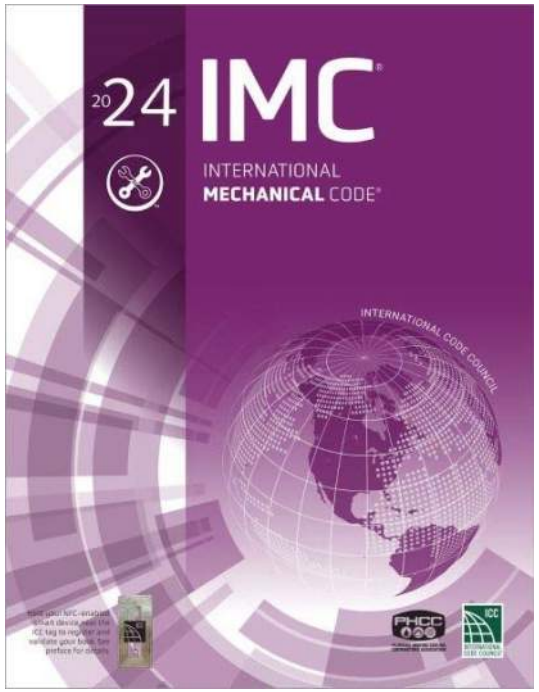
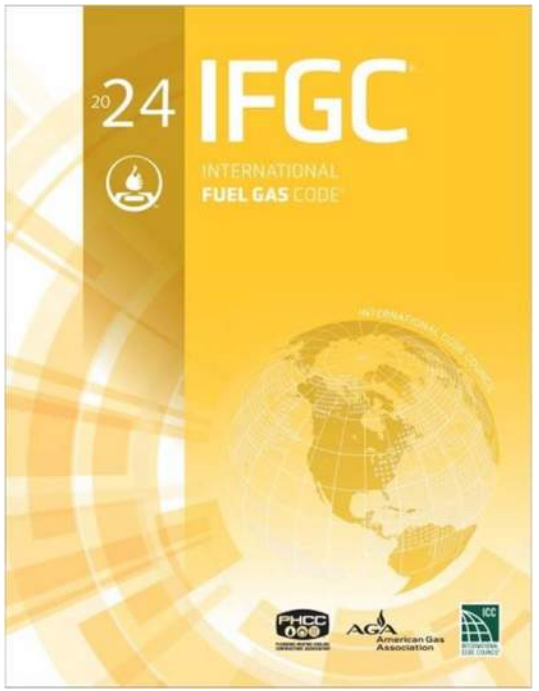
2024 IMC & 2024 IFGC Overview/Significant changes





SHUMS CODA ASSOCIATES

ICC INTERNATIONAL CODE COUNCIL PREFERRED PROVIDER

2024 IMC & 2024 IFGC Overview/Significant changes

SHUMS CODA ASSOCIATES

INTERNATIONAL CODE COUNCIL PREFERRED PROVIDER

1

Instructor
Gil Rossmiller

- Over 40 years in the construction industry
- IRC Plumbing & Mechanical Code Development Committee 2009-2012
- Commercial Energy Code Development Committee 2015-2018
- Residential Energy Code Development Committee 2021-2024
- 2003 – 2016

Building Official Parker, Colorado

 2

2

Today's Discussion

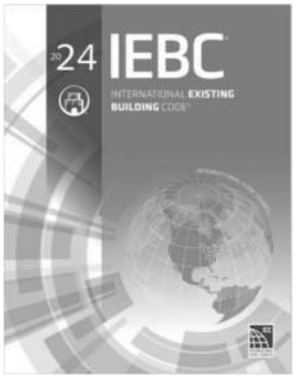
- Significant Changes in the IMC
- Excludes minor editorial changes
- Overview of significant changes
- Overview of the more common used sections

 3

3

102.2.1 Existing buildings

- Additions, alterations, renovations or repairs related to building or structural issues shall be regulated by the International Existing Building Code.
- (2018 IMC)



 4

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102.3 Maintenance

- Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition.
- Devices or safeguards which are required by this code shall be maintained in compliance with the code edition under which they were installed.
- The owner or the owner's designated agent shall be responsible for maintenance of mechanical systems.
- To determine compliance with this provision, the code official shall have the authority to require a mechanical system to be reinspected.
- **The inspection for maintenance of HVAC systems shall be done in accordance with ASHRAE/ACCA/ANSI Standard 180.**

 5

5

IMC 2024

- Administrative changes New 2024
  - Section 104 Determination of compliance
    Significantly updated
    - Process by which compliance is approved
    - Listing and labeling
    - Tests, reports, technical assistance
    - qualifications

 6

6

IMC 2024

- Administrative changes New 2024
  - 108.3 Permit Valuations
    - Gives the Building Official ability to adjust final valuation amount for permit fees.

 7

7

Definitions 2024

AMBULATORY CARE FACILITY Buildings or portions thereof used to provide medical, surgical, psychiatric, nursing or similar care on a less than 24-hour basis to persons who are rendered incapable of self-preservation by the services provided or staff has accepted responsibility for care recipients already incapable

 8

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IMC 2024

- Approved-*acceptable* to the code official

 9

9

Definitions 2021

- **BALANCED VENTILATION SYSTEM**
- A ventilation system that simultaneously supplies outdoor air to and exhausts air from a space, where the mechanical supply airflow rate and the mechanical exhaust airflow rate are each within 10 percent of the average of the two airflow rates.

 10

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Definitions 2021

- CEILING RADIATION DAMPER
- A listed device installed in a ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly to limit automatically the radiative heat transfer through an air inlet/outlet opening. Ceiling radiation dampers are classified for use in either static systems that will automatically shut down in the event of a fire or in dynamic systems that continue to operate during a fire. A dynamic ceiling radiation damper is tested and rated for closure under elevated temperature airflow.

 11

11

Definitions (2018)

- COMMERCIAL COOKING APPLIANCES
- Appliances used in a commercial food service establishment for heating or cooking food. For the purpose of this definition, a commercial food service establishment shall include any building is where food is prepared for sale or is prepared on a portion thereof used for the preparation scale that is by volume and serving frequency not representative of food domestic household cooking.

 12

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IMC 2024

- Condensing Unit –New 2024
- A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more power-driven compressors, condensers, liquid receivers (where required) and factory-supplied accessories.

 13

13

Definitions 2024

- DRAFTSTOP A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor/ceiling assemblies, roof/ceiling assemblies and attics

 14

14

Definitions 2024

- GREASE DUCT. A duct serving a Type I hood, or cooking appliances equipped with integral down-draft exhaust systems that produce grease, to convey grease-laden air from the hood or cooking appliance directly to the outdoors

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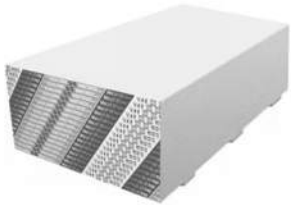
IMC 2024

- Gypsum Board—New 2024
  - *A type of gypsum panel product consisting of a noncombustible core primarily of gypsum with paper surfacing.*



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IMC 2024

- Heat pump—clarity given 2024
  - *A refrigeration system of factory-made appliance that utilizes refrigerant to transfer heat into a space or substance.*

 17

17

IMC 2024

- Listed– added additional language 2024
  - Added terms to include “listed”, “certified”, “classified” or “other appropriate terms as determined by the listing organization”

 18

18

IMC 2024

- Noncombustible Material—rewrite 2024
  - Eliminated language to only refer to ASTM E136

Designation: E136 – 2022

An American National Standard

Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C[1]

 19

19

IMC 2024

- Peer Review—new 2024
  - *An independent and objective technical review conducted by an approved third party*

 20

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IMC 2024

- Refrigerant—rewrite 2024
  - *The fluid used for heat transfer in a refrigerant system that undergoes a change of state to absorb heat.*

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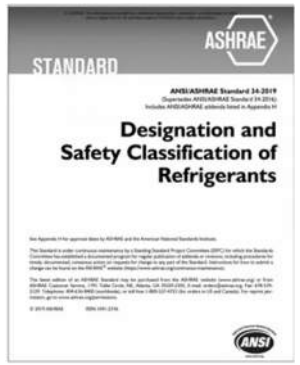
IMC 2024

- Refrigerant designation—new 2024

The unique identifying alphanumeric value or refrigerant number assigned to an individual refrigerant and published in ASHRAE 34



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Definitions 2024

STEAM BATH EQUIPMENT. Includes steam bath generators, combination room and steam generator systems, and steam bath cabinets intended for high-humidity concentrated heating at elevated temperatures for personal bathing.

 23

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Definitions 2021

- UNVENTED ALCOHOL FUEL-BURNING DECORATIVE APPLIANCE
- A stationary, self-contained appliance intended to be directly or indirectly secured to a wall or floor and not intended for duct connection. Such appliance burns alcohol and is made in a manufacturing facility for subsequent delivery to the installation site.

