2015 MINNESOTA MECHANICAL CODE

(Errata, June 2015)

CHAPTER 2
DEFINITIONS

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

CHAPTER 5
EXHAUST SYSTEMS

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

CHAPTER 6
DUCT SYSTEMS

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

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

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

CHAPTER 8
CHIMNEYS AND VENTS

801.10 Connection to fireplace. ~~Connection of *appliances* to chimney flues serving fireplaces shall be in accordance with Sections 801.10.1 through 801.10.3.~~ Connection of *appliances* to *chimney* flues serving fireplaces is prohibited. Refer to IFGC Section 602 for *Decorative Appliances for Installation in Fireplaces* and IFGC Section 603 for *Log Lighters*.

~~801.10.1 Closure and access.~~ ~~A noncombustible seal shall be provided below the point of connection to prevent entry of room air into the flue. Means shall be provided for access to the flue for inspection and cleaning.~~

~~801.10.2 Connection to factory-built fireplace flue.~~ ~~An *appliance* shall not be connected to a flue serving a factory-built fireplace unless the *appliance* is specifically *listed* for such installation. The connection shall be made in accordance with *appliance* manufacturer's installation instructions.~~

~~801.10.3 Connection to masonry fireplace flue.~~ ~~A connector shall extend from the *appliance* to the flue serving a masonry fireplace such that the flue gases are exhausted directly into the flue. The connector shall be provided with access or shall be removable for inspection and cleaning of both the connector and the flue. *Listed* direct connection devices shall be installed in accordance with their listing.~~

CHAPTER 9
SPECIFIC APPLIANCES, FIREPLACES AND SOLID FUEL-BURNING EQUIIPMENT

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

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

CHAPTER 10
BOILERS, WATER HEATERS AND PRESSURE VESSELS

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

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

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

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

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

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

1. Boilers in buildings occupied solely for residential purposes with accommodations for not more than five families.
2. Boilers under the direct jurisdiction of the United States.
3. Boilers located on farms used solely for agricultural or horticultural purposes; for the purposes of this subpart, boilers used for mint oil extraction are considered used for agricultural or horticultural purposes, provided that the owner or lessee complies with the inspection requirements contained in Minnesota Statutes, Section 326B.958.

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

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

1. Pressure vessels in buildings occupied solely for residential purposes with accommodations for not more than five families.
2. Pressure vessels under the direct jurisdiction of the United States.
3. Pressure vessels located on farms used solely for agricultural or horticultural purposes; for the purposes of this section, boilers used for mint oil extraction are considered used for agricultural or horticultural purposes, provided that the owner or lessee complies with the inspection requirements contained in Minnesota Statutes, Section 326B.958.

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

CHAPTER 12
HYDRONIC PIPING

1205.1.6 Expansion tanks. Shutoff valves shall be installed at connections to nondiaphragm-type expansion tanks. The pipe between the boilers or mains and the expansion tank shall be a minimum of $^1/_2$" nominal size. The valve between boilers or mains and an expansion tank shall have permanently attached thereto a metal tag that contains the following language stamped or etched thereon: "This valve must be open at all times, except when draining expansion tank."

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

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

Exception: Engineered design installations.

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

2015 MINNESOTA FUEL GAS CODE

(Errata, June 2015)

1346.5060
REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL (ICC) CODES

Subpart 1. General. References to other codes and standards promulgated by the International Code Council in the IMC and IFGC are modified in subparts 2 to ~~11~~ 10.

CHAPTER 2
DEFINITIONS

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

CHAPTER 4
GAS PIPING INSTALLATIONS

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

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

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

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

CHAPTER 5
CHIMNEYS AND VENTS

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

~~**501.7.1 Closure and access.** A noncombustible seal shall be provided below the point of connection to prevent entry of room air into the flue. Means shall be provided for *access* to the flue for inspection and cleaning.~~

~~**501.7.2 Connection to factory-built fireplace flue.** An *appliance* shall not be connected to a flue serving a factory-built fireplace unless the *appliance* is specifically *listed* for such installation. The connection shall be made in accordance with the *appliance* manufacturer's installation instructions.~~

~~**501.7.3 Connection to masonry fireplace flue.** A connector shall extend from the *appliance* to the flue serving a masonry *fireplace* such that the flue gases are exhausted directly into the flue. The connector shall be accessible or removable for inspection and cleaning of both the connector and the flue. *Listed* direct connection devices shall be installed in accordance with their listing.~~

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

1. Ranges.
2. Built-in domestic cooking units *listed* and marked for optional venting.
3. Hot plates and laundry stoves.
4. Type 1 clothes dryers (Type 1 clothes dryers shall be exhausted in accordance with the requirements of IFGC Sections 613 and 614).
5. A single booster-type automatic instantaneous water heater, where designed and used solely for the sanitizing rinse requirements of a dishwashing machine, provided that the heater is installed in a commercial kitchen having a mechanical exhaust system. Where installed in this manner, the draft hood, if required, shall be in place and unaltered and the draft hood outlet shall be not less than 36 inches (914 mm) vertically and 6 inches (152 mm) horizontally from any surface other than the heater.
6. Refrigerators.
7. Counter *appliances*.
8. Direct-fired *make-up air* heaters.
9. Specialized *equipment* of limited input such as laboratory burners and gas lights.

