Department of Labor and Industry

Adopted Permanent Rules Adopting Changes to the Mechanical and Fuel Code

1346.0050 TITLE; INCORPORATION BY REFERENCE.

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

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

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

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

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

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

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

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

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

1346.0202 SECTION 202 GENERAL DEFINITIONS.

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

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

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

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

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

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

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

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

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

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

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

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

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

[For text of subpart 2, see Minnesota Rules]

1346.0303 SECTION 303 EQUIPMENT AND APPLIANCE LOCATION.

IMC section 303.8 is deleted in its entirety.

1346.0306 SECTION 306 ACCESS AND SERVICE SPACE.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1346.0307 SECTION 307 CONDENSATE DISPOSAL.

IMC section 307.3 is deleted in its entirety.

1346.0313 SECTION 313 CARBON MONOXIDE ALARMS.

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

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

Exceptions:

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

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

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

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

Exceptions:

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

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

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

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

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

1346.0401 SECTION 401 GENERAL.

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

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

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

401.2.1 Ventilation in IRC buildings.

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

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

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

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

Air intake openings shall comply with all of the following:

[For text of item A, see Minnesota Rules]

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

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

[For text of item C, see Minnesota Rules]

1346.0403 MECHANICAL VENTILATION.

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

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

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

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

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

1346.0404 SECTION 404 GARAGES.

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

404.1 Enclosed parking garages. Mechanical ventilation systems for enclosed parking garages shall operate automatically upon detection of certain gas concentrations. Enclosed parking garages shall be equipped with a carbon monoxide (CO) detector and a nitrogen dioxide (NO_2) detector. The mechanical ventilation system shall activate upon detection of a CO level of 25 parts per million (ppm) or greater, a NO_2 level of 3 ppm or greater, or both. Such detectors shall be listed in accordance with UL 2075 and installed in accordance with their listing and manufacturers' instructions.

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

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

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

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

[For text of subpart 4, see Minnesota Rules]

1346.0501 SECTION 501 GENERAL.

[For text of subpart 1, see Minnesota Rules]

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

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

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

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

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

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

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

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

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

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

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

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

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

3.1 Passive makeup air openings shall comply with item 1.

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

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

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

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

1. In the space containing the vented combustion appliances.

2. In the space containing the exhaust system.

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

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

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

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

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

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

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

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

1.2 An exhaust system is installed or replaced.

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

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

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

2.2 An exhaust system is installed or replaced.

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

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

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

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

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

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

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

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

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

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

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

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

Table 501.4.1

Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Dwellings

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

2. Exhaust Capacity				
a) clothes dryer	135	135	135	135
b) 80% of largest exhaust rating (cfm):	_____	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust)				
c) 80% of next largest exhaust rating (cfm):	not applicable	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust)				
Total Exhaust Capacity (cfm): [2a+2b+2c]	_____	_____	_____	_____
3. Makeup Air Requirement				
a) Total Exhaust Capacity (from above)	_____	_____	_____	_____
b) Estimated House Infiltration (from above)	_____	_____	_____	_____
Makeup Air Quantity (cfm): [3a - 3b]	_____	_____	_____	_____
(if value is negative, no makeup air is needed)				
4. For Makeup Air Opening Sizing, refer to Table 501.4.2				

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

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

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

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

Table 501.4.2

Makeup Air Opening Sizing Table for New and Existing Dwellings

Type of opening or system	One or multiple power vent or direct vent appliances or no combustion appliances[A] (cfm)	One or multiple fan-assisted appliances and power vent or direct vent appliances[B] (cfm)	One atmospher-ically vented gas or oil appliance or one solid fuel appliance[C] (cfm)	Multiple appliances that are atmospher-ically vented gas or oil appliances or solid fuel appliances[D] (cfm)	Passive makeup air opening duct diame-ter[E,F,G] (inches)
Passive Opening	1-36	1-22	1-15	1-9	3
Passive Opening	37-66	23-41	16-28	10-17	4
Passive Opening	67-109	42-66	29-46	18-28	5
Passive Opening	110-163	67-100	47-69	29-42	6
Passive Opening	164-232	101-143	70-99	43-61	7
Passive Opening	233-317	144-195	100-135	62-83	8
Passive Opening with Motorized Damper	318-419	196-258	136-179	84-110	9
Passive Opening with Motorized Damper	420-539	259-332	180-230	111-142	10