 24

24

IMC 2024

302.3 Cutting and notching of wood—
302.5 Cutting and notching of steel

- Simply now sends you to the International Building Code for wood and to AISI S240 and S220 for steel

 25

25

305.5 Protection against physical damage 2024

- In concealed locations where piping, other than cast-iron or steel, is installed through holes or notches in studs, joists, rafters or similar members less than ~~1-1/2~~ 1-1/4 inches from the nearest edge of the member, the pipe shall be protected by shield plates
- 305.5.1 Shield plates.
- Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (No. 16 gage)

 26

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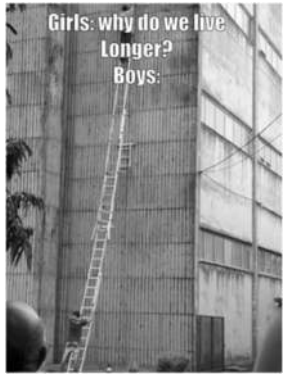
IMC 2024

Changes consistent with OSHA Regulations

306 Access
306.5 roofs and elevated surfaces
Permanent ladder—several changes 2024
Side railing to extend above 42” from edge of roof or platform.



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IMC 2024

306 Access
306.5 roofs and elevated surfaces--2024
Rung spacing is now 10 inches minimum not to exceed 14 inches
Toe spacing in now minimum of 7 inches and not more than 12 inches.
Rails not to exceed 16 inches between rails.

 28

28

IMC 2024

306 Access

306.5 roofs and elevated surfaces--2024

New –#11. landing required. Landing shall be provided on exit side of roof hatch a 30-inch deep and not less than the hatch width.

 29

29

307 CONDENSATE DISPOSAL 2021

307.1.1 Identification

The termination of concealed condensate piping shall be marked to indicate whether the piping is connected to the primary or secondary drain

 30

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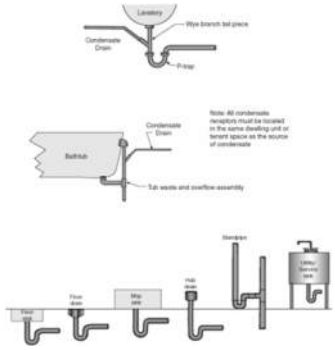
307.2.1.1 Condensate discharge (2021)

- Condensate drains shall not directly connect to any plumbing drain, waste or vent pipe. Condensate drains shall not discharge into a plumbing fixture other than a floor sink, floor drain, trench drain, mop sink, hub drain, standpipe, utility sink or laundry sink. Condensate drain connections to a lavatory wye branch tailpiece or to a bathtub overflow pipe shall not be considered as discharging to a plumbing fixture. Except where discharging to grade outdoors, the point of discharge of condensate drains shall be located within the same occupancy, tenant space or dwelling unit as the source of the condensate.



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307.2.5 Drain Line Maintenance

Condensate drain

lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut

 32

32

Section 312 Heating and cooling load calculations

312.1 Load calculations

Heating and cooling system design loads for the purpose of sizing systems, appliances and equipment shall be determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183. Alternatively, design loads shall be determined by an approved equivalent computation procedure, using the design parameters specified in Chapter 3 [CE] of the International Energy Conservation Code.

 33

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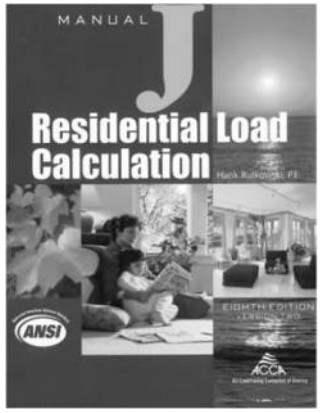

 34

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DESIGN LOADS

Design Information

Weather: Denver, CO, US

Winter Design Conditions			Summer Design Conditions		
Outside db	-3	°F	Outside db	90	°F
Inside db	70	°F	Inside db	75	°F
Design TD	73	°F	Design TD	15	°F
			Daily range	H	
			Relative humidity	50	%
			Moisture difference	-36	gr/lb

Heating Summary

Structure	26853	Btuh
Ducts	0	Btuh
Central vent (64 cfm)	4213	Btuh
Humidification	0	Btuh
Piping	0	Btuh
Equipment load	31066	Btuh

Infiltration

Method	Simplified
Construction quality	Average
Fireplaces	0

	Heating	Cooling
Area (ft²)	3600	3600
Volume (ft³)	14464	14464
Air changes/hour	0.28	0.15
Equiv. A/F (cfm)	67	36

Sensible Cooling Equipment Load Sizing

Structure	14954	Btuh
Ducts	0	Btuh
Central vent (64 cfm)	877	Btuh
Blower	0	Btuh
Use manufacturer's data	y	
Rate/sizing multiplier	1.00	
Equipment sensible load	15832	Btuh

Latent Cooling Equipment Load Sizing

Structure	274	Btuh
Ducts	0	Btuh
Central vent (64 cfm)	-1281	Btuh
Equipment latent load	0	Btuh
Equipment total load	15832	Btuh
Req. total capacity at 0.85 SHR	1.6	ton

 35

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DESIGN LOADS

Construction descriptions	Or	Area	U-value	Insul R	Htg HTM	Loss	Clg HTM	Gain
Walls								
12F-0sw: Frm wall, wd ext, 1/2" wood shth, r-21 cav ins, 1/2" gypsum board int finsh, 2"x6" wood frm								
15B13-0wc-8: Bg wall, light dry soil, 2"x4" wood int frm, concrete wall, r-13 cav ins, 8" thk, 1/2" gypsum board int finsh								
Partitions								
12E-0sw: Frm wall, wd ext, 1/2" wood shth, r-19 cav ins, 1/2" gypsum board int finsh, 2"x6" wood frm		243	0.068	19.0	2.38	578	1.02	248
Windows								
Low E u 32 SHGC 40; 1 glazing, clr glz, mtl no brk frm mat, 1/8" thk; NFRC rated (SHGC=0.40); 50% blinds 45°, medium; 50% outdoor ins-ect screen; 2 ft overhang (3 ft window ht, 2 ft sep.)								

There are hundreds of construction descriptions. They should match the construction plans.

A Partition is a wall that separates a conditioned area from a unconditioned area. This would be typical of a wall between the house and the garage.

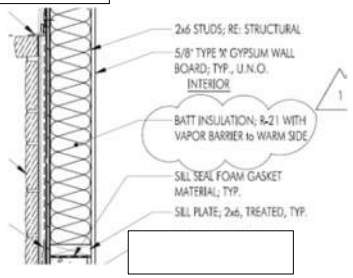
Verify that the designer has taken credit for blinds, screens and overhangs.

 36

36

DESIGN LOADS

Construction descriptions	Or	Area ft²	U-value Btu/ft²·°F	Insul R ft²·°F/Btu	Htg HTM Btu/ft²	Loss Btu	Clg HTM Btu/ft²	Gain Btu
Walls								
12F-0sw: Frm wall, wd ext, 1/2" wood shth, r-21 cav ins, 1/2" gypsum board int finsh, 2"x6" wood frm	ne	254	0.065	21.0	4.74	1205	0.78	199
	se	223	0.065	21.0	4.74	1058	0.78	175
	sw	242	0.065	21.0	4.74	1148	0.78	190
	nw	388	0.065	21.0	4.74	1841	0.78	304
	all	1107	0.065	21.0	4.74	5253	0.78	867



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DESIGN LOADS

Construction descriptions	Or	Area ft²	U-value Btu/ft²·°F	Insul R ft²·°F/Btu	Htg HTM Btu/ft²	Loss Btu	Clg HTM Btu/ft²	Gain Btu
Walls								
12F-0sw: Frm wall, wd ext, 1/2" wood shth, r-21 cav ins, 1/2" gypsum board int finsh, 2"x6" wood frm	ne	254	0.065	21.0	4.74	1205	0.78	199
	se	223	0.065	21.0	4.74	1058	0.78	175
	sw	242	0.065	21.0	4.74	1148	0.78	190
	nw	388	0.065	21.0	4.74	1841	0.78	304
	all	1107	0.065	21.0	4.74	5253	0.78	867
	ne	236	0.049	13.0	3.30	780	0	0
	se	448	0.049	13.0	3.58	1602	0	0
	sw	216	0.049	13.0	2.98	644	0	0
	nw	388	0.049	13.0	3.08	1195	0	0
	all	1288	0.049	13.0	3.28	4222	0	0
Partitions								
12E-0sw: Frm wall, wd ext, 1/2" wood shth, r-19 cav ins, 1/2" gypsum board int finsh, 2"x6" wood frm								
Windows								

In Wrightsoft there is a command to turn the house in the direction with the highest loads. It is not unusual for production builders to do this.

HTM = Heat Transfer Modifier
All of the Manual J formulas boil down to an HTM. The HTM times the area equals the heat loss or gain.