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

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

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

Exceptions:

1. As an alternate method of sizing an individual chimney venting system for a single *appliance* with a draft hood, the effective areas of the vent connector and chimney flue shall be not less than the area of the *appliance* flue collar or draft hood outlet, nor greater than four times the draft hood outlet area.
2. As an alternate method for sizing a chimney venting system connected to two *appliances* with draft hoods, the effective area of the chimney flue shall be not less than the area of the larger draft hood outlet plus 50 percent of the area of the smaller draft hood outlet, nor greater than four times the smallest draft hood outlet area.

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

CHAPTER 6
SPECIFIC APPLIANCES

602.3 Prohibited installations. Decorative appliances for installation in fireplaces shall not be installed where prohibited by IFGC Section 303.3. Unvented decorative appliances shall not be installed in any dwelling or occupancy.

SECTION 621 (IFGC)
UNVENTED ROOM HEATERS

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

~~**621.1 General.** Unvented room heaters shall be tested in accordance with ANSI Z21.11.2 and shall be installed in accordance with the conditions of the listing and the manufacturer's installation instructions. Unvented room heaters utilizing fuel other than fuel gas shall be regulated by the *International Mechanical Code*.~~

~~**621.2 Prohibited use.** One or more unvented room heaters shall not be used as the sole source of comfort heating in a *dwelling unit*.~~

~~**621.3 Input rating.** Unvented room heaters shall not have an input rating in excess of 40,000 Btu/h (11.7 kW).~~

~~**621.4 Prohibited locations.** Unvented room heaters shall not be installed within occupancies in Groups A, E and I. The location of unvented room heaters shall also comply with Section 303.3.~~

~~**621.5 Room or space volume.** The aggregate input rating of all unvented appliances installed in a room or space shall not exceed 20 Btu/h per cubic foot (207 W/m^3) of volume of such room or space. Where the room or space in which the appliances are installed is directly connected to another room or space by a doorway, archway or other opening of comparable size that cannot be closed, the volume of such adjacent room or space shall be permitted to be included in the calculations.~~

~~**621.6 Oxygen-depletion safety system.** Unvented room heaters shall be equipped with an oxygen depletion sensitive safety shutoff system. The system shall shut off the gas supply to the main and pilot burners when the oxygen in the surrounding atmosphere is depleted to the percent concentration specified by the manufacturer, but not lower than 18 percent. The system shall not incorporate field adjustment means capable of changing the set point at which the system acts to shut off the gas supply to the room heater.~~

~~**621.7 Unvented decorative room heaters.** An unvented decorative room heater shall not be installed in a factory built *fireplace* unless the *fireplace* system has been specifically tested, *listed* and *labeled* for such use in accordance with UL 127.~~

~~**621.7.1 Ventless firebox enclosures.** Ventless firebox enclosures used with unvented decorative room heaters shall be *listed* as complying with ANSI Z21.9.1.~~

TABLE 402.4(2)A
SCHEDULE 40 METALLIC PIPE

Gas	Natural
Inlet Pressure	7 in. w.c.
Pressure Drop	1 in. w.c.
Specific Gravity Natural Gas	0.60