Passive Opening with Motorized Damper	540-679	333-419	231-290	143-179	11
Powered Makeup Air[H]	>679	>419	>290	>179	Not Applicable

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

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

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

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

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

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

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

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

Table 501.4.3(1)

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

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

	One or multiple power vent or direct vent appliances or no combustion appliances[A]	One or multiple fan-assisted appliances and power vent or direct vent appliances[B]	One atmospherically vented gas or oil appliance or one solid fuel appliance[C]	Multiple appliances that are atmospherically vented gas or oil appliances or solid fuel appliances[D]
1. Use the Appropriate Column to Estimate House Infiltration				
a) pressure factor (cfm/sf)	0.15	0.09	0.06	0.03
b) conditioned floor area (sf)	_____	_____	_____	_____
Estimated House Infiltration (cfm): [1a x 1b]	_____	_____	_____	_____
2. Exhaust Capacity				
80% of exhaust rating = Exhaust Capacity (cfm):	_____	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked and matched to exhaust)				
3. Makeup Air Requirement				
a) Exhaust Capacity (from above)	_____	_____	_____	_____
b) Estimated House Infiltration (from above)	_____	_____	_____	_____
Makeup Air Quantity (cfm): [3a - 3b]	_____	_____	_____	_____
(if value is negative, no makeup air is needed)				
4. For Makeup Air Opening Sizing, refer to Table 501.4.2				

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

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

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

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

Table 501.4.3(2)

Procedure to Determine Makeup Air Quantity for Exhaust Appliances in Existing 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]	_____	_____	_____	_____

or Alternative Calculation (by using blower door test)[E]				
c) conversion factor	0.75	0.45	0.30	0.15
d) CFM50 value (from blower door test)	_____	_____	_____	_____
Estimated House Infiltration (cfm): [1c x 1d]	_____	_____	_____	_____

2. Exhaust Capacity

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

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

3. Makeup Air Requirement

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

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

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

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

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

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

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

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

Table 501.4.3(3)

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

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

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

c) conversion factor	0.75	0.45	0.30	0.15
d) CFM50 value (from blower door test)	_____	_____	_____	_____
Estimated House Infiltration (cfm): [1c x 1d]	_____	_____	_____	_____
2. Exhaust Capacity				
a) clothes dryer (cfm)	135	135	135	135
b) 80% of largest exhaust rating (cfm):	_____	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked and with exhaust)				
c) 80% of next largest exhaust rating (cfm)	Not applicable	_____	_____	_____
(not applicable if recirculating system or if powered makeup air is electrically interlocked with exhaust)				
Total Exhaust Capacity (cfm): [2a+2b+2c]	_____	_____	_____	_____
3. Makeup Air Requirement				
a) Total Exhaust Capacity (from above)	_____	_____	_____	_____
b) Estimated House Infiltration (from above)	_____	_____	_____	_____
Makeup Air Quantity (cfm): [3a - 3b]	_____	_____	_____	_____
(if value is negative, no makeup air is needed)				

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

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

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

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

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

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

1346.0505 SECTION 505 DOMESTIC KITCHEN EXHAUST APPLIANCES.

IMC section 505.2 is amended to read as follows:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6. Outlets shall be protected against local weather conditions.

7. Outlets shall not be directed onto walkways.

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

Subp. 2a. **Section 506.5.** IMC section 506.5 and all subsections are deleted in their entirety. Exhaust equipment shall comply with NFPA 96 and ASHRAE 154.

Subp. 2b. [See repealer.]

Subp. 3. [See repealer.]

Subp. 4. [See repealer.]

1346.0507 SECTION 507 COMMERCIAL KITCHEN HOODS.

Subpart 1. **Section 507.1.** IMC section 507.1 and all subsections are deleted in their entirety and replaced with the following:

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

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

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

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

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

Subp. 3. [Repealed, 34 SR 537]

Subp. 4. [Repealed, 39 SR 690]

Subp. 5. [Repealed, 34 SR 537]

Subp. 6. [See repealer.]