38

401.2 Ventilation required 2021

Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. Dwelling units complying with the air leakage requirements of the International Energy Conservation Code or ASHRAE 90.1 shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

39

401.4 Intake opening location 2021

Air intake openings shall comply with all of the following:

3.Intake openings shall be located not less than 3 feet below contaminant sources where such sources are located within 10 feet of the opening. Separation is not required between intake air openings and living space exhaust air openings of an individual dwelling unit or sleeping unit where an approved factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the manufacturer's instructions.

40

IMC 2024

403.3.1 Other Building intended to be occupied—removed language 2024

Removed language for building of 3 stories or less.

Did this for any other location with reference of three stories or less.

 41

41

Table 403.3.1.1 2024

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT² [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² [a]	EXHAUST AIRFLOW RATE CFM/FT² [a]
Animal facilities				
Animal exam room (veterinary office)	20	10	0.12	—
Animal imaging (MR/CT/PET)	20	10	0.18	0.9
Animal operating rooms	20	10	0.18	3.00
Animal postoperative recovery room	20	10	0.18	1.50
Animal preparation rooms	20	10	0.18	1.50
Animal procedure room	20	10	0.18	2.25
Animal surgery scrub	20	10	0.18	1.50
Large-animal holding room	20	10	0.18	2.25
Necropsy	20	10	0.18	2.25
Small-animal cage room (static cages)	20	10	0.18	2.25
Small-animal cage room (ventilated cages)	20	10	0.18	1.50

 42

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Table 403.3.1.1 2024

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT² [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE. R. CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE. R.CFM/FT² [a]	EXHAUST AIRFLOW RATE CFM/FT² [a]
Outpatient healthcare facilities [i,j]				
Birthing room	15	10	0.18	—
Class 1 imaging room	5	5	0.12	—
Dental operatory[k]	20	10	0.18	—
General examination room	20	7.5	0.12	—
Other dental treatment areas	5	5	0.06	—
Physical therapy exercise area	7	20	0.18	—
Physical therapy individual room	20	10	0.06	—
Physical therapeutic pool area	—	—	0.48	—
Prosthetics and orthotics room	20	10	0.18	—
Psychiatric consultation room	20	5	0.06	—
Psychiatric examination room	20	5	0.06	—
Psychiatric group room	50	5	0.06	—
Psychiatric seclusion room	5	10	0.06	—
Speech therapy room	20	5	0.06	—
Urgent care examination room	20	7.5	0.12	—
Urgent care observation room	20	5	0.06	—
Urgent care treatment room	20	7.5	0.18	—
Urgent care triage room	20	10	0.18	—

 43

43

Table 403.3.1.1 2024

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT² [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² [a]	EXHAUST AIRFLOW RATE CFM/FT² [a]
Hotels, motels, resorts and dormitories				
Bathrooms/toilet—private[g]	—	—	—	25/50[f]
Bedroom/living room	10	5	0.06	—
Conference/meeting	50	5	0.06	—
Dormitory sleeping areas	20	5	0.06	—
Gambling casinos	120	7.5	0.18	—
Laundry rooms, central	10	5	0.12	—
Laundry rooms within dwelling units	10	5	0.12	—
Lobbies/prefunction	30	7.5	0.06	—
Multipurpose assembly	120	5	0.06	—

 44

44

Table 403.3.1.1 2024

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT² [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² [a]	EXHAUST AIRFLOW RATE CFM/FT² [a]
Offices				
Break rooms	50	5	0.12	—
Conference rooms	50	5	0.06	—
Main entry lobbies	10	5	0.06	—
Occupiable storage rooms for dry materials	2	5	0.06	—
Office spaces	5	5	0.06	—
Reception areas	30	5	0.06	—
Telephone/data entry	60	5	0.06	—

45

Table 403.3.1.1 2024

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT² [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² [a]	EXHAUST AIRFLOW RATE CFM/FT² [a]
Public spaces				
Corridors	—	—	0.06	—
Courtrooms	70	5	0.06	—
Elevator car	—	—	—	1.0
Legislative chambers	50	5	0.06	—
Libraries	10	5	0.12	—
Museums (children's)	40	7.5	0.12	—
Museums/galleries	40	7.5	0.06	—
Places of religious worship	120	5	0.06	—
Room with adult changing station	—	—	—	50/70[e]
Shower room (per shower head)[f]	—	—	—	50/20[f]
Smoking lounges[g]	70	60	—	—
Toilet rooms — public[g]	—	—	—	50/70[e]

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Table 403.3.1.1 2024

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT² [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² [a]	EXHAUST AIRFLOW RATE CFM/FT² [a]
Specialty shops				
Automotive motor fuel-dispensing stations[b]	—	—	—	1.5
Banks or lobbies	15	7.5	0.06	—
Barber	25	7.5	0.06	0.5
Beauty salons[b]	25	20	0.12	0.6
Embalming room[b]	—	—	—	2.0
Nail salons [b, h]	25	20	0.12	0.6
Pet shops (animal areas)[b]	10	7.5	0.18	0.9
Supermarkets	8	7.5	0.06	—

47

Table 403.3.1.1 2024

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT² [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² [a]	EXHAUST AIRFLOW RATE CFM/FT² [a]
Workrooms				
Bank vaults/safe deposit	5	5	0.06	—
Computer (without printing)	4	5	0.06	—
Copy, printing rooms	4	5	0.06	0.5
Darkrooms	—	—	—	1.0
Manufacturing where hazardous materials are not used	7	10	0.18	—
Manufacturing where hazardous materials are used (excludes heavy industrial and chemical processes)	7	10	0.18	—
Meat processing[c]	10	15	—	—
Pharmacy (prep. area)	10	5	0.18	—
Photo studios	10	5	0.12	—
Sorting, packing, light assembly	7	7.5	0.12	—
Telephone closets	—	—	0.00	—

48

403.3.2 Group R-2, R-3 and R-4 occupancies~~, three stories and less~~

- 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 403.3.2.1 through 403.3.2.5

 49

49

403.3.2.1 Outdoor air for dwelling units

- An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9

QOA=0.03$Afloor$+7.5(Nbr+1)

where:
QOA = outdoor airflow rate, cfm
Afloor = conditioned floor area, ft2
Nbr = number of bedrooms; not to be less than one

 50

50

403.3.2.1 Outdoor air for dwelling units 2021

Exceptions:

1. The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor airflow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.

2. The minimum mechanical ventilation rate determined in accordance with Equation 4-9 shall be reduced by 30 percent provided that both of the following conditions apply:

2.1. A ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms:

2.1.1. Living room.

2.1.2. Dining room.

2.1.3. Kitchen.

2.2. The whole-house ventilation system is a balanced ventilation system.

 51

51

403.3.2.4 System controls (2018)

Where provided within a dwelling unit, controls for outdoor air ventilation systems shall include text or a symbol indicating the system's function.

 52

52

502.20 Manicure and Pedicure Stations 2021

502.20.1 Operation

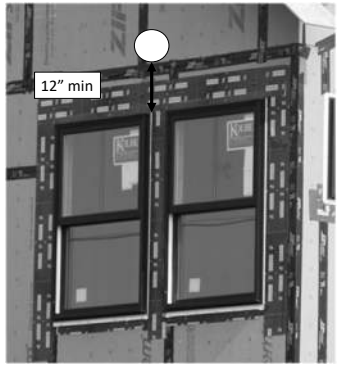
The exhaust system for manicure and pedicure stations shall have controls that operate the system continuously when the space is occupied.

 53

53

501.3.1 Location of exhaust outlets 2024

3. For all environmental air exhaust: 3 feet from property lines; 3 feet from operable openings, except where the exhaust opening is located not less than 1 foot above the gravity air intake opening into buildings for all occupancies….remainder unchanged



 54

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501.6 Common ducts 2024

The discharge from exhaust fans serving separate dwelling or sleeping units shall not be connected to a common duct or shaft, except where the common duct or shaft is maintained at a negative pressure.

 55

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504
Clothes Dryer Exhaust

- Clothes dryers shall be exhausted in accordance with the manufacturer's instructions.
- Shall be independent of all other systems and shall convey the moisture and any products of combustion to the outside of the building.
  - Exception: This section shall not apply to listed and labeled condensing (ductless) clothes dryers.

 56

56

504.3
Cleanout

- Each vertical riser shall be provided with a means for cleanout.

 57

57

504.4
Dryer Exhaust Installation

- Must terminate on the outside of the building
- Be equipped with a backdraft damper.
- Screens shall not be installed at the duct termination.
- Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow.
- Cannot be connected to a vent connector, vent or chimney.
- Cannot extend into or through ducts or plenums.

 58

58

Cloths Dryer Exhaust 2021

- 504.4.1Termination location
- Exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions. Where the manufacturer's instructions do not specify a termination location, the exhaust duct shall terminate not less than 3 feet in any direction from openings into buildings, including openings in ventilated soffits.