PIPE SIZING FOR NATURAL GAS							
Nominal	**1/4**	**3/8**	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**
Actual ID	**0.364**	**0.493**	**0.622**	**0.824**	**1.049**	**1.380**	**1.610**
Length (ft)	**Maximum Capacity in Cubic Feet of Gas Per Hour**						
10	61	135	248	518	976	2,004	3,003
20	42	93	170	356	671	1,378	2,064
30	34	74	137	286	539	1,106	1,657
40	29	64	117	245	461	947	1,419
50	25	56	104	217	409	839	1,257
60	23	51	94	197	370	760	1,139
80	20	44	80	168	317	651	975
100	17	39	71	149	281	577	864
125	16	34	63	132	249	511	766
150	14	31	57	120	226	463	694
175	13	29	53	110	208	426	638
200	12	27	49	102	193	396	594
250	11	24	43	91	171	351	626
300	10	21	39	82	155	318	477
350	9	20	36	76	143	293	439
400	8	18	34	70	133	272	408
450	8	17	32	66	124	256	383
500	7	16	30	62	118	241	362
Nominal	**2**	**2 1/2**	**3**	**4**	**5**	**6**	**8**
Actual ID	**2.067**	**2.469**	**3.068**	**4.026**	**5.047**	**6.065**	**7.891**
Length (ft)	**Maximum Capacity in Cubic Feet of Gas Per Hour**						
10	5,784	9,218	16,296	33,239	60,134	97,370	194,195
20	3,975	6,336	11,200	22,845	41,330	66,922	133,469
30	3,192	5,088	8,994	18,345	33,189	53,741	107,181
40	2,732	4,354	7,698	115,701	28,406	45,995	91,733
50	2,421	3,859	6,822	13,916	25,175	40,765	81,301
60	2,194	3,497	6,182	12,609	22,811	36,936	73,665
80	1,878	2,993	5,291	10,791	19,523	31,612	63,047
100	1,664	2,652	4,689	9,564	17,303	28,017	55,878
125	1,475	2,351	4,156	8,477	15,335	24,831	49,523
150	1,336	2,130	3,765	7,680	13,895	22,499	44,872
175	1,229	1,960	3,464	7,066	12,783	20,699	41,281
200	1,144	1,823	3,223	6,573	11,892	19,256	38,404
250	1,014	1,616	2,856	5,826	10,540	17,066	34,037
300	918	1,464	2,588	5,279	9,550	15,463	30,840
350	845	1,347	2,381	4,856	8,786	14,226	28,373
400	786	1,253	2,215	4,518	8,173	13,235	26,395
450	738	1,176	2,078	4,239	7,669	12,418	24,766
500	697	1,110	1,963	4,004	7,244	11,730	23,394

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1-inch water column = 0.2488 kPa, 1 British thermal unit per hour = 0.2931 W, 1 cubic foot per hour = 0.0283 m^3/h, 1 degree = 0.01745 rad.

Note: All table entries have been rounded to three significant digits.

APPENDIX E (IFGC)

WORKSHEET E-1

Residential Combustion Air Calculation Method
(for Furnace, Boiler, and/or Water Heater in the Same Space)

Step 1: Complete vented combustion appliance information.

Furnace/Boiler:

_____ Draft Hood (Not fan assisted) _____ Fan Assisted & Power Vent _____ Direct Vent Input: _____ Btu/hr

Water Heater:

_____ Draft Hood (Not fan assisted) _____ Fan Assisted & Power Vent _____ Direct Vent Input: _____ Btu/hr

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

The CAS includes all spaces connected to one another by code compliant openings. CAS volume: _____ ft^3

Step 3: Determine Air Changes per Hour (ACH)[1]

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

Step 4: Determine Required Volume for Combustion Air.

4a. Standard Method.

Total Btu/hr input of all combustion appliances (DO NOT COUNT DIRECT VENT APPLIANCES) Input: _____ Btu/hr

Use Standard Method column in Table E-1 to find Total Required Volume (TRV) TRV: _____ ft^3

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

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

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

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

Use Fan-Assisted Appliances column in Table E-1 to find Required Volume Fan Assisted (RVFA) RVFA: _____ ft^3

Total Btu/hr of all Non-Fan-Assisted Appliances Input: _____ Btu/hr

Use Non-Fan-Assisted Appliances column in Table E-1 to find Required Volume Non-Fan-Assisted (RVNFA) RVNFA: _____ ft^3

Total Required Volume (TRV) = RVFA + RVNFA RV = _____ + _____ = _____ ft^3

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

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

(continued)

WORKSHEET E-1—(continued)

Residential Combustion Air Calculation Method
(for Furnace, Boiler, and/or Water Heater in the Same Space)

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

Ratio = CAS Volume (from Step 2) ***divided by*** TRV (from Step 4a or Step 4b)

Ratio = _____ / _____ = _____

Step 6: Calculate Reduction Factor (RF).

RF = 1 ***minus*** Ratio

RF = 1 – _____ = _____

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

Total Btu/hr input of all Combustion Appliances in the same CAS (EXCEPT DIRECT VENT)

Input: _____ Btu/hr

Combustion Air Opening Area (CAOA):

Total Btu/hr ***divided by*** 3000 Btu/hr per in^2

CAOA = _____ / 3000 Btu/hr per in^2 = _____ in^2

Step 8: Calculate Minimum CAOA.

Minimum CAOA = CAOA ***multiplied by*** RF

Minimum CAOA = _____ × _____ = _____ in^2

Step 9: Calculate Combustion Air Opening Diameter (CAOD).

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

CAOD = 1.13 Minimum CAOA = _____ in

[1]If desired, ACH can be determined using ASHRAE calculation or blower door test. Follow procedures in Section G304.