Subp. 7. [See repealer.]

Subp. 8. [See repealer.]

Subp. 9. [See repealer.]

Subp. 10. [See repealer.]

Subp. 11. [Repealed, 34 SR 537]

Subp. 12. [See repealer.]

Subp. 13. [Repealed, 34 SR 537]

1346.0508 SECTION 508 COMMERCIAL KITCHEN MAKEUP AIR.

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

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

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

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

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

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

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

1346.0602 SECTION 602 PLENUMS.

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

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

1346.0603 SECTION 603 DUCT CONSTRUCTION AND INSTALLATION.

Subpart 1. [Repealed, 34 SR 537]

Subp. 2. [See repealer.]

Subp. 2a. [See repealer.]

Subp. 3. [See repealer.]

Subp. 4. [See repealer.]

Subp. 5. [See repealer.]

Subp. 6. [See repealer.]

Subp. 7. [See repealer.]

[For text of subpart 8, see Minnesota Rules]

Subp. 9. [See repealer.]

[For text of subpart 10, see Minnesota Rules]

1346.0604 SECTION 604 INSULATION.

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

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

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

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

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

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

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

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

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

1346.1206 SECTION 1206 PIPING INSTALLATION.

[For text of subpart 1, see Minnesota Rules]

Subp. 2. [See repealer.]

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

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

1346.1500 CHAPTER 15, REFERENCED STANDARDS.

Subpart 1. [Repealed, 39 SR 690]

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

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

B. ASHRAE 154-2016 *Ventilation for Commercial Cooking Operations*;

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

D. ASME B31.3-2016 *Process Piping Code*;

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

F. NFPA 96-2017 *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*;

G. NFPA 85-2015 *Boiler and Combustion Systems Hazards Code*;

H. NFPA 45-2015 *Standard on Fire Protection for Laboratories Using Chemicals*;

I. NFPA 90B-2018 *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*;

J. NFPA 54-2018 *National Fuel Gas Code*;

K. UL 217; and

L. UL 2034.

1346.5050 TITLE; INCORPORATION BY REFERENCE.

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

Chapters 2 to 8 of the 2018 edition of the International Fuel Gas Code ("IFGC"), as promulgated by the International Code Council, Inc., Washington, DC, are incorporated by reference as part of the Minnesota Fuel Gas Code except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended in this code. Portions of this

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

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

1346.5202 SECTION 202 (IFGC) GENERAL DEFINITIONS.

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

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

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

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

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

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

Subp. 2. [See repealer.]

1346.5303 SECTION 303, (IFGC) APPLIANCE LOCATION.

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

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

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

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

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

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

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

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

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

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

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

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

Exceptions:

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

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

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

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

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

Table 304.1

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

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

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

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

*Flexible duct shall be stretched with minimal sags.

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

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

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

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

1346.5306 SECTION 306 (IFGC) ACCESS AND SERVICE SPACE.

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

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

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

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

1346.5307 CONDENSATE DISPOSAL.

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

1346.5311 SECTION 311 CARBON MONOXIDE ALARMS.

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

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

Exceptions:

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

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

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

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

Exceptions:

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

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

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

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

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

1346.5403 SECTION 403 (IFGC) PIPING MATERIALS.

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

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

1. ASME B36.10, 10M;

2. ASTM A53/A53M; or

3. ASTM A106.

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

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

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

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

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

Subp. 2. [See repealer.]

1346.5409 SECTION 409 (IFGC) SHUTOFF VALVES.

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

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

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

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

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

1346.5501 SECTION 501 (IFGC) GENERAL.

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

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

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

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

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

3. Listed vent systems.

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

1346.5503 SECTION 503 (IFGC) VENTING OF APPLIANCES.

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

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

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

1. The provisions of Section 504.

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

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

4. Approved engineering practices.

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

1346.5800 CHAPTER 8 REFERENCED STANDARDS.

Subpart 1. [Repealed, 39 SR 690]

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

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

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

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

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