC, are incorporated  
40.13 by reference as part of the Minnesota Fuel Gas Code except as qualified by the applicable  
40.14 provisions in Minnesota Rules, chapter 1300, and as amended in this code. Portions of this  
40.15 code reproduce excerpts from the ~~2012~~ 2018 IFGC, International Code Council, Inc.,  
40.16 Washington, DC, copyright ~~2012~~ 2017, reproduced with permission, all rights reserved.

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

40.19 **1346.5202 SECTION 202 (IFGC) GENERAL DEFINITIONS.**

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

40.22 **APPROVED.** "Approved" means approval by the building official, pursuant to the Minnesota  
40.23 State Building Code, by reason of: inspection, investigation, or testing; accepted principles;

41.1 computer simulations; research reports; or testing performed by either a licensed engineer  
41.2 or by a locally or nationally recognized testing laboratory.

41.3 **CODE.** For purposes of parts 1346.5050 to 1346.6014, "the code" or "this code" means the  
41.4 portion of this rule that adopts the ~~2012~~ 2018 International Fuel Gas Code, with amendments.

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

41.8 **GAS PIPING SYSTEM - MEDIUM PRESSURE.** A system that operates at a pressure  
41.9 exceeding 14 inches of water column but not exceeding 5 psig. LPG is a pressure exceeding  
41.10 14 inches of water column but not exceeding 20 psig.

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

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

41.16 Subp. 2. [See repealer.]

41.17 **1346.5303 SECTION 303, (IFGC) APPLIANCE LOCATION.**

41.18 Subpart 1. Section 303.3. IFGC section 303.3, Prohibited locations, is amended by  
41.19 deleting items 3 and 4 from the list of exceptions.

41.20 Subp. 2. Section 303.3.1. IFGC section 303.3.1 is amended to read as follows:

41.21 **303.3.1 Fireplaces and decorative appliances in Group I-1, Condition 2 and Group**  
41.22 **I-2, Condition 2 occupancies.** Direct-vent gas fireplaces shall be permitted inside smoke  
41.23 compartments containing dwelling units, sleeping rooms, and patient sleeping areas where  
41.24 all of the following conditions are met:

- 42.1 1. The direct-vent gas fireplaces are not located within a sleeping room.
- 42.2 2. The direct-vent fireplaces have a sealed glass front with a wire mesh panel or screen.
- 42.3 3. The controls for the direct-vent gas fireplace are located where they can be accessed
- 42.4 only by facility staff.
- 42.5 4. Electrically supervised carbon monoxide detection is provided in the room where
- 42.6 the direct-vent gas fireplace is located.
- 42.7 5. The direct-vent fireplace includes a guard in front of the glass where the glass
- 42.8 temperature is equal to or exceeds 125°F (52°C).

42.9 **1346.5304 SECTION 304 (IFGC) COMBUSTION, VENTILATION AND DILUTION**

42.10 **AIR.**

42.11 Subpart 1. **Section 304.1.** IFGC section ~~304~~ 304.1 is amended by adding language to

42.12 ~~the end of the first paragraph and additional exceptions~~ to read as follows:

42.13 **304.1 General.** Refer to IFGC Appendix E for Worksheet E-1, "Residential Combustion

42.14 Air Calculation Method" and Table E-1, "Residential Combustion Air Required Volume"

42.15 ~~in part 1346.6012.~~ Air for combustion, ventilation, and dilution of flue gases for appliances

42.16 installed in buildings shall be provided by application of one of the methods prescribed in

42.17 sections 304.5 to 304.9. Where the requirements of section 304.5 are not met, outdoor air

42.18 shall be introduced in accordance with one of the methods prescribed in sections 304.6 to

42.19 304.9. Direct-vent appliances, gas appliances of other than natural draft design, vented gas

42.20 appliances not designated as Category I and appliances equipped with power burners shall

42.21 be provided with combustion, ventilation and dilution air in accordance with the appliance

42.22 manufacturer's instructions.

42.23 **Exceptions:**

- 42.24 ~~1. Direct vent appliances.~~

43.1 ~~2.~~ 1. Type 1 clothes dryers that are provided with makeup air in accordance with the  
43.2 manufacturer's installation instructions.

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

43.5 ~~3.1 Replacement appliance has a Btu/hr (kW) input rating not greater than 30~~  
43.6 ~~percent above the original appliance input rating.~~

43.7 ~~3.2 Combustion air provisions meet the code requirements in effect at the time of~~  
43.8 ~~the original installation.~~

43.9 ~~3.3 Replacement appliance shall not cause an existing mechanical system to become~~  
43.10 ~~unsafe, hazardous, or overloaded.~~

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

43.14 ~~5.~~ 2. Combustion air for power burner appliances equipped with a draft control device  
43.15 and having an input above 400,000 Btu/hr shall have a net free area of 0.2 square inches  
43.16 per 1,000 Btu/hr. Combustion air shall be provided from a single opening from the  
43.17 outdoors, ~~terminating within 12 inches of the bottom of the enclosure.~~ In lieu of this  
43.18 requirement, combustion air requirements specified by the manufacturer for a specific  
43.19 power burner appliance may be approved by the building official.

43.20 ~~6.~~ 3. Combustion air for power burner appliances not equipped with a draft control  
43.21 device and having an input above 400,000 Btu/hr shall have a net free area of 0.1 square  
43.22 inches per 1,000 Btu/hr. Combustion air shall be provided from a single opening from  
43.23 the outdoors, ~~terminating within 12 inches of the bottom of the enclosure.~~ In lieu of  
43.24 this requirement, combustion air requirements specified by the manufacturer for a  
43.25 specific power burner appliance may be approved by the building official.

44.1 4. Combustion air for Category I, III, and IV gas-fired appliances shall be determined  
 44.2 using Table 304.1.

44.3 5. Combustion air requirements for residential dwellings shall be calculated by using  
 44.4 Worksheet E-1, "Residential Combustion Air Calculation Method" and Table E-1,  
 44.5 "Residential Combustion Air Required Volume" located in IFGC Appendix E, as  
 44.6 amended in Minnesota Rules, parts 1346.6012 and 1346.6014.

44.7 Table 304.1

44.8 Combustion Air Requirements for Category I, III, and IV Gas-Fired Appliances When the  
 44.9 Combined Input is Up to and Including 400,000 Btu/hr

44.10	Total input of appliances <sup>1</sup> , 44.11 thousands of Btu/hr (kW)	Required free area of 44.12 air-supply opening or duct, square inches (sq mm)	Acceptable approximate round duct equivalent diameter <sup>2</sup> , inch (mm)
44.13	25 (8)	7 (4,500)	3 (75)
44.14	50 (15)	7 (4,500)	3 (75)
44.15	75 (23)	11 (7,000)	4 (100)
44.16	100 (30)	14 (9,000)	4 (100)
44.17	125 (37)	18 (12,000)	5 (125)
44.18	150 (45)	22 (14,000)	5 (125)
44.19	175 (53)	25 (16,000)	6 (150)
44.20	200 (60)	29 (19,000)	6 (150)
44.21	225 (68)	32 (21,000)	6 (150)
44.22	250 (75)	36 (23,000)	7 (175)
44.23	275 (83)	40 (26,000)	7 (175)
44.24	300 (90)	43 (28,000)	7 (175)
44.25	325 (98)	47 (30,000)	8 (200)
44.26	350 (105)	50 (32,000)	8 (200)
44.27	375 (113)	54 (35,000)	8 (200)
44.28	400 (120)	58 (37,000)	9 (225)

45.1 <sup>1</sup>For total inputs falling between listed capacities, use next largest listed input.

45.2 <sup>2</sup>If flexible duct is used, increase the duct diameter by one inch.\*

45.3 \*Flexible duct shall be stretched with minimal sags.

45.4 *[For text of subparts 2 and 2a, see Minnesota Rules]*

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

45.6 **304.6.2 One permanent opening method.** When any natural draft appliances are installed,  
45.7 one permanent opening, commencing within 12 inches (300 mm) of the bottom of the  
45.8 enclosure, shall be provided. When other than natural draft appliances are installed, one  
45.9 permanent opening, commencing within 12 inches (300) of the top of the enclosure, shall  
45.10 be provided. The appliances shall have clearances of at least 1 inch (25 mm) from the sides  
45.11 and back and 6 inches (160 mm) from the front of the appliance. The opening shall directly  
45.12 communicate with the outdoors or shall communicate through a vertical or horizontal duct  
45.13 to the outdoors or spaces that freely communicate with the outdoors ~~and shall have a~~  
45.14 ~~minimum free area of 1 inch<sup>2</sup>/3,000 Btu/hr (700 mm<sup>2</sup>/kW) of the total input rating of all~~  
45.15 ~~appliances located in the enclosure.~~

45.16 *[For text of subparts 4 to 9, see Minnesota Rules]*

45.17 **1346.5306 SECTION 306 (IFGC) ACCESS AND SERVICE SPACE.**

45.18 *[For text of subparts 1 and 2, see Minnesota Rules]*

45.19 Subp. 3. **Section 306.6.** IFGC section 306.6 is amended to read as follows:

45.20 **306.6 Guards.** Guards shall be provided where various components that require service  
45.21 and roof hatch openings are located within 10 feet (3,048 mm) of a roof edge or open side  
45.22 of a walking surface and such edge or open side is located more than 30 inches (762 mm)  
45.23 above the floor, roof, or grade below. The guard shall extend not less than 30 inches (762  
45.24 mm) beyond each end of components that requires service. The top of the guard shall be

46.1 located not less than 42 inches (1,067 mm) above the elevated surface adjacent to the guard.  
46.2 The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm)  
46.3 sphere and shall comply with the loading requirements for guards specified in the  
46.4 *International Building Code*.

46.5 **Exception:** Guards are not required where fall arrest/restraint anchorage connector  
46.6 devices that comply with ANSI/ASSE Z359.1 are installed.

46.7 **1346.5307 CONDENSATE DISPOSAL.**

46.8 IFGC section 307.6, Condensate pumps, is deleted in its entirety.

46.9 **1346.5311 SECTION 311 CARBON MONOXIDE ALARMS.**

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

46.11 **311.1 General.** Carbon monoxide alarms shall be installed in new and existing rooms  
46.12 containing a fuel-burning appliance that is utilized to control environmental conditions and  
46.13 produces carbon monoxide during operation.

46.14 **Exceptions:**

46.15 1. Rooms containing a boiler that is regulated by Minnesota Rules, chapter 5225, shall  
46.16 be provided with carbon monoxide alarms in accordance with that chapter.

46.17 2. Where the room containing the fuel-burning appliance is located in a building  
46.18 regulated by the International Residential Code, carbon monoxide alarms shall be provided  
46.19 in accordance with Minnesota Rules, chapter 1309.

46.20 **311.2 Carbon monoxide alarms.** Carbon monoxide alarms shall comply with sections  
46.21 311.2.1 to 311.2.1.4.

46.22 **311.2.1 Power source.** Carbon monoxide alarms shall receive their primary power from  
46.23 the building wiring where such wiring is served from a commercial source, and when primary

47.1 power is interrupted, receive power from a battery. Wiring shall be permanent and without  
47.2 a disconnecting switch other than that required for overcurrent protection.

47.3 **Exceptions:**

47.4 1. Where installed in buildings without commercial power, battery-powered carbon  
47.5 monoxide alarms are permitted.

47.6 2. Where installed in the room of an existing building containing a fuel-burning  
47.7 appliance, battery-powered carbon monoxide alarms are permitted.

47.8 **311.2.1.2 Listings.** Carbon monoxide alarms shall be listed in accordance with UL 2034.

47.9 **311.2.1.3 Combination alarms.** Combination carbon monoxide and smoke alarms shall  
47.10 be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide  
47.11 and smoke alarms shall be listed in accordance with UL 2034 and UL 217.

47.12 **311.2.1.4 Carbon monoxide detections systems.** Carbon monoxide detection systems shall  
47.13 be an acceptable alternative to carbon monoxide alarms listed in sections 311.2.1.2 and  
47.14 311.2.1.3, provided they comply with NFPA 720 and are listed in accordance with UL 2075.

47.15 **1346.5403 SECTION 403 (IFGC) PIPING MATERIALS.**

47.16 Subpart 1. **Section ~~403.8~~ 403.4.2.** IFGC section ~~403.8~~ 403.4.2 is amended to read as  
47.17 follows:

47.18 ~~**403.8 Protective coating.** Where in contact with material, or passing through concrete or~~  
47.19 ~~other abrasive material or atmosphere exerting a corrosive action, metallic piping and fittings~~  
47.20 ~~coated with a corrosion-resistant material, sleeve, or casing shall be used. Steel pipe exposed~~  
47.21 ~~in exterior locations shall be galvanized or coated with approved corrosion-resistant material.~~  
47.22 ~~External or internal coatings or linings used on piping or components shall not be considered~~  
47.23 ~~as adding strength.~~

48.1 **403.4.2 Steel.** Steel and wrought-iron pipe shall not be lighter than Schedule 40 and shall  
48.2 comply with one of the following standards:

48.3 1. ASME B36.10, 10M;

48.4 2. ASTM A53/A53M; or

48.5 3. ASTM A106.

48.6 Subp. 1a. **Section ~~403.10.1~~ 403.8.** IFGC section ~~403.10.1~~ 403.8 is amended to read  
48.7 as follows:

48.8 **~~403.10.1 Pipe joints.~~** Pipe joints shall be threaded, flanged, brazed, welded, or made with  
48.9 ~~press-connect fittings complying with ANSI LC-4. Where nonferrous pipe is brazed, the~~  
48.10 ~~brazing materials shall have a melting point in excess of 1,000°F (538°C). Brazing alloys~~  
48.11 ~~shall not contain more than 0.05 percent phosphorus.~~

48.12 **403.8 Protective coating.** Where in contact with material, or passing through concrete or  
48.13 other abrasive material or atmosphere exerting a corrosive action, metallic piping and fittings  
48.14 coated with a corrosion-resistant material, sleeve, or casing shall be used. Steel pipe exposed  
48.15 in exterior locations shall be galvanized or coated with approved corrosion-resistant material.  
48.16 External or internal coatings or linings used on piping or components shall not be considered  
48.17 as adding strength.