 59

59

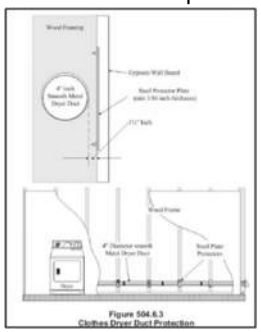
504.6
Makeup air

- Installations exhausting more than 200 cfm shall be provided with makeup air.
- Closet installation - an opening having an area of not less than 100 square inches shall be provided in the closet enclosure.

 60

60

504.8 Protection required



- Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct.
- Shield plates shall be placed on the finished face of all framing members where there is less than 1 ¼ inches between the duct and the finished face of the framing member.
- **504.8.1 Shield plates.**
- Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (No. 16 gage).

 61

61

504.8.1 Domestic Clothes Dryer Ducts

- Exhaust ducts shall be constructed of metal and shall have a smooth interior finish.
- Minimum nominal size of 4 inches in diameter.
- Entire system shall be supported and secured in place.
- The male end of the duct at overlapped duct joints shall extend in the direction of airflow.

 62

62

504.8.2 Duct Installation

……Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch into the inside of the duct.

 63

63

504.8.3 Domestic Clothes Dryer Ducts

- Transition ducts used to connect the appliance to the exhaust duct system shall be limited to single lengths not to exceed 8 feet and shall be listed and labeled for the application.
- Transition ducts shall not be concealed within construction.

 64

64

504.8.4.1 Specified Length

- The maximum length of the exhaust duct shall be 35 feet from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 504.6.4.1.

TABLE 504.6.4.1
DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH

DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH
4" radius mitered 45-degree elbow	2 feet 6 inches
4" radius mitered 90-degree elbow	5 feet
6" radius smooth 45-degree elbow	1 foot
6" radius smooth 90-degree elbow	1 foot 9 inches
8" radius smooth 45-degree elbow	1 foot
8" radius smooth 90-degree elbow	1 foot 7 inches
10" radius smooth 45-degree elbow	9 inches
10" radius smooth 90-degree elbow	1 foot 6 inches

 65

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Manufacturer's Instructions 504.8.4.2

- The maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer. Where the exhaust duct is to be concealed, the installation instructions shall be provided to the code official prior to the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table 504.6.4.1 shall be used.

 66

66

504.8.4.3 Dryer exhaust duct power ventilator length

- The maximum length of the exhaust duct
- Shall be determined by the dryer exhaust duct power ventilator
- Manufacturer's installation instructions

 67

67

Length identification 504.8.5

- Where the exhaust duct is concealed within the building construction, the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet of the exhaust duct connection.

 68

68

Exhaust Duct Required 504.8.6

- Where space for a clothes dryer is provided, an exhaust duct system shall be installed. Where the clothes dryer is not installed at the time of occupancy, the exhaust duct shall be capped at the location of the future dryer.

Exception: Where a listed condensing clothes dryer is installed prior to occupancy of structure.

 69

69

505.1 Domestic Kitchen Exhaust systems

- Where domestic range hoods and domestic appliances equipped with downdraft exhaust are located within dwelling units, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper.
- Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems.

 70

70

Domestic Kitchen Exhaust Makeup Air Required - 505.4

- Exhaust hood systems capable of exhausting in excess of 400 cfm shall be provided with makeup air at a rate approximately equal to the exhaust air rate.
- Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

 71

71

505.6 Other than Group R (revised 2018)

- In other than Group R occupancies, where cooktops, ranges, and open-top broilers are installed, domestic cooking ~~appliances are utilized for domestic purposes, such appliances shall be provided with domestic range~~
- ~~hoods. Hoods and~~ exhaust systems shall be ~~in accordance with Sections 505.1 and 505.2.~~ provided.

 72

72

505.7 Group I-1 occupancies 2024

In Group I-1 occupancies, hood installations over domestic cooking equipment installed in accordance with Section 420.9 of the International Building Code shall comply with the following:

1. Range hoods shall have a minimum air flow rate of 500 cfm.
2. Mechanical ventilation shall be provided to the rooms or spaces containing the domestic cooking equipment in accordance with Section 403.3.1.
3. Range hood exhaust shall discharge to the outdoors.

Exception: A listed and labeled ductless range hood shall be permitted where a charcoal filter is provided in the hood to reduce smoke and odors.

Alcohol and drug centers
Assisted living facilities
Congregate care facilities
Group homes
Halfway houses
Residential board and care facilities
Social rehabilitation facilities

 73

73

505.8 Group I-2 occupancies 2024

In Group I-2 occupancies, hood installations above domestic cooking equipment installed in accordance with Section 407.2.7 of the International Building Code shall comply with the following:

1. Range hoods shall have a minimum air flow rate of 500 cfm.
2. Mechanical ventilation shall be provided to the rooms or spaces containing the domestic cooking equipment in accordance with Section 403.3.1.
3. Range hood exhaust shall discharge to the outdoors.

Exception: A listed and labeled ductless range hood shall be permitted where a charcoal filter is provided in the hood to reduce smoke and odors.

Hospitals
Nursing homes
Psychiatric hospitals

 74

74

506.3.2.5 Grease duct test 2024

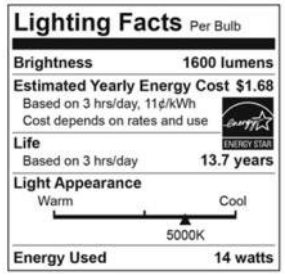
- ……. A test shall be performed for the entire grease duct system, including the hood-to-duct connection. The grease duct system shall be permitted to be tested in sections, provided that every joint is tested. For listed factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds. The test shall be performed in accordance with either Section 506.3.2.5.1 or 506.3.2.5.2.

 75

75

506.3.2.5.1 Light test 2024

A duct test shall be performed by passing a lamp, having not less than 1600 lumens, through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A successful test shall be where the light from the lamp is not visible at any point on the exterior of the duct.



 76

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506.3.2.5.2 Water spray test 2024

A duct test shall be performed by simulating a cleaning operation of the interior of the duct. A water pump capable of a flowing outlet pressure of not less than 1,200 psi shall be used, along with any necessary hoses and spray nozzles, to apply high-pressure water to the inside surfaces of the duct. A successful test shall be where there is no evidence of cleaning water at any point on the exterior of the duct

 77

77

506.3.7 - Prevention of grease accumulation in grease ducts 2021

- Duct systems serving a Type I hood shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than one-fourth unit vertical in 12 units horizontal (2-percent slope) toward the hood or toward a grease reservoir designed and installed in accordance with Section 506.3.7.1.
- Where horizontal ducts exceed 75 feet in length, the slope shall be not less than one unit vertical in 12 units horizontal.

Exception: Factory-built grease ducts shall be installed at a slope that is in accordance with the listing and manufacturer's installation instructions.

 78

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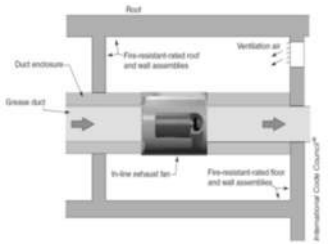
506.5.1.2 In-Line Fan Location 2018



- Where enclosed duct systems are connected to in-line fans not located outdoors, the fan shall be located in a room or space having the same fire resistance rating as the duct enclosure. Access shall be provided for servicing and cleaning of fan components. Such rooms or spaces shall be ventilated in accordance with the fan manufacturers' installation instructions.

 79

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506.5.2 Pollution Control Units (2018)

POLLUTION CONTROL UNIT (PCU) Manufactured equipment that is installed in a grease exhaust duct system for the purpose of extracting smoke, grease particles, and odors from the exhaust flow by means of a series of filters.

- Pollution control units shall be installed in accordance with the manufacturer's installation instructions and shall be in accordance with all of the following:
- Sixteen requirements

 80

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506.5.4 Exhaust Fan Mounting

Up-blast fans serving

Type I hoods and installed in a vertical or horizontal position shall be hinged, and supplied with a flexible weatherproof electrical cable to permit inspection and cleaning and shall be equipped with a means of restraint to limit the swing of the fan on its hinge. The ductwork shall extend a minimum of 18 inches above the roof surface

 81

81

507.1 General

Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2 and 507.3. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. ~~Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust equipment and makeup air system shall comply with the requirements of Sections 506, 507, 508 and 509.~~ Now in 507.3

New exceptions

 82

82

507.1 General 2024

3. Ovens listed and labeled for use with wood fuel in accordance with UL 2162 and vented in accordance with the manufacturer's instructions.

4. An electric cooking appliance listed and labeled in accordance with UL 197 for reduced grease emissions.

5. Commercial electric dishwashers incorporating a self-contained condensing system listed and labeled in accordance with UL 921.

 83

83

507.1 General 2024

6. Where the heat and moisture loads from dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process are incorporated into the HVAC system design or into the design of a separate removal system.

Spaces containing such cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot.

For the purpose of determining the floor area required to be exhausted, each individual appliance that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet.

Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot.

 84

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507.1.3 Fuel-burning appliances 2024

Appliances equipped with draft hoods or atmospheric burners shall not be located in the same room or space containing a Type I or Type II hood except where the appliance is located in a sealed enclosure equipped with a self-closing device with combustion air obtained from the outdoors or from other spaces in the building in accordance with Chapter 7 or the International Fuel Gas Code.

 85

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507.3 Type II hoods 2024 (Moved from 507.1)

Type II hoods shall be installed above light-duty cooking appliances, dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process. Type II hoods shall be installed above all appliances that produce products of combustion and do not produce grease or smoke as a result of the cooking process. A Type I hood shall be permitted to be installed for a required Type II hood, provided that the Type I hood installation complies with all of the requirements for a Type I hood installation. Where such a Type I hood serves only dishwashers and appliances that require a Type II hood, the Type I hood shall not be required to have fire suppression or grease filters

 86

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~~507.6 Performance test~~ 2024 Sent in errata could be section 507.1.7

- ~~A performance test shall be conducted upon completion and before final approval of the installation of a ventilation system serving commercial cooking appliances. The test shall verify the rate of exhaust airflow required by Section 507.5, makeup airflow required by Section 508 and proper operation as specified in this chapter. The permit holder shall furnish the necessary test equipment and devices required to perform the tests.~~

 87

87

~~507.6.1 Capture and containment test~~ 2024 Sent in errata could be section 507.1.7.1

- ~~The permit holder shall verify capture and containment performance of the exhaust system. This field test shall be conducted with all appliances under the hood at operating temperatures, with all sources of outdoor air providing makeup air for the hood operating and with all sources of recirculated air providing conditioning for the space in which the hood is located operating. Capture and containment shall be verified visually by observing smoke or steam produced by actual or simulated cooking, such as that provided by smoke generators.~~

 88

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508.1.1 Makeup air temperature 2024

HVAC systems that serve the kitchen space shall have the additional capacity necessary for the latent and sensible loads that are introduced by the makeup air supplied to the kitchen space, or the makeup air shall be conditioned by dedicated systems such that the difference in temperature between the makeup air supplied to the kitchen space and the design setpoint temperature in the kitchen space is not greater than 10° F

Exception: Makeup air supplied to a compensating hood shall not be required to be conditioned.

 89

89

Section 509 Hazardous exhaust systems 2024

- As section 509 FIRE SUPPRESSION SYSTEMS was moved to 507.2.11 section 509 is now Hazardous exhaust systems
- Dust, stock and refuse conveying systems is now section 510
- Subslab soil exhaust systems is now section 511
- Smoke control systems is now section 512
- Energy recovery ventilation systems is now section 513
- No changes to the above sections

 90

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601.5 Return air openings 2024

- 8. Return air from a closet shall serve only the closet and shall not require a dedicated closet supply duct.
- 9. Return air taken from a closet smaller than 30 square feet shall require the closet door be undercut not less than 1-1/2 inches or have either a louvered door or an air transfer grille, each with a net free area of not less than 30 square inches.
- 7. Return air for heating or air-conditioning systems shall not be taken from a ~~closet~~ bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.

 91

91

Section 602 Plenums 2024

602.1 General.

Supply, return, exhaust, relief and ventilation air plenums shall be in accordance with this section.

602.1.1 Locations limited

Plenums shall be limited to uninhabited crawl spaces, above a ceiling or below the floor, attic spaces, mechanical equipment rooms and the framing cavities addressed in Section 602.2

602.1.2 Limited to a fire area

Plenums shall be limited to one fire area. Air systems shall be ducted directly from the boundary of the fire area served to the air-handling equipment.

602.1.3 Fuel-fired appliances

Fuel-fired appliances shall not be installed within a plenum.

 92

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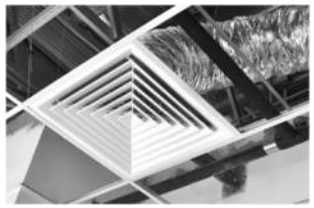
Section 602 Plenums 2024

602.3 Materials within plenums

Materials within plenums shall be noncombustible or shall be in compliance with the applicable requirements in Sections 602.3.1 through 602.3.10.



Exceptions:

1. Materials exposed within plenums in one- and two-family dwellings.
2. Combustible materials fully enclosed within one of the following:
   - 2.1 Continuous noncombustible raceways or enclosures.
   - 2.2 Approved gypsum board assemblies.
   - 2.3 Materials listed and labeled for installation within a plenum and listed for the application.
3. Materials in Group H, Division 5 fabrication areas and the areas above and below the fabrication area that share a common air recirculation path with the fabrication area.

 93

93

Section 602 Plenums 2024

602.3.1 Ducts, connectors, duct coverings, linings and tape

Rigid and flexible ducts and connectors shall conform to Section 603. Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604.

602.3.2 Smoke detectors

Smoke detectors shall be listed and labeled.

 94

94

602.3.6 Discrete Electrical, Plumbing and Mechanical Products in Plenums 2018

Where discrete plumbing and mechanical products and appurtenances are located in a plenum and have exposed combustible material, they shall be listed and labeled for such use in accordance with UL 2043.

Exception: Electrical equipment with metallic enclosures exposed within a plenum

Discrete Product

Products that are non-continuous, individual, distinct pieces such as, but not limited to, electrical, plumbing and mechanical products and duct straps, duct fittings, duct registers and pipe hangers.

 95

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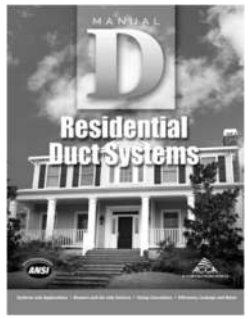
603.2 Duct sizing

603.2 Duct sizing

Ducts installed within a single *dwelling unit* shall be sized in accordance with ACCA Manual D, the appliance manufacturer's installation instructions or other approved methods. Ducts installed within all other buildings shall be sized in accordance with the ASHRAE Handbook of Fundamentals or other equivalent computation procedure.



 96

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607.2.4 Mechanical, electrical and plumbing controls. 2024

607.2.4 Mechanical, electrical and plumbing controls.

Mechanical, electrical and plumbing controls shall not be installed in air duct systems.

Exception: Controls shall be permitted to be installed in air duct systems only if the wiring is directly associated with the air distribution system. The wiring shall comply with the requirements of Section 602 and the total length of such wiring shall not exceed 4 feet.

 97

97

607.2.4.1 Controls not permitted to be installed through dampers. 2024

607.2.4.1 Controls not permitted to be installed through dampers

Mechanical, electrical and plumbing controls shall not be installed through fire dampers, smoke dampers, combination fire/smoke dampers or ceiling radiation dampers unless otherwise permitted by the manufacturer and the listing.

 98

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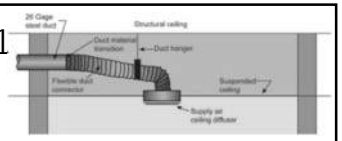
Duct and Transfer openings 2021

607.5.2 Fire barriers

Ducts and air transfer openings that penetrate fire barriers shall be protected with listed fire dampers installed in accordance with their listing….



International Code Council

- 3.Such walls are penetrated by fully ducted HVAC systems, have a required fire-resistance rating of 1 hour or less, are in areas of other than Group H and are in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the International Building Code. For the purposes of this exception, a fully ducted HVAC system shall be a duct system for the structure's HVAC system. Such a duct system shall be constructed of sheet steel not less than 26 gage thickness and shall be continuous from the air-handling appliance or equipment to the air outlet and inlet terminals. Flexible air connectors shall be permitted in a fully ducted system, limited to the following installations:
- 3.1.Nonmetallic flexible connections that connect a duct to an air handling unit or equipment located within a mechanical room in accordance with Section 603.9.
- 3.2.Nonmetallic flexible air connectors in accordance with Section 603.6.2 that connect an overhead metal duct to a ceiling diffuser where the metal duct and ceiling diffuser are located within the same room.

 99

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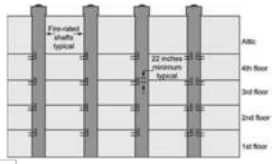
607.5.5 Subducts Penetrating Shaft Enclosures 2021

607.5.5Shaft enclosures

Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with listed fire and smoke dampers installed in accordance with their listing.



International Code Council

1.Fire dampers are not required at penetrations of shafts where any of the following apply:

1.1. Steel exhaust subducts having a wall thickness of not less than 0.0187 inch extend not less than 22 inches vertically in exhaust shafts and an exhaust fan is installed at the upper terminus of the shaft that is powered continuously, in accordance with Section 909.11 of the International Building Code, so as to maintain a continuous airflow upward to the outdoors.

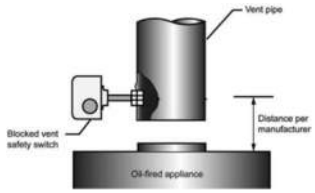
 100

100

Chimneys and Vents 2021

801.21 Blocked vent switch

Oil-fired appliances shall be equipped with a device that will stop burner operation in the event that the venting system is obstructed. Such device shall have a manual reset and shall be installed in accordance with the manufacturer's instructions.



 101

101

Section 907 Incinerators and crematories 2024

907.1 General

Factory-built cremation furnaces and commercial direct-fed incinerators shall be listed and labeled in accordance with UL 2790

Factory-built incinerators for domestic applications shall be listed and labeled in accordance with UL 791.

Incinerators and cremation furnaces shall be installed in accordance with the manufacturer’s instructions.

 102

102

Section 912 Infrared radiant heaters 2024

912.1 General

Permanently installed electric space heaters shall be listed and labeled in accordance with UL 2021 and installed in accordance with the manufacturer’s instructions

 103

103

928 Evaporative Cooling Equipment 2018

Evaporative cooling equipment shall:

1. Be installed in accordance with the manufacturer’s instructions.
2. Be installed on level platforms in accordance with Section 304.10.
3. Have openings in exterior walls or roofs flashed in accordance with the International Building Code.
4. Be provided with an approved water supply, sized for peak demand. The quality of water shall be provided in accordance with the equipment manufacturer’s recommendations. The piping system and protection of the potable water supply system shall be installed as required by the International Plumbing Code.
5. Have air intake opening locations in accordance with Section 401.4.

 104

104

930 HIGH-VOLUME LARGE-DIAMETER CEILING FANS (2018)

Where provided, high volume large diameter fans shall be tested and labeled in accordance with AMCA 230, listed and installed labeled in accordance with UL 507, and installed in accordance with the manufacturer's instructions.

 105

105

Section 931 Steam bath equipment 2024

931.1 General

Steam bath equipment shall be listed and labeled in accordance with UL 499 and shall be installed in accordance with their listing and the manufacturer's instructions.

 106

106

1002.4 Water heater pan required 2024

1002.4 Water heater pan required

Where a storage-type water heater or a hot water storage tank is installed in a location where water leakage from the tank will cause damage, the tank shall be installed in a pan constructed of one of the following:

1. Galvanized steel or aluminum of not less than 0.0236 inch in thickness.
2. Plastic of not less than 0.036 inch in thickness constructed of material having a flame spread index of not more than 25 and a smoke-developed index of not more than 450 when tested in accordance with ASTM E84 or UL 723.
3. Other approved materials.

 107

107

1101.1.2 Ammonia refrigerant 2024

Refrigeration systems using ammonia refrigerant shall comply with IIAR 2 for system design, IIAR 3 for valves, IIAR 4 for installation, IIAR 5 for start-up and IIAR 6 and shall not be required to comply with this chapter

IIAR- International Institute of Ammonia Refrigeration

108

1101.2.1 Group A2L, A2, A3 and B1 high-probability equipment 2024

1101.2.1 Group A2L, A2, A3 and B1 high-probability equipment

High-probability equipment using Group A2L, A2, A3 or B1 refrigerant shall comply with UL 484, UL/CSA 60335-2-40 or UL/CSA 60335-2-89.

 109

109

INCREASING FLAMMABILITY	SAFETY GROUP	
Higher Flammability	A3	B3
Lower Flammability	A2 / A2L*	B2 / B2L*
No Flame Propagation	A1	B1
	Lower Toxicity	Higher Toxicity

INCREASING TOXICITY

* A2L and B2L are lower flammability refrigerants with a maximum burning velocity of ≤3.9 in./s (10 cm/s).

 110

110

1101.7 Changing refrigerant 2024

Changes of refrigerant in an existing system to a refrigerant with a different refrigerant designation shall be allowed only where in accordance with the following:

1. The owner or the owner's authorized agent shall be notified prior to making a change of refrigerant, and the change of refrigerant shall not be made where the owner objects to the change.
2. The change in refrigerant shall be in accordance with one of the following:
   2.1 Written instructions of the original equipment manufacturer.
   2.2 An evaluation of the system by a registered design professional or by an approved agency that validates safety and suitability of the replacement refrigerant.
   2.3 Approved by the code official.
3. Where the replacement refrigerant is classified into the same safety group, requirements that were applicable to the existing system shall continue to apply.
4. Where the replacement refrigerant is classified into a different safety group, the system shall comply with the requirements of this standard for a new installation, and the change of refrigerant shall require code official approval.

 111

111

1102.2.1 Mixing 2024

1102.2.1 Mixing

Refrigerants with different refrigerant designations shall only be mixed in a system in accordance with both of the following:

1. The addition of a second refrigerant is allowed by the equipment manufacturer and is in accordance with the manufacturer's written instructions.
2. The resulting mixture does not change the refrigerant safety group.

 112

112

1101.9 Access Port Protection

Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

Exception:

This section shall not apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

 113

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1104.3.1 Air conditioning for human comfort 2024

1104.3.1 Air conditioning for human comfort

High-probability systems used for human comfort shall use Group A1 or A2L refrigerant.

Exceptions:

1. Equipment listed for and used in residential occupancies containing a maximum of 6.6 pounds of refrigerant.
2. Equipment listed for and used in commercial occupancies containing a maximum of 22 pounds of refrigerant.
3. Industrial occupancies

 114

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1104.3.2 Group A2, A3, B2 and B3 refrigerants 2024

1104.3.2 Group A2, A3, B2 and B3 refrigerants

Group A2 and B2 refrigerants shall not be used in high-probability systems. Group A3 and B3 refrigerants shall not be used except where approved.

Exceptions: This section does not apply to:

1. Laboratories where the floor area per occupant is not less than 100 square feet
2. Listed self-contained systems having a maximum of 0.331 pounds of Group A3 refrigerant.
3. Industrial occupancies.
4. Equipment listed for and used in residential occupancies containing a maximum of 6.6 pounds of Group A2 or B2 refrigerant.
5. Equipment listed for and used in commercial occupancies containing a maximum of 22 pounds of Group A2 or B2 refrigerant.

 115

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MACHINERY ROOM, GENERAL REQUIREMENTS 2021

1105.9 Means of egress

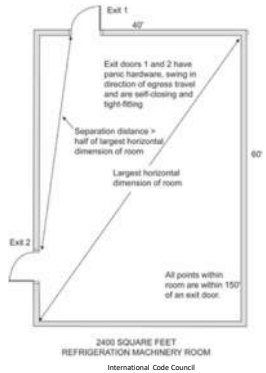
Machinery rooms larger than 1,000 square feet shall have not less than two exits or exit access doorways. Where two exit access doorways are required, one such doorway is permitted to be served by a fixed ladder or an alternating tread device.

Exit access doorways shall be separated by a horizontal distance equal to one-half the maximum horizontal dimension of the room.

All portions of machinery rooms shall be within 150 feet of an exit or exit access doorway.

An increase in exit access travel distance is permitted in accordance with Section 1017.1 of the International Building Code.

Exit and exit access doorways shall swing in the direction of egress travel and shall be equipped with panic hardware, regardless of the occupant load served. Exit and exit access doorways shall be tight fitting and self-closing.



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1106.4 Group A2L and B2L refrigerants 2024

Adds new subsections

106.4.1 Elevated temperatures.

Open flame-producing devices or continuously operating hot surfaces over 1290°F shall not be permanently installed in the room

6.4.2 Refrigerant detector

In addition to the requirements of Section 1105.3, refrigerant detectors shall signal an alarm and activate the ventilation system in accordance with the response time specified in Table 1106.4.2.

ACTIVATION LEVEL	MAXIMUM RESPONSE TIME (seconds)	ASHRAE 15 VENTILATION (seconds)	ALARM RESET	ALARM TYPE
Less than or equal to the OEL in Table 1103.1	300	1	Automatic	Trouble
Less than or equal to the refrigerant concentration level in Table 1103.1	15	2	Manual	Emergency

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1109.2.2 Refrigerant pipe enclosure 2024

Refrigerant piping shall be protected by locating it within the building elements or within protective enclosures.

Exception: Piping protection within the building elements or protective enclosure shall not be required in any of the following locations:

1. Where installed without ready access or located more than 7 feet 3 inches above the finished floor.
2. Where located within 6 feet of the refrigerant unit or appliance.
3. Where located in a machinery room complying with Section 1105.
4. Outside the building:
   - 4.1. Where protected from damage from the weather, including but not limited to hail, ice and snow loads.
   - 4.2 Where protected from damage within the expected foot or traffic path.
   - 4.3 Where installed underground not less than 8 inches below finished grade and protected against corrosion.

118

1109.2.3 Prohibited locations 2024

Refrigerant piping shall not be installed in any of the following locations:

1. Exposed within a fire-resistance-rated exit access corridor.
2. Exposed within an interior exit stairway.
3. Within an interior exit ramp.
4. Within an exit passageway.
5. Within an elevator, dumbwaiter or other shaft containing a moving object

119

1109.2.7 Pipe identification 2024

Refrigerant pipe located in areas other than the room or space where the refrigerating equipment is located shall be identified. The pipe identification shall be located at intervals not exceeding 20 feet on the refrigerant piping or pipe insulation. The minimum height of lettering of the identification label shall be 1/2 inch. The identification shall indicate the refrigerant designation and safety group classification of refrigerant used in the piping system. For Group A2L and B2L refrigerants, the identification shall also include the following statement: “WARNING—Risk of Fire. Flammable Refrigerant.”…….

120

1109.3.1 Protection against physical damage 2024

- In addition to the requirements of Section 305.5, aluminum, copper and steel tube used for ~~Group A2L and B2L~~ Group A2, A3, B2 and B3 refrigerants and located in concealed locations where tubing is installed in studs, joists, rafters or similar member spaces, and located less than 1-1/4 inches from the nearest edge of the member, shall be continuously protected by shield plates. Protective steel shield plates shall cover the area of the tube plus the area extending not less than 2 inches beyond both sides of the tube

1109.3.1.1 Shield plates.

Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (No. 16 gage).

 121

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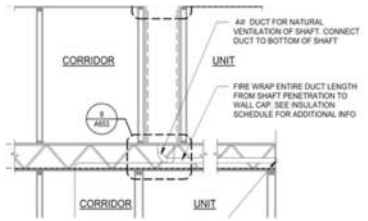
1109.3.2 Shaft ventilation 2024



- Refrigerant pipe shafts with systems using Group A2L or B2L refrigerant shall be naturally or mechanically ventilated. Refrigerant pipe shafts with one or more systems using any Group A2, A3, B2 or B3 refrigerant shall be continuously mechanically ventilated and shall include a refrigerant detector. The shaft ventilation exhaust outlet shall comply with Section 501.3.1. Naturally ventilated shafts shall have a pipe, duct or conduit not less than 4 inches in diameter that connects to the lowest point of the shaft and extends to the outdoors……

 122

122

1110.3 Field test gases. 2024

110.3 Field test gases.

The medium used for field pressure testing the refrigeration system shall be one of the following inert gases: oxygen-free nitrogen, helium argon or premixed nonflammable oxygen-free nitrogen with a tracer gas of hydrogen or helium. For R-744 refrigeration systems, carbon dioxide shall be allowed as the test medium. For R-718 refrigeration systems, water shall be allowed as the test medium.

 123

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1110.3.1 Test gases not permitted. 2024

1110.3.1 Test gases not permitted

Oxygen, air, refrigerants other than those identified in Section 1110.3, combustible gases and mixtures containing such gases shall not be used as the pressure test medium

 124

124

Chapter 12 Hydronic piping 2024

1203.13 Stainless steel pipe

Joints between stainless steel pipe or fittings shall be mechanical joints that are made with an approved elastomeric seal, or shall be threaded or welded joints conforming to Section 1203.3.

 125

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Chapter 12 Hydronic piping 2024

1203.14 Stainless steel tubing

Joints between stainless steel tubing or fittings shall be mechanical or welded joints conforming to Section 1203.3.

 126

126

Chapter 12 Hydronic piping 2024

1209.6 Radiant tubing placement

Hydronic tubing to be embedded for the purpose of radiant heating or cooling shall be installed in accordance with the manufacturer's instructions and with the tube layout and spacing in accordance with the system design. Individual tubing circuit lengths shall be installed with a variance of not more than ±10 percent from the design

 127

127

Chapter 12 Hydronic piping 2024

1209.6.1 Radiant tubing circuit length

The maximum circuit length of radiant tubing from a supply-and-return manifold shall not exceed the lengths specified by the system design or, in the absence of manufacturer's specifications, the lengths specified in Table 1209.6.1.

 128

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Table 1209.6.1 Maximum circuit length of radiant tubing from a supply-and-return manifold arrangement 2024

Table 1209.6.1 Maximum circuit length of radiant tubing from a supply-and-return manifold arrangement

NOMINAL TUBE SIZE	MAXIMUM CIRCUIT LENGTH (feet)
1/4	125
5/16	200
3/8	250
1/2	300
5/8	400
3/4	500
1	750

 129

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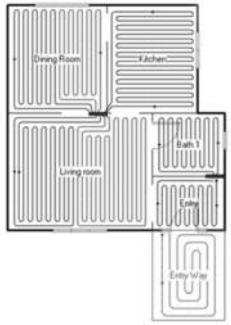
Chapter 12 Hydronic piping 2024

1209.6.2 Radiant tubing circuit tags

Each individual radiant tubing circuit shall have a tag or label securely affixed to each manifold outlet to indicate the length of each circuit and the areas served

1209.6.3 Radiant tubing drawings

The radiant tubing drawings and design report shall be provided to the building owner or the designated representative of the building owner.



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Chapter 12 Hydronic piping 2024

1209.7 Snow- and ice-melt tubing placement

Hydronic tubing to be embedded for the purpose of snow- and ice-melt systems shall be installed in accordance with the manufacturer's installation instructions and with the tube layout and spacing in accordance with the system design

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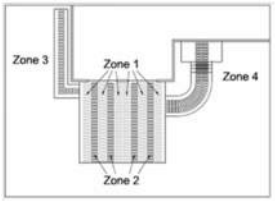
131

Chapter 12 Hydronic piping 2024

- **1209.7.1 Snow- and ice-melt tubing circuit length**
- The maximum circuit length of snow- and ice-melt tubing from a supply-and-return manifold shall not exceed the lengths specified by the system design or, in the absence of manufacturer's specifications, the lengths specified in Table 1209.7.1. Individual tubing circuit lengths shall be installed with a variance of not more than ±10 percent from the design.
- **1209.7.2 Snow- and ice-melt tubing drawings**
- The snow- and ice-melt tubing drawings and design report shall be provided to the building owner or the designated representative of the building owner.



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Chapter 12 Hydronic piping 2024

Table 1209.7.1 Maximum circuit length of snow- and ice-melt tubing from a supply-and-return manifold arrangement

NOMINAL TUBE SIZE	MAXIMUM CIRCUIT LENGTH (feet)
1/2	140
5/8	250
3/4	325
1	475

 133

133

Appendix D Clean air delivery 2024

D101.1 Clean air delivery capability

In Group A, B, E and I occupancies, each mechanical system shall meet the requirements in Section D101.1.1.

Exception:

Occupiable spaces where 100 percent of the supply air meets high-efficiency particulate air filtration.

D101.1.1 Airflow for increased filtration

Mechanical systems shall be sized to accommodate a design airflow at a total static pressure drop that assumes the utilization of a supply air filter with a Minimum Efficiency Reporting Value (MERV) of not less than 13.

 134

134

Appendix E Clean air delivery and monitoring 2024

E101.1 Demand control ventilation

Group A, B, E and I occupancies shall be equipped with a minimum of one carbon dioxide sensor for every 500 square feet of occupiable space. Carbon dioxide sensors installed in accordance with this section shall meet the requirements in Sections E101.1.1 and E101.1.3. Mechanical equipment serving each zone shall be equipped with controls that meet the requirements in Section E101.1.2.

Exception: Occupiable zones less than 500 square feet.

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Appendix E Clean air delivery and monitoring 2024

E101.1.1 Carbon dioxide sensor performance specifications

E101.1.2 Mechanical system controls

E101.1.3 Carbon dioxide detection threshold level

E101.1.4 Carbon dioxide detection threshold level exceeded

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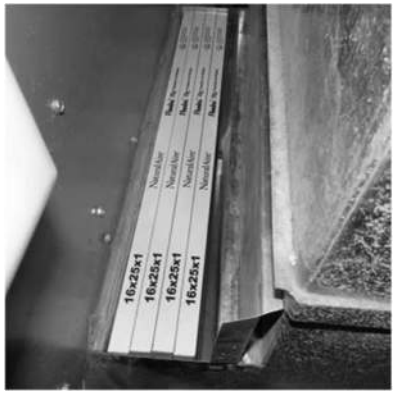

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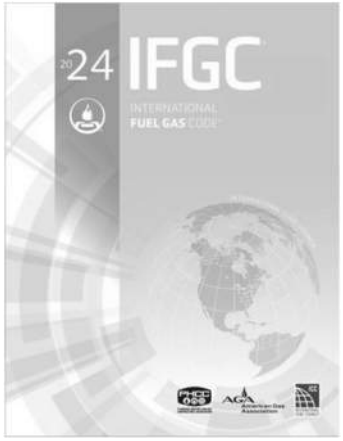

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IFGC 2024

- Administrative changes New 2024
  - Section 104 Determination of compliance
    Significantly updated
    - Process by which compliance is approved
    - Listing and labeling
    - Tests, reports, technical assistance
    - qualifications

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IFGC 2024

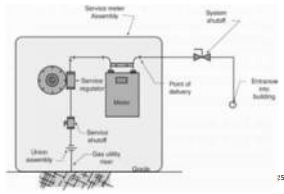
- Administrative changes New 2024
  - 108.3 Permit Valuations
    - Gives the Building Official ability to adjust final valuation amount for permit fees.

 151

151

Definition

POINT OF DELIVERY. For natural gas systems, the point of delivery is the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where a meter is not provided. Where a system shutoff valve is provided after the outlet of the service meter assembly, such valve shall be considered to be downstream of the point of delivery. For undiluted liquefied petroleum gas systems, the point of delivery shall be considered to be the outlet of the service pressure regulator, exclusive of line gas regulators, in the system.
SERVICE METER ASSEMBLY. The meter, valve, regulator, piping, fittings and equipment installed by the service gas supplier before the point of delivery
SYSTEM SHUTOFF. A valve installed after the point of delivery to shut off the entire piping system.
VALVE. A device used in piping to control the gas supply to any section of a system of piping or to an appliance.
Service shutoff. A valve, installed by the serving gas supplier between the ~~service meter or~~ source of supply and the point of delivery ~~customer piping system~~, to shut off the entire piping system.



Service meter assembly and point of delivery
International Code Council

 152

152

Definition

LISTED

Adds:

Terms that are used to identify listed equipment, products or materials include “listed,” “certified,” “classified” or other terms as determined appropriate by the listing organization

 153

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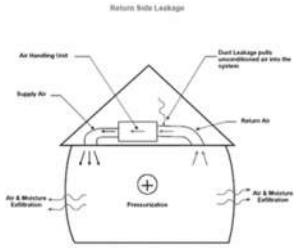
Definition

[M] AIR, MAKEUP. Any combination of outdoor and transfer

air intended to replace exhaust air and exfiltration.



 154

154

Definition

PEER REVIEW

An independent and objective technical review conducted by an approved third party

 155

155

303.3.1 Fireplaces and decorative appliances in Group I-2 Condition 2 occupancies (2018)

Gas fireplace appliances and decorative gas appliances shall be prohibited in Group I-2, condition 2 occupancies except where such appliances are direct-vent appliances installed in public lobby and waiting areas that are not within smoke compartments containing patient sleeping areas. The appliance controls shall be located where they can be accessed only by facility staff. Such fireplaces shall comply with Sections 501.2 and 604.1 and Section 915 of the International Fire Code.

308.4.1.2 Condition 2

This occupancy condition shall include facilities that provide nursing and medical care and could provide emergency care, surgery, obstetrics or in-patient stabilization units for psychiatric or detoxification, including but not limited to hospitals

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IFGC 304.1 COMBUSTION, VENTILATION AND DILUTION AIR

Where chemicals that generate corrosive or flammable products such as aerosol sprays are routinely used, one of the following shall apply to fired appliances where these chemicals can enter combustion air:

1. Fired appliances shall be located in a mechanical room separate or partitioned off from other areas with provisions for combustion and dilution air from outdoors.

2. The appliances shall be direct vent and installed in accordance with the appliance manufacturer's installation instructions.

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IFGC 304.5 Indoor combustion air

- The required volume of indoor air shall be determined in accordance with Section C304.5.1 or C304.5.2, except that where the air infiltration rate is known to be less than 0.40 air changes per hour (ACH), Section C304.5.2 shall be used.
- The total required volume shall be the sum of the required volume calculated for all appliances located within the space.
- Rooms communicating directly with the space in which the appliances are installed through openings not furnished with doors, and through combustion air openings sized and located in accordance with Section C304.5.3, are considered to be part of the required volume.

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158

IFGC 304.5.1 Standard method

- The minimum required volume shall be 50 cubic feet per 1,000 Btu/h of the appliance input rating.
- is based on a conservative assumed natural air infiltration rate of at least 0.40 air change per hour (ACH); therefore, if the ACH is known to be less than 0.40, this method cannot be used.
- So how does one know what the natural air infiltration rate is??????

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159

IFGC 304.5.2 Known air-infiltration-rate method

- Where the air infiltration rate of a structure is known, the minimum required volume shall be determined as follows:
- For appliances other than fan-assisted, calculate volume using Equation 3-1
- For fan-assisted appliances, calculate volume using Equation 3-2.

$$Required\ Volume_{other} \geq \frac{21\ ft^3}{ACH}\left(\frac{I_{other}}{1{,}000\ Btu/hr}\right)$$

(Equation 3-1)

$$Required\ Volume_{fan} \geq \frac{15\ ft^3}{ACH}\left(\frac{I_{fan}}{1{,}000\ Btu/hr}\right)$$

(Equation 3-2)

where:
I_{other} = All appliances other than fan assisted (input in Btu/h).
I_{fan} = Fan-assisted appliance (input in Btu/h).
ACH = Air change per hour (percent of volume of space exchanged per hour, expressed as a decimal).

For purposes of this calculation, an infiltration rate greater than 0.60 ACH shall not be used in Equations 3-1 and 3-2.

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IFGC 304.5.2
Known air-infiltration-rate method

Assume and ACH50 of 2.5

Convert ACH50 to Natural ACH: ACH50/20

2.5/20 = 0.125

For appliances other than fan-assisted, calculate volume using Equation 3-1.

$$Required\ Volume_{other} \geq \frac{21\ ft^3}{ACH}\left(\frac{I_{other}}{1{,}000\ Btu/h}\right)$$

(Equation 3-1)

21 ft³ / 0.125 * (50,000 / 1000)

168 * 50 = 8400 cubic feet

For fan-assisted appliances, calculate volume using Equation 3-2.

$$Required\ Volume_{fan} \geq \frac{15\ ft^3}{ACH}\left(\frac{I_{fan}}{1{,}000\ Btu/h}\right)$$

(Equation 3-2)

15 ft³ / 0.125 * (50,000 / 1000)

120 * 50 = 6,000 cubic feet

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304.7 Combination indoor and outdoor combustion air

Needed volume = 7500

Actual Volume = 5000

One opening size = 50”

$$\left[1 - \left(\frac{\text{available indoor volume}}{\text{volume required by Section 304.5}}\right)\right] \times \text{full size opening required by Section 304.6} = \text{reduced size outdoor air openings}$$

[1- (5000/7500)] * 50

[1- 0.67] * 50

.33 * 50 = 16.5” required outside opening

Diameter squared in inches * .7854 = area

25 * 0.7854 = 19.63 sq. in.

5” duct would work

304.7.3 Outdoor opening(s) size.

The outdoor opening(s) size shall be calculated in accordance with the following:

1. The ratio of interior spaces shall be the available volume of all communicating spaces divided by the required volume.

2. The outdoor size reduction factor shall be one minus the ratio of interior spaces.

3. The minimum size of outdoor opening(s) shall be the full size of outdoor opening(s) calculated in accordance with Section 304.6, multiplied by the reduction factor.

The minimum dimension of air openings shall be not less than 3 inches

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IFGC 304.11
Combustion Air Ducts

- Galvanized steel equivalent corrosion-resistant material approved for this application.
- shall terminate in an unobstructed space allowing free movement of combustion
- Shall serve a single enclosure.
- Shall not serve both upper and lower combustion air openings.

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IFGC 304.11
Combustion Air Ducts

- Cannot be screened where terminating in an attic space.
- Horizontal upper combustion air ducts cannot slope downward toward the source of combustion air.
- The remaining space surrounding a chimney liner, gas vent, special gas vent or plastic piping installed within a masonry, metal or factory-built chimney shall not be used to supply combustion air.
  - Exception: Direct-vent gas-fired appliances designed for installation in a solid fuel-burning fireplace where installed in accordance with the manufacturer’s instructions.
- Combustion air intake openings located on the exterior of a building shall have the lowest side of such openings located not less than 12 inches vertically from the adjoining finished ground level.

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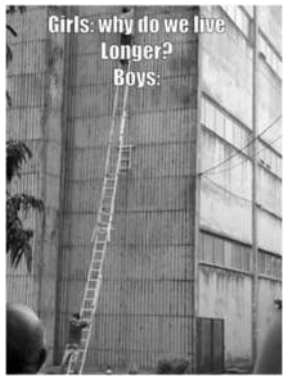
IFGC 2024

Changes consistent with OSHA Regulations

306 Access
- 306.5 roofs and elevated surfaces
  - Permanent ladder—several changes 2024
    - Side railing to extend above 42” from edge of roof or platform.



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IFGC 2024

306 Access
- 306.5 roofs and elevated surfaces--2024
  - Rung spacing is now 10 inches minimum not to exceed 14 inches
  - Toe spacing in now minimum of 7 inches and not more than 12 inches.
  - Rails not to exceed 16 inches between rails.

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IFGC 2024

306 Access
- 306.5 roofs and elevated surfaces--2024
  - New –#11. landing required.
    - Landing shall be provided on exit side of roof hatch a 30-inch deep and not less than the hatch width.

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307.2 Concealed Condensate Piping (2021)

- **307.2 Fuel-burning appliances**
- Liquid combