

1.1 **Department of Labor and Industry**

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

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

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

1.6 Chapters 2 to 15 of the 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 2018 IMC, International Code Council, Inc.,
1.11 Washington, DC, copyright 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 2017 edition of NFPA 96 Standard for Ventilation
1.15 Control and Fire Protection of Commercial Cooking Operations, promulgated by the National
1.16 Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471, are incorporated
1.17 by reference as part of the Minnesota Mechanical Code as amended in this chapter. As used
1.18 in this code, "NFPA 96" means the NFPA 96 Standard for Ventilation Control and Fire
1.19 Protection of Commercial Cooking Operations chapters that are incorporated into this code.
1.20 Portions of this chapter reproduce text and tables from the NFPA 96. The NFPA 96 is
1.21 copyrighted, 2017, by the National Fire Protection Association. All rights reserved.

1.22 The NFPA 96 is not subject to frequent change and a copy of the NFPA 96, with
1.23 amendments for use in Minnesota, is available in the office of the commissioner of labor
1.24 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 **SEALED.** Secured with a product meeting UL 181 or equivalent.

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

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

4.10 **1346.0303 SECTION 303 EQUIPMENT AND APPLIANCE LOCATION.**

4.11 IMC section 303.8 is deleted in its entirety.

4.12 **1346.0306 SECTION 306 ACCESS AND SERVICE SPACE.**

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

4.15 **306.5 Mechanical equipment and appliances on roofs or elevated structures.** Where
4.16 mechanical equipment or appliances requiring periodic inspection, service, or maintenance
4.17 are installed on roofs or elevated structures, a permanent stair shall be provided for access.

4.18 **Exception:** A portable ladder may be used for dwellings, replacement equipment and
4.19 appliances, on existing buildings, and exterior roof access points not exceeding 16 feet
4.20 (4.9 m) above grade, unless the building official determines that the unique shape of
4.21 the roof does not allow safe access with a portable ladder.

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

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

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

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

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

5.6 5. Interior stairs shall terminate at the under side of the roof at a hatch or scuttle of at
5.7 least 8 square feet (0.74 m²) with a minimum dimension of 20 inches (508 mm).

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

5.10 7. Exterior stairs shall terminate at the roof access point or at a level landing of at least
5.11 8 square feet (0.74 m²) with a minimum dimension of 20 inches (508 mm). The landing
5.12 shall have a guard installed in accordance with IMC section 304.11.

5.13 **306.5.1 Sloped roofs.** Where appliances, equipment, fans, or components that require service
5.14 are installed on a roof having a slope of 3 units vertical in 12 units horizontal (25-percent
5.15 slope) or greater and having an edge more than 30 inches (762 mm) above grade at such
5.16 edge, a level platform shall be provided on each side of the appliance to which access is
5.17 required for service, repair, or maintenance. The platform shall be at least 30 inches (762
5.18 mm) in any dimension and shall be provided with guards. The guards shall extend at least
5.19 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage
5.20 of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for
5.21 guards specified in Minnesota Rules, chapter 1305.

5.22 **306.5.2 Electrical requirements.** A receptacle outlet shall be provided at or near the
5.23 equipment or appliance location in accordance with the Minnesota Electrical Code.

6.1 **306.5.3 Permanent ladders.** Where a change in roof elevation greater than 30 inches (762
6.2 mm) but not exceeding 16 feet (4.9 m) exists, a permanent ladder shall be provided. The
6.3 ladder shall be vertical. The ladder must, at a minimum, meet the following:

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

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

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

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

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

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

6.10 **1346.0307 SECTION 307 CONDENSATE DISPOSAL.**

6.11 IMC section 307.3 is deleted in its entirety.

6.12 **1346.0313 SECTION 313 CARBON MONOXIDE ALARMS.**

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

6.14 **313.1 General.** Carbon monoxide alarms shall be installed in new and existing rooms
6.15 containing a fuel-burning appliance that is utilized to control environmental conditions and
6.16 produces carbon monoxide during operation.

6.17 **Exceptions:**

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

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

7.1 **313.2 Carbon monoxide alarms.** Carbon monoxide alarms under section 313.1 shall comply
7.2 with sections 313.2.1 to 313.2.1.4.

7.3 **313.2.1 Power source.** Carbon monoxide alarms shall receive their primary power from
7.4 the building wiring where such wiring is served from a commercial source, and when primary
7.5 power is interrupted, receive power from a battery. Wiring shall be permanent and without
7.6 a disconnecting switch other than that required for overcurrent protection.

7.7 **Exceptions:**

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

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

7.12 **313.2.1.2 Listings.** Carbon monoxide alarms shall be listed in accordance with UL 2034.

7.13 **313.2.1.3 Combination alarms.** Combination carbon monoxide and smoke alarms shall
7.14 be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide
7.15 and smoke alarms shall be listed in accordance with UL 2034 and UL 217.

7.16 **313.2.1.4 Carbon monoxide detection systems.** Carbon monoxide detection systems that
7.17 comply with NFPA 720 and are listed in accordance with UL 2075 shall be an acceptable
7.18 alternative to carbon monoxide alarms listed in sections 313.2.1.2 and 313.2.1.3.

7.19 **1346.0401 SECTION 401 GENERAL.**

7.20 Subpart 1. **Section 401.2.** IMC section 401.2, Ventilation required, is amended and
7.21 subsections added to read as follows:

7.22 **401.2 Ventilation required.** Every occupied space other than ~~residential~~ buildings
7.23 constructed in accordance with the IRC and dwelling units Group R-2, R-3, and R-4
7.24 occupancies three stories and less in height shall be ventilated by natural means in accordance

8.1 with section 402 or by mechanical ventilation in accordance with section 403. Ambulatory
8.2 care facilities and Group I-2 occupancies shall be ventilated by mechanical means in
8.3 accordance with section 407.

8.4 **401.2.1 Ventilation in IRC buildings.**

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

8.8 **401.2.2 Ventilation in Group R-2, R-3, and R-4 occupancies three stories and less in**
8.9 **height.** Ventilation in Group R-2, R-3, and R-4 occupancies three stories and less in height
8.10 shall be provided with a balanced ventilation system and shall comply with the fan efficacy
8.11 requirements located in Minnesota Rules, chapter 1322, and the ventilation requirements
8.12 in (1) Minnesota Rules, chapter 1322, or (2) ASHRAE 62.2 Ventilation and Acceptable
8.13 Indoor Air Quality in Residential Buildings.

8.14 **401.2.3 Ventilation in Group R-2, R-3, and R-4 occupancies more than three stories**
8.15 **in height.** Ventilation in Group R-2, R-3, and R-4 occupancies more than three stories in
8.16 height above grade plane shall comply with ventilation requirements of section 402, section
8.17 403, or ASHRAE 62.2 Ventilation and Acceptable Indoor Air Quality in Residential
8.18 Buildings.

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

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

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

8.22 B. Mechanical outdoor air intake openings shall be located a minimum of 10 feet
8.23 (3,048 mm) from any hazardous or noxious contaminant, such as chimneys, plumbing vents,
8.24 streets, alleys, parking lots, and loading docks, except as specified in item C or section
8.25 501.3.1. Outdoor air intake openings shall be permitted to be located less than 10 feet (3,048

9.1 mm) horizontally from streets, alleys, parking lots, and loading docks provided that the
9.2 openings are located not less than 25 feet (7,620 mm) vertically above such locations. Where
9.3 openings front on a street or public way, the distance shall be measured to the centerline of
9.4 the street or public way.

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

9.6 **1346.0403 MECHANICAL VENTILATION.**

9.7 Subpart 1. Section 403.1 Ventilation system. IMC section 403.1 is amended to read
9.8 as follows:

9.9 **403.1 Ventilation system.** Mechanical ventilation shall be provided by a method of supply
9.10 air and return or exhaust air. The amount of supply air shall be approximately equal to the
9.11 amount of return and exhaust air. The system shall not be prohibited from producing negative
9.12 or positive pressure. The system to convey ventilation air shall be designed and installed in
9.13 accordance with chapter 6.

9.14 Subp. 2. Section 403.3 Outdoor air and local exhaust airflow rates. IMC section
9.15 403.3 is amended to read as follows:

9.16 **403.3 Outdoor air and local exhaust airflow rates.** Group R-2, R-3, and R-4 occupancies
9.17 three stories and less in height above grade plane shall be provided with outdoor air and
9.18 local exhaust in accordance with section 401.2.2. Other buildings intended to be occupied
9.19 shall be provided with outdoor air and local exhaust in accordance with section 403.3.1.

9.20 Subp. 3. Sections 403.3.2 to 403.3.2.5. IMC sections 403.3.2 to 403.3.2.5 are deleted
9.21 in their entirety.

9.22 **1346.0404 SECTION 404 GARAGES.**

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

10.1 **404.1 Enclosed parking garages.** Mechanical ventilation systems for enclosed parking
10.2 garages shall operate automatically upon detection of certain gas concentrations. Enclosed
10.3 parking garages shall be equipped with a carbon monoxide (CO) detector and a nitrogen
10.4 dioxide (NO₂) detector. The mechanical ventilation system shall activate upon detection of
10.5 a CO level of 25 parts per million (ppm) or greater, a NO₂ level of 3 ppm or greater, or both.
10.6 Such detectors shall be listed in accordance with UL 2075 and installed in accordance with
10.7 their listing and manufacturers' instructions.

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

10.9 **404.2 Occupied spaces accessory to public garages.** Connecting offices, waiting rooms,
10.10 ticket booths, elevator lobbies, and similar uses that are accessory to a public garage shall
10.11 be maintained at a positive pressure and shall be provided with ventilation in accordance
10.12 with IMC section 403.3.

10.13 Subp. 3. **Section 404.3.** IMC section 404 is amended by adding a subsection 404.3
10.14 to read as follows:

10.15 **404.3 Minimum exhaust.** The mechanical ventilation system shall be capable of producing
10.16 a minimum exhaust rate of 0.75 cfm per square foot (0.0038 m³/s·m²) of floor area.

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

10.18 **1346.0501 SECTION 501 GENERAL.**

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

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

10.22 **501.4 Pressure equalization.** Mechanical exhaust systems shall be sized and operated to
10.23 remove the quantity of air required by this chapter. If a greater quantity of air is supplied

11.1 by 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 **501.4.1 Makeup air in new dwellings.** Makeup air quantity for new dwellings shall be
11.4 determined by using Table 501.4.1 and shall be supplied in accordance with section 501.4.2.

11.5 **501.4.2 Makeup air supply.** Makeup air shall be provided by one of the following methods:

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

11.7 1.1 Passive makeup air openings from the outdoors shall be sized according to
11.8 Table 501.4.2.

11.9 1.2 Barometric dampers are prohibited in passive makeup air openings when any
11.10 atmospherically vented appliance is installed.

11.11 1.3 Single passive openings larger than 8 inches (204 mm) diameter, or equivalent,
11.12 shall be provided with a motorized damper that is electrically interlocked with the
11.13 largest exhaust system.

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

11.17 2.1 Powered makeup air shall be electrically interlocked with the largest exhaust
11.18 system.

11.19 2.2 Powered makeup air shall be matched to the airflow of the largest exhaust
11.20 system.

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

11.23 3.1 Passive makeup air openings shall comply with item 1.

12.1 3.2 Powered makeup air shall be supplied for the quantity of airflow in excess of
12.2 the passive makeup air opening provided, and it shall be electrically interlocked
12.3 with the exhaust system.

12.4 **501.4.2.1 Makeup air ducts.** Makeup air ducts shall be constructed and installed according
12.5 to IMC chapter 6 and section 501.4.2.

12.6 **501.4.2.2 Makeup air intake.** Makeup air intake openings shall be located to avoid intake
12.7 of exhaust air in accordance with IMC section 401.4 and IFGC section 503.8, and shall be
12.8 covered with corrosion resistant screen of not less than 1/4 inch (6.4 mm) mesh. Makeup
12.9 air intake openings shall be located at least 12 inches (305 mm) above adjoining grade level.

12.10 **501.4.2.3 Makeup air location.** Makeup air requirements of 175 cubic feet per minute
12.11 (cfm) (0.084 m³/s) and greater shall be introduced to the dwelling in one of the following
12.12 locations:

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

12.14 2. In the space containing the exhaust system.

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

12.17 **501.4.2.4 Makeup air termination restriction.** A makeup air opening shall not terminate
12.18 in the return air plenum of a forced air heating system unless it is installed according to the
12.19 heating appliance manufacturer's installation instructions.

12.20 **501.4.2.5 Separate makeup air and combustion air openings.** When both makeup air
12.21 and combustion air openings are required, they shall be provided through separate openings
12.22 to the outdoors, subject to IFGC section 304, to determine requirements for air for combustion
12.23 and ventilation:

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

13.4 **501.4.2.6 Makeup air effectiveness.** The makeup air shall not reduce the effectiveness of
13.5 exhaust systems or performance of vented combustion appliances, and makeup air shall not
13.6 adversely affect the heating or cooling capability of the mechanical appliances.

13.7 **501.4.3 Additions, alterations, or installations of mechanical systems in existing**
13.8 **dwelling.** Makeup air shall be supplied to existing dwellings when any of the following
13.9 conditions occur:

13.10 1. If a dwelling was constructed after 2003 using the makeup air provisions of section
13.11 501.4.2, makeup air quantity shall be determined by using Table 501.4.1 and shall be
13.12 supplied according to section 501.4.2 when any of the following conditions occur:

13.13 1.1 A vented combustion appliance, including a solid fuel appliance, is installed
13.14 or replaced.

13.15 1.2 An exhaust system is installed or replaced.

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

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

13.22 2.1 A vented combustion appliance, including a solid fuel appliance, is installed
13.23 or replaced.

13.24 2.2 An exhaust system is installed or replaced.

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

14.3 3. When a solid fuel appliance is installed in a dwelling constructed during or after
14.4 1994 under the Minnesota Energy Code, Minnesota Rules, chapter 7670, makeup air
14.5 quantity shall be determined by using Table 501.4.1 and shall be supplied according
14.6 to section 501.4.2.

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

14.10 4. When an exhaust system with a rated capacity greater than 300 cfm (0.144 m³/s) is
14.11 installed in a dwelling constructed during or after 1994 under the Minnesota Energy
14.12 Code, Minnesota Rules, chapter 7670, makeup air quantity shall be determined by
14.13 using Table 501.4.3(1) and shall be supplied according to section 501.4.2.

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

14.16 5. When an exhaust system with a rated capacity greater than 300 cfm (0.144 m³/s) is
14.17 installed in a dwelling constructed prior to 1994, makeup air quantity shall be determined
14.18 by using Table 501.4.3(2) and shall be supplied according to section 501.4.2.

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

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

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

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

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

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

15.12 Table 501.4.1

15.13 Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Dwellings

15.14				Multiple
15.15				appliances that
15.16	One or multiple	One or multiple	One	are
15.17	power vent or	fan-assisted	atmospherically	atmospherically
15.18	direct vent	appliances and	vented gas or oil	vented gas or oil
15.19	appliances or no	power vent or	appliance or one	appliances or
15.20	combustion	direct vent	solid fuel	solid fuel
15.21	appliances ^A	appliances ^B	appliance ^C	appliances ^D

15.22 1. Use the Appropriate Column to Estimate House Infiltration

15.23 a) pressure factor

15.24 (cfm/sf) 0.15 0.09 0.06 0.03

15.25 b) conditioned

15.26 floor area (sf) _____ _____ _____ _____

15.27 (including unfinished basements)

15.28 Estimated House

15.29 Infiltration (cfm):

15.30 [1a x 1b] _____ _____ _____ _____

16.1	2. Exhaust Capacity				
16.2	a) clothes dryer	135	135	135	135
16.3	b) 80% of largest				
16.4	exhaust rating				
16.5	(cfm):	_____	_____	_____	_____
16.6	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
16.7	and matched to exhaust)				
16.8	c) 80% of next				
16.9	largest exhaust	not			
16.10	rating (cfm):	applicable	_____	_____	_____
16.11	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
16.12	and matched to exhaust)				
16.13	Total Exhaust				
16.14	Capacity (cfm):				
16.15	[2a+2b+2c]	_____	_____	_____	_____
16.16	3. Makeup Air Requirement				
16.17	a) Total Exhaust				
16.18	Capacity (from				
16.19	above)	_____	_____	_____	_____
16.20	b) Estimated				
16.21	House Infiltration				
16.22	(from above)	_____	_____	_____	_____
16.23	Makeup Air				
16.24	Quantity (cfm):				
16.25	[3a - 3b]	_____	_____	_____	_____
16.26	(if value is negative, no makeup air is needed)				
16.27	4. For Makeup Air Opening Sizing, refer to Table 501.4.2				
16.28	^A Use this column if there are other than fan-assisted or atmospherically vented gas or				
16.29	oil appliances or if there are no combustion appliances.				
16.30	^B Use this column if there is one fan-assisted appliance per venting system. Other than				
16.31	atmospherically vented appliances may also be included.				

17.1 ^CUse this column if there is one atmospherically vented (other than fan-assisted) gas
 17.2 or oil appliance per venting system or one solid fuel appliance.

17.3 ^DUse this column if there are multiple atmospherically vented gas or oil appliances
 17.4 using a common vent or if there are atmospherically vented gas or oil appliances and solid
 17.5 fuel appliances.

17.6 Table 501.4.2

17.7 Makeup Air Opening Sizing Table for New and Existing Dwellings

17.8		One or multiple	One or multiple	One	Multiple	Passive
17.9		power vent or	fan-assisted	atmospher-	appliances that	makeup
17.10		direct vent	appliances and	ically vented	are atmospher-	air
17.11		appliances or	power vent or	gas or oil	ically vented	opening
17.12		no combustion	direct vent	appliance or	gas or oil	duct
17.13		appliances ^A	appliances ^B	one solid fuel	appliances or	diameter ^{E,F,G}
17.14				appliance ^C	solid fuel	
17.15					appliances ^D	
17.16	Type of opening					
17.17	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					
17.25	with Motorized					
17.26	Damper	318-419	196-258	136-179	84-110	9
17.27	Passive Opening					
17.28	with Motorized					
17.29	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 Ap-
18.5	Air ^H	>679	>419	>290	>179	plicable

18.6 ^AUse 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 ^BUse this column if there is one fan-assisted appliance per venting system. Other than
18.9 atmospherically vented appliances may also be included.

18.10 ^CUse 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 ^DUse 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 solid
18.14 fuel appliance(s).

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

18.18 ^FIf flexible duct is used, increase the duct diameter by one inch. Flexible duct shall be
18.19 stretched with minimal sags.

18.20 ^GBarometric dampers are prohibited in passive makeup air openings when any
18.21 atmospherically vented appliance is installed.

18.22 ^HPowered makeup air shall be electrically interlocked with the largest exhaust system.

18.23 Table 501.4.3(1)

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

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

19.1					Multiple
19.2					appliances that
19.3	One or multiple	One or multiple	One		are
19.4	power vent or	fan-assisted	atmospherically		atmospherically
19.5	direct vent	appliances and	vented gas or oil		vented gas or oil
19.6	appliances or no	power vent or	appliance or one		appliances or
19.7	combustion	direct vent	solid fuel		solid fuel
19.8	appliances ^A	appliances ^B	appliance ^C		appliances ^D

19.9 1. Use the Appropriate Column to Estimate House Infiltration

19.10	a) pressure factor				
19.11	(cfm/sf)	0.15	0.09	0.06	0.03
19.12	b) conditioned				
19.13	floor area (sf)	_____	_____	_____	_____
19.14	Estimated House				
19.15	Infiltration (cfm):				
19.16	[1a x 1b]	_____	_____	_____	_____

19.17 2. Exhaust Capacity

19.18	80% of exhaust				
19.19	rating = Exhaust				
19.20	Capacity (cfm):	_____	_____	_____	_____

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

19.23 3. Makeup Air Requirement

19.24	a) Exhaust				
19.25	Capacity (from				
19.26	above)	_____	_____	_____	_____
19.27	b) Estimated				
19.28	House Infiltration				
19.29	(from above)	_____	_____	_____	_____
19.30	Makeup Air				
19.31	Quantity (cfm):				
19.32	[3a - 3b]	_____	_____	_____	_____

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

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

20.1 ^AUse this column if there are other than fan-assisted or atmospherically vented gas or
 20.2 oil appliances or if there are no combustion appliances.

20.3 ^BUse this column if there is one fan-assisted appliance per venting system. Other than
 20.4 atmospherically vented appliances may also be included.

20.5 ^CUse this column if there is one atmospherically vented (other than fan-assisted) gas
 20.6 or oil appliance per venting system or one solid fuel appliance.

20.7 ^DUse this column if there are multiple atmospherically vented gas or oil appliances
 20.8 using a common vent or if there are atmospherically vented gas or oil appliances and solid
 20.9 fuel appliances.

Table 501.4.3(2)

Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing Dwellings

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

	One or multiple power vent or direct vent appliances or no combustion appliances ^A	One or multiple fan-assisted appliances and power vent or direct vent appliances ^B	One atmospherically vented gas or oil appliance or one solid fuel appliance ^C	Multiple appliances that are atmospherically vented gas or oil appliances or solid fuel appliances ^D
--	-----------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------

1. Use the Appropriate Column to Estimate House Infiltration

a) pressure factor (cfm/sf)	0.25	0.15	0.10	0.05
b) conditioned floor area (sf)	_____	_____	_____	_____
(including unfinished basements)				
Estimated House Infiltration (cfm):				
[1a x 1b]	_____	_____	_____	_____

21.1	or				
21.2	Alternative				
21.3	Calculation (by				
21.4	using blower				
21.5	door test) ^E				
21.6	c) conversion				
21.7	factor	0.75	0.45	0.30	0.15
21.8	d) CFM50 value				
21.9	(from blower				
21.10	door test)	_____	_____	_____	_____
21.11	Estimated House				
21.12	Infiltration (cfm):				
21.13	[1c x 1d]	_____	_____	_____	_____
21.14	2. Exhaust Capacity				
21.15	80% of exhaust				
21.16	rating = Exhaust				
21.17	Capacity (cfm):	_____	_____	_____	_____
21.18	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
21.19	with exhaust)				
21.20	3. Makeup Air Requirement				
21.21	a) Exhaust				
21.22	Capacity (from				
21.23	above)	_____	_____	_____	_____
21.24	b) Estimated				
21.25	House Infiltration				
21.26	(from above)	_____	_____	_____	_____
21.27	Makeup Air				
21.28	Quantity (cfm):				
21.29	[3a - 3b]	_____	_____	_____	_____
21.30	(if value is negative, no makeup air is needed)				
21.31	4. For Makeup Air Opening Sizing, refer to Table 501.4.2				
21.32	^A Use this column if there are other than fan-assisted or atmospherically vented gas or				
21.33	oil appliances or if there are no combustion appliances.				

22.1 ^BUse this column if there is one fan-assisted appliance per venting system. Other than
 22.2 atmospherically vented appliances may also be included.

22.3 ^CUse this column if there is one atmospherically vented (other than fan-assisted) gas
 22.4 or oil appliance per venting system or one solid fuel appliance.

22.5 ^DUse this column if there are multiple atmospherically vented gas or oil appliances
 22.6 using a common vent or if there are atmospherically vented gas or oil appliances and solid
 22.7 fuel appliances.

22.8 ^EAs an alternative, the Estimated House Infiltration may be calculated by performing
 22.9 a blower door test and multiplying the conversion factor by the CFM50 value.

22.10 Table 501.4.3(3)

22.11 Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing Dwellings

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

22.13					Multiple
22.14		One or	One or	One	appliances that
22.15		multiple	multiple	atmospher-	are
22.16		power vent or	fan-assisted	ically vented	atmospherically
22.17		direct vent	appliances and	gas or oil	vented gas or
22.18		appliances or	power vent or	appliance or	oil appliances
22.19		no combustion	direct vent	one solid fuel	or solid fuel
22.20		appliances ^A	appliances ^B	appliance ^C	appliances ^D

22.21 1. Use the Appropriate Column to Estimate House Infiltration

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

22.23 b) conditioned floor area (sf) _____

22.24 (including unfinished basements)

22.25 Estimated House Infiltration
 22.26 (cfm): [1a x 1b] _____

22.27 or
 22.28 Alternative Calculation (by
 22.29 using blower door test)^E

23.1	c) conversion factor	0.75	0.45	0.30	0.15
23.2	d) CFM50 value (from blower				
23.3	door test)	_____	_____	_____	_____
23.4	Estimated House Infiltration				
23.5	(cfm): [1c x 1d]	_____	_____	_____	_____
23.6	2. Exhaust Capacity				
23.7	a) clothes dryer (cfm)	135	135	135	135
23.8	b) 80% of largest exhaust				
23.9	rating (cfm):	_____	_____	_____	_____
23.10	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
23.11	and with exhaust)				
23.12	c) 80% of next largest exhaust				
23.13	rating (cfm)	Not applicable	_____	_____	_____
23.14	(not applicable if recirculating system or if powered makeup air is electrically interlocked				
23.15	with exhaust)				
23.16	Total Exhaust Capacity (cfm):				
23.17	[2a+2b+2c]	_____	_____	_____	_____
23.18	3. Makeup Air Requirement				
23.19	a) Total Exhaust Capacity				
23.20	(from above)	_____	_____	_____	_____
23.21	b) Estimated House				
23.22	Infiltration (from above)	_____	_____	_____	_____
23.23	Makeup Air Quantity (cfm):				
23.24	[3a - 3b]	_____	_____	_____	_____
23.25	(if value is negative, no makeup air is needed)				
23.26	4. For Makeup Air Opening Sizing, refer to Table 501.4.2				
23.27	^A Use this column if there are other than fan-assisted or atmospherically vented gas or				
23.28	oil appliances or if there are no combustion appliances.				
23.29	^B Use this column if there is one fan-assisted appliance per venting system. Other than				
23.30	atmospherically vented appliances may also be included.				

24.1 ^CUse this column if there is one atmospherically vented (other than fan-assisted) gas
24.2 or oil appliance per venting system or one solid fuel appliance.

24.3 ^DUse this column if there are multiple atmospherically vented gas or oil appliances
24.4 using a common vent or if there are atmospherically vented gas or oil appliances and solid
24.5 fuel appliances.

24.6 ^EAs an alternative, the Estimated House Infiltration may be calculated by performing
24.7 a blower door test and multiplying the conversion factor by the CFM50 value.

24.8 **1346.0505 SECTION 505 DOMESTIC KITCHEN EXHAUST APPLIANCES.**

24.9 IMC section 505.2 is amended to read as follows:

24.10 **505.2 Domestic cooking exhaust.** Where domestic cooking exhaust equipment is provided,
24.11 it shall comply with the following as applicable:

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

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

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

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

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

25.1 **1346.0506 SECTION 506 COMMERCIAL KITCHEN HOOD VENTILATION**
25.2 **SYSTEM DUCTS AND EXHAUST EQUIPMENT.**

25.3 Subpart 1. **Section 506.3.** IMC section 506.3 and all subsections are deleted in their
25.4 entirety and replaced with the following:

25.5 **506.3 Ducts serving Type I hoods.** Commercial kitchen exhaust systems serving Type I
25.6 hoods shall be designed, constructed and installed in accordance with NFPA 96, Standard
25.7 for Ventilation Control and Fire Protection of Commercial Cooking Operations and ASHRAE
25.8 154 Ventilation for Commercial Cooking Operations.

25.9 Subp. 2. **Section 506.4.** IMC section 506.4 is amended and a subsection added to read
25.10 as follows:

25.11 **506.4 Ducts serving Type II hoods.** Commercial kitchen exhaust systems serving Type II
25.12 hoods shall comply with sections 506.4.1 and 506.4.2 and ASHRAE 154.

25.13 **506.4.1 Ducts.** Ducts and plenums serving Type II hoods shall be constructed of rigid
25.14 metallic materials. Duct construction, installation, bracing, and supports shall comply with
25.15 chapter 6. Ducts subject to positive pressure or conveying moisture-laden air, or both, and
25.16 ducts conveying waste-heat-laden air shall be tested pursuant to section 506.4.1.1.

25.17 **506.4.1.1 Testing.** Ducts shall be tested in accordance with ASHRAE 154 requirements for
25.18 duct leakage testing.

25.19 **506.4.2 Type II terminations.** Exhaust outlets serving Type II hoods shall terminate in
25.20 accordance with the hood manufacturer's installation instructions and shall comply with all
25.21 of the following:

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

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

- 26.1 3. Outlets shall terminate not less than ten feet (3,048 mm) above grade.
- 26.2 4. Outlets that terminate above a roof shall terminate not less than 30 inches (762 mm)
- 26.3 above the roof surface.
- 26.4 5. Outlets shall terminate not less than 30 inches (762 mm) from exterior vertical walls.
- 26.5 6. Outlets shall be protected against local weather conditions.
- 26.6 7. Outlets shall not be directed onto walkways.
- 26.7 8. Outlets shall meet the provisions for exterior wall opening protectives in accordance
- 26.8 with the International Building Code.
- 26.9 Subp. 2a. **Section 506.5.** IMC section 506.5 and all subsections are deleted in their
- 26.10 entirety. Exhaust equipment shall comply with NFPA 96 and ASHRAE 154.
- 26.11 Subp. 2b. [See repealer.]
- 26.12 Subp. 3. [See repealer.]
- 26.13 Subp. 4. [See repealer.]
- 26.14 **1346.0507 SECTION 507 COMMERCIAL KITCHEN HOODS.**
- 26.15 Subpart 1. **Section 507.1.** IMC section 507.1 and all subsections are deleted in their
- 26.16 entirety and replaced with the following:
- 26.17 **507.1 General.** Commercial kitchen exhaust hoods shall comply with the requirements of
- 26.18 this section.
- 26.19 **507.1.1 Type I hood construction and installation.** Type I hood construction and
- 26.20 installation shall comply with NFPA 96 and ASHRAE 154.
- 26.21 **507.1.2 Type II hood construction and installation.** Type II hood construction and
- 26.22 installation shall comply with this code and ASHRAE 154.

27.1 **507.1.2.1 Type II hood materials.** Type II hood materials shall be constructed of stainless
27.2 steel not less than 0.024 inch (0.61 mm) (No. 24 Gage) in thickness, copper sheets weighing
27.3 not less than 24 ounces per square foot (7.3 kg/m²), or of other approved material and gage.

27.4 Subp. 2. **Sections 507.2 to 507.6.1.** IMC sections 507.2 to 507.6.1 are deleted in their
27.5 entirety and replaced with NFPA 96 and ASHRAE 154.

27.6 Subp. 3. [Repealed, 34 SR 537]

27.7 Subp. 4. [Repealed, 39 SR 690]

27.8 Subp. 5. [Repealed, 34 SR 537]

27.9 Subp. 6. [See repealer.]

27.10 Subp. 7. [See repealer.]

27.11 Subp. 8. [See repealer.]

27.12 Subp. 9. [See repealer.]

27.13 Subp. 10. [See repealer.]

27.14 Subp. 11. [Repealed, 34 SR 537]

27.15 Subp. 12. [See repealer.]

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

27.17 **1346.0508 SECTION 508 COMMERCIAL KITCHEN MAKEUP AIR.**

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

27.19 **508.1 Makeup air.** Makeup air shall be supplied during the operation of commercial kitchen
27.20 exhaust systems that are provided for commercial kitchen appliances. The amount of makeup
27.21 air supplied to the building from all sources shall be approximately equal to the exhaust air
27.22 for all exhaust systems for the building. The makeup air shall not reduce the effectiveness

28.1 of the exhaust system. Makeup air shall be provided by ~~gravity or~~ mechanical means ~~or~~
28.2 ~~both~~ and the exhaust and makeup air systems shall be electrically interlocked to insure that
28.3 makeup air is provided whenever the exhaust system is in operation. ~~Mechanical makeup~~
28.4 ~~air systems shall be automatically controlled to start and operate simultaneously with the~~
28.5 ~~exhaust system.~~ Makeup air intake openings shall comply with IMC section 401.4.

28.6 **508.1.1 Makeup air temperature.** Makeup air shall be not less than 50°F (10°C), measured
28.7 at the flow of air from the supply diffuser into the space.

28.8 **508.1.2 Makeup and ventilation air distribution.** Makeup and ventilation air supply
28.9 diffusers located within 12 feet (3.7 m) of an exhaust hood shall be directed away from the
28.10 hood.

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

28.13 Subp. 2. **Section 508.2.** IMC section 508.2 is deleted in its entirety. Compensating
28.14 hoods shall comply with NFPA 96 and ASHRAE 154.

28.15 **1346.0602 SECTION 602 PLENUMS.**

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

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

28.20 **1346.0603 SECTION 603 DUCT CONSTRUCTION AND INSTALLATION.**

28.21 Subpart 1. [Repealed, 34 SR 537]

28.22 Subp. 2. [See repealer.]

28.23 Subp. 2a. [See repealer.]

28.24 Subp. 3. [See repealer.]

29.1 Subp. 4. [See repealer.]

29.2 Subp. 5. [See repealer.]

29.3 Subp. 6. [See repealer.]

29.4 Subp. 7. [See repealer.]

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

29.6 Subp. 9. [See repealer.]

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

29.8 **1346.0604 SECTION 604 INSULATION.**

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

29.10 **604.1 General.** Duct insulation shall conform to the requirements in Minnesota Rules,
29.11 chapter 1322 or 1323, as applicable.

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

29.13 **604.3 Coverings and linings.** Coverings and linings, including adhesives where used, shall
29.14 have a flame-spread index of not more than 25 and a smoke-developed index of not more
29.15 than 50, when tested in accordance with ASTM E84 or UL 723, using the specimen
29.16 preparation and mounting procedures of ASTM E2231. Duct coverings and linings shall
29.17 not flame, glow, smolder, or smoke when tested in accordance with ASTM C411 at the
29.18 temperature to which they are exposed in service. The test temperature shall not fall below
29.19 250°F (121°C). Coverings and linings shall be listed and labeled.

29.20 **Exception:** Spray polyurethane foam without additional ignition barrier or thermal
29.21 barrier protection shall be permitted as a duct covering where duct construction in
29.22 compliance with Table 603.4 is installed in a floor assembly over an unconditioned
29.23 space in IRC-1, IRC-2, or IRC-3 occupancies, as defined in Minnesota Rules, part

30.1 1300.0070, subpart 12b, provided the spray polyurethane foam meets all of the following
30.2 requirements:

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

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

30.6 3. Spray polyurethane foam shall have a flame-spread index of 25 or less and a
30.7 smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL
30.8 723.

30.9 **1346.1206 SECTION 1206 PIPING INSTALLATION.**

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

30.11 Subp. 2. [See repealer.]

30.12 Subp. 3. **Section 1206.12.** IMC Section 1206 is amended by adding a new subsection
30.13 to the end of the section to read as follows:

30.14 **1206.12 Draining and venting.** Hydronic pipes shall be installed so that the pipes can be
30.15 drained and so that air can be completely removed from the system during filling.

30.16 **1346.1500 CHAPTER 15, REFERENCED STANDARDS.**

30.17 Subpart 1. [Repealed, 39 SR 690]

30.18 Subp. 2. **Supplemental standards.** The standards listed in this part shall supplement
30.19 the list of referenced standards in chapter 15 of the 2018 IMC. The standards referenced in
30.20 this rule shall be considered part of the requirements of this rule to the extent prescribed in
30.21 each rule or reference.

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

- 31.1 B. ASHRAE 154-2016 *Ventilation for Commercial Cooking Operations*;
- 31.2 C. ASME BPVC-2007 (Sections I, II, IV, V, VIII & IX) *Boiler and Pressure*
- 31.3 *Vessel Code*;
- 31.4 D. ASME B31.3-2016 *Process Piping Code*;
- 31.5 E. ASTM E1998-02 2014 *Standard Guide for Assessing Depressurization-Induced*
- 31.6 *Backdrafting and Spillage from Vented Combustion Appliances*;
- 31.7 F. NFPA 96-2017 *Standard for Ventilation Control and Fire Protection of*
- 31.8 *Commercial Cooking Operations*;
- 31.9 G. NFPA 85-2015 *Boiler and Combustion Systems Hazards Code*;
- 31.10 H. NFPA 45-2015 *Standard on Fire Protection for Laboratories Using Chemicals*;
- 31.11 I. NFPA 90B-2018 *Standard for the Installation of Warm Air Heating and*
- 31.12 *Air-Conditioning Systems*;
- 31.13 J. NFPA 54-2018 *National Fuel Gas Code*;
- 31.14 K. UL 217; and
- 31.15 L. UL 2034.

31.16 **1346.5050 TITLE; INCORPORATION BY REFERENCE.**

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

31.18 Code."

31.19 Chapters 2 to 8 of the 2018 edition of the International Fuel Gas Code ("IFGC"), as

31.20 promulgated by the International Code Council, Inc., Washington, DC, are incorporated by

31.21 reference as part of the Minnesota Fuel Gas Code except as qualified by the applicable

31.22 provisions in Minnesota Rules, chapter 1300, and as amended in this code. Portions of this

32.1 code reproduce excerpts from the 2018 IFGC, International Code Council, Inc., Washington,
32.2 DC, copyright 2017, reproduced with permission, all rights reserved.

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

32.5 **1346.5202 SECTION 202 (IFGC) GENERAL DEFINITIONS.**

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

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

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

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

32.17 **GAS PIPING SYSTEM - MEDIUM PRESSURE.** A system that operates at a pressure
32.18 exceeding 14 inches of water column but not exceeding 5 psig. LPG is a pressure exceeding
32.19 14 inches of water column but not exceeding 20 psig.

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

32.22 Subp. 2. [See repealer.]

33.1 **1346.5303 SECTION 303, (IFGC) APPLIANCE LOCATION.**

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

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

33.5 **303.3.1 Fireplaces and decorative appliances in Group I-1, Condition 2 and Group**
33.6 **I-2, Condition 2 occupancies.** Direct-vent gas fireplaces shall be permitted inside smoke
33.7 compartments containing dwelling units, sleeping rooms, and patient sleeping areas where
33.8 all of the following conditions are met:

33.9 1. The direct-vent gas fireplaces are not located within a sleeping room.

33.10 2. The direct-vent fireplaces have a sealed glass front with a wire mesh panel or screen.

33.11 3. The controls for the direct-vent gas fireplace are located where they can be accessed
33.12 only by facility staff.

33.13 4. Electrically supervised carbon monoxide detection is provided in the room where
33.14 the direct-vent gas fireplace is located.

33.15 5. The direct-vent fireplace includes a guard in front of the glass where the glass
33.16 temperature is equal to or exceeds 125°F (52°C).

33.17 **1346.5304 SECTION 304 (IFGC) COMBUSTION, VENTILATION AND DILUTION**
33.18 **AIR.**

33.19 Subpart 1. **Section 304.1.** IFGC section 304.1 is amended to read as follows:

33.20 **304.1 General.** Air for combustion, ventilation, and dilution of flue gases for appliances
33.21 installed in buildings shall be provided by application of one of the methods prescribed in
33.22 sections 304.5 to 304.9. Where the requirements of section 304.5 are not met, outdoor air
33.23 shall be introduced in accordance with one of the methods prescribed in sections 304.6 to
33.24 304.9. Direct-vent appliances, gas appliances of other than natural draft design, vented gas

34.1 appliances not designated as Category I and appliances equipped with power burners shall
34.2 be provided with combustion, ventilation and dilution air in accordance with the appliance
34.3 manufacturer's instructions.

34.4 **Exceptions:**

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

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

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

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

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

34.25 Table 304.1

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

35.3	Total input of appliances ¹ , 35.4 thousands of Btu/hr (kW)	Required free area of 35.5 air-supply opening or duct, square inches (sq mm)	Acceptable approximate round duct equivalent diameter ² , inch (mm)
35.6	25 (8)	7 (4,500)	3 (75)
35.7	50 (15)	7 (4,500)	3 (75)
35.8	75 (23)	11 (7,000)	4 (100)
35.9	100 (30)	14 (9,000)	4 (100)
35.10	125 (37)	18 (12,000)	5 (125)
35.11	150 (45)	22 (14,000)	5 (125)
35.12	175 (53)	25 (16,000)	6 (150)
35.13	200 (60)	29 (19,000)	6 (150)
35.14	225 (68)	32 (21,000)	6 (150)
35.15	250 (75)	36 (23,000)	7 (175)
35.16	275 (83)	40 (26,000)	7 (175)
35.17	300 (90)	43 (28,000)	7 (175)
35.18	325 (98)	47 (30,000)	8 (200)
35.19	350 (105)	50 (32,000)	8 (200)
35.20	375 (113)	54 (35,000)	8 (200)
35.21	400 (120)	58 (37,000)	9 (225)

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

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

35.24 *Flexible duct shall be stretched with minimal sags.

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

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

36.1 **304.6.2 One permanent opening method.** When any natural draft appliances are installed,
36.2 one permanent opening, commencing within 12 inches (300 mm) of the bottom of the
36.3 enclosure, shall be provided. When other than natural draft appliances are installed, one
36.4 permanent opening, commencing within 12 inches (300) of the top of the enclosure, shall
36.5 be provided. The appliances shall have clearances of at least 1 inch (25 mm) from the sides
36.6 and back and 6 inches (160 mm) from the front of the appliance. The opening shall directly
36.7 communicate with the outdoors or shall communicate through a vertical or horizontal duct
36.8 to the outdoors or spaces that freely communicate with the outdoors.

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

36.10 **1346.5306 SECTION 306 (IFGC) ACCESS AND SERVICE SPACE.**

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

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

36.13 **306.6 Guards.** Guards shall be provided where various components that require service
36.14 and roof hatch openings are located within 10 feet (3,048 mm) of a roof edge or open side
36.15 of a walking surface and such edge or open side is located more than 30 inches (762 mm)
36.16 above the floor, roof, or grade below. The guard shall extend not less than 30 inches (762
36.17 mm) beyond each end of components that requires service. The top of the guard shall be
36.18 located not less than 42 inches (1,067 mm) above the elevated surface adjacent to the guard.
36.19 The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm)
36.20 sphere and shall comply with the loading requirements for guards specified in the
36.21 *International Building Code.*

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

36.24 **1346.5307 CONDENSATE DISPOSAL.**

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

37.1 **1346.5311 SECTION 311 CARBON MONOXIDE ALARMS.**

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

37.3 **311.1 General.** Carbon monoxide alarms shall be installed in new and existing rooms
37.4 containing a fuel-burning appliance that is utilized to control environmental conditions and
37.5 produces carbon monoxide during operation.

37.6 **Exceptions:**

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

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

37.12 **311.2 Carbon monoxide alarms.** Carbon monoxide alarms shall comply with sections
37.13 311.2.1 to 311.2.1.4.

37.14 **311.2.1 Power source.** Carbon monoxide alarms shall receive their primary power from
37.15 the building wiring where such wiring is served from a commercial source, and when primary
37.16 power is interrupted, receive power from a battery. Wiring shall be permanent and without
37.17 a disconnecting switch other than that required for overcurrent protection.

37.18 **Exceptions:**

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

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

37.23 **311.2.1.2 Listings.** Carbon monoxide alarms shall be listed in accordance with UL 2034.

38.1 **311.2.1.3 Combination alarms.** Combination carbon monoxide and smoke alarms shall
38.2 be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide
38.3 and smoke alarms shall be listed in accordance with UL 2034 and UL 217.

38.4 **311.2.1.4 Carbon monoxide detections systems.** Carbon monoxide detection systems shall
38.5 be an acceptable alternative to carbon monoxide alarms listed in sections 311.2.1.2 and
38.6 311.2.1.3, provided they comply with NFPA 720 and are listed in accordance with UL 2075.

38.7 **1346.5403 SECTION 403 (IFGC) PIPING MATERIALS.**

38.8 Subpart 1. **Section 403.4.2.** IFGC section 403.4.2 is amended to read as follows:

38.9 **403.4.2 Steel.** Steel and wrought-iron pipe shall not be lighter than Schedule 40 and shall
38.10 comply with one of the following standards:

38.11 1. ASME B36.10, 10M;

38.12 2. ASTM A53/A53M; or

38.13 3. ASTM A106.

38.14 Subp. 1a. **Section 403.8.** IFGC section 403.8 is amended to read as follows:

38.15 **403.8 Protective coating.** Where in contact with material, or passing through concrete or
38.16 other abrasive material or atmosphere exerting a corrosive action, metallic piping and fittings
38.17 coated with a corrosion-resistant material, sleeve, or casing shall be used. Steel pipe exposed
38.18 in exterior locations shall be galvanized or coated with approved corrosion-resistant material.
38.19 External or internal coatings or linings used on piping or components shall not be considered
38.20 as adding strength.

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

38.22 **403.10.1 Pipe joints.** Pipe joints shall be threaded, flanged, brazed, welded, or made with
38.23 press-connect fittings complying with ANSI LC-4. Where nonferrous pipe is brazed, the

39.1 brazing materials shall have a melting point in excess of 1,000°F (538°C). Brazing alloys
39.2 shall not contain more than 0.05 percent phosphorus.

39.3 Subp. 2. [See repealer.]

39.4 **1346.5409 SECTION 409 (IFGC) SHUTOFF VALVES.**

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

39.7 **409.1.4 Main shutoff valve.** Piping systems shall be provided with an approved main
39.8 shutoff valve before the first branch line. The main shutoff valve shall be installed in the
39.9 first available location inside the building 5 feet or less above the floor that provides ready
39.10 access and shall have a permanently attached handle.

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

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

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

39.18 **1346.5501 SECTION 501 (IFGC) GENERAL.**

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

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

39.21 **501.12 Residential and low-heat appliances flue lining systems.** An approved metallic
39.22 liner shall be installed in masonry chimneys used to vent gas appliances. The liner shall
39.23 comply with one of the following:

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

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

40.6 3. Listed vent systems.

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

40.9 **1346.5503 SECTION 503 (IFGC) VENTING OF APPLIANCES.**

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

40.11 Subp. 6. **Section 503.6.10.1.** IFGC section 503.6.10.1 is amended to read as follows:

40.12 **503.6.10.1 Category I appliances.** The sizing of natural draft venting systems serving one
40.13 or more listed appliances equipped with a draft hood or appliances listed for use with Type
40.14 B gas vent, installed in a single story of a building, shall be in accordance with one of the
40.15 following methods:

40.16 1. The provisions of Section 504.

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

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

40.24 4. Approved engineering practices.

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

41.2 **1346.5800 CHAPTER 8 REFERENCED STANDARDS.**

41.3 Subpart 1. [Repealed, 39 SR 690]

41.4 Subp. 2. **Supplemental standards.** The standards listed in this part shall supplement
41.5 the list of referenced standards in chapter 8 of the 2012 IFGC. The standards referenced in
41.6 this rule shall be considered part of the requirements of this rule to the extent prescribed in
41.7 each rule or reference.

41.8 A. NFPA 54-2018 *National Fuel Gas Code.*

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

41.11 **REPEALER.** Minnesota Rules, parts 1346.0506, subparts 2b, 3, and 4; 1346.0507, subparts
41.12 6, 7, 8, 9, 10, and 12; 1346.0601; 1346.0603, subparts 2, 2a, 3, 4, 5, 6, 7, and 9; 1346.1003;
41.13 1346.1206, subpart 2; 1346.5202, subpart 2; 1346.5403, subpart 2; 1346.5404, subpart 2;
41.14 1346.5407; 1346.5408; and 1346.5504, subpart 1, are repealed.

41.15 **EFFECTIVE DATE.** Minnesota Rules, parts 1346.0050 to 1346.5800, are effective March
41.16 31, 2020, or five working days after publication of the amendments' notice of adoption in
41.17 the State Register, whichever is later.