48.18 Subp. 1b. **Section ~~403.10.2~~ 403.10.1.** IFGC section ~~403.10.2~~ 403.10.1 is amended to  
48.19 read as follows:

48.20 **~~403.10.2 Tubing joints.~~** Tubing joints shall be either made with approved gas tubing fittings  
48.21 ~~or brazed with a material having a melting point in excess of 1,000°F (538°C), or made by~~  
48.22 ~~press-connect fittings complying with ANSI LC-4, Press-Connect Copper and Copper Alloy,~~  
48.23 ~~Fittings for Use in Fuel Gas Distribution Systems. Brazing alloys shall not contain more~~  
48.24 ~~than 0.05 percent phosphorus.~~

49.1 **403.10.1 Pipe joints.** Pipe joints shall be threaded, flanged, brazed, welded, or made with  
49.2 press-connect fittings complying with ANSI LC-4. Where nonferrous pipe is brazed, the  
49.3 brazing materials shall have a melting point in excess of 1,000°F (538°C). Brazing alloys  
49.4 shall not contain more than 0.05 percent phosphorus.

49.5 Subp. 2. [See repealer.]

49.6 **1346.5409 SECTION 409 (IFGC) SHUTOFF VALVES.**

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

49.9 **409.1.4 Main shutoff valve.** Piping systems shall be provided with an approved main  
49.10 shutoff valve before the first branch line. The main shutoff valve shall be installed in the  
49.11 first available location inside the building 5 feet or less above the floor that provides ready  
49.12 access and shall have a permanently attached handle.

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

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

49.19 [For text of subparts 2 and 3, see Minnesota Rules]

49.20 **1346.5501 SECTION 501 (IFGC) GENERAL.**

49.21 [For text of subparts 1 and 2, see Minnesota Rules]

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

50.1 **501.12 Residential and low-heat appliances flue lining systems.** An approved metallic  
50.2 liner shall be installed in masonry chimneys used to vent gas appliances. The liner shall  
50.3 comply with one of the following:

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

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

50.9 3. Listed vent systems.

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

50.12 ~~**501.12.1 Terminations.** Metallic liners shall terminate in accordance with the requirements~~  
50.13 ~~for gas vents in IFGC Section 503.6.6.~~

50.14 **1346.5503 SECTION 503 (IFGC) VENTING OF APPLIANCES.**

50.15 *[For text of subparts 1 to 5, see Minnesota Rules]*

50.16 Subp. 6. **Section ~~503.6.9.1~~ 503.6.10.1.** IFGC section ~~503.6.9.1~~ 503.6.10.1 is amended  
50.17 to read as follows:

50.18 ~~**503.6.9.1**~~ **503.6.10.1 Category I appliances.** The sizing of natural draft venting systems  
50.19 serving one or more listed appliances equipped with a draft hood or appliances listed for  
50.20 use with Type B gas vent, installed in a single story of a building, shall be in accordance  
50.21 with one of the following methods:

50.22 1. The provisions of Section 504.

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

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

51.8 4. Approved engineering practices.

51.9 *[For text of subparts 7 to 9, see Minnesota Rules]*

51.10 **1346.5800 CHAPTER 8 REFERENCED STANDARDS.**

51.11 Subpart 1. [Repealed, 39 SR 690]

51.12 Subp. 2. **Supplemental standards.** The standards listed in this part shall supplement  
51.13 the list of referenced standards in chapter 8 of the 2012 IFGC. The standards referenced in  
51.14 this rule shall be considered part of the requirements of this rule to the extent prescribed in  
51.15 each rule or reference.

51.16 A. ~~NFPA 54-2012~~ 54-2018 *National Fuel Gas Code.*

51.17 B. ANSI LC-4-2012 *Press-Connect Metallic Fittings for Use In Fuel Gas*  
51.18 *Distribution Systems.*

51.19 **REPEALER.** Minnesota Rules, parts 1346.0506, subparts 2b, 3, and 4; 1346.0507, subparts  
51.20 6, 7, 8, 9, 10, and 12; 1346.0601; 1346.0603, subparts 2, 2a, 3, 4, 5, 6, 7, and 9; 1346.1003;  
51.21 1346.1206, subpart 2; 1346.5202, subpart 2; 1346.5403, subpart 2; 1346.5404, subpart 2;  
51.22 1346.5407; 1346.5408; and 1346.5504, subpart 1, are repealed.

- 52.1 **EFFECTIVE DATE.** Minnesota Rules, parts 1346.0050 to 1346.5800, are effective March
- 52.2 31, 2020, or five working days after publication of the amendments' notice of adoption in
- 52.3 the State Register, whichever is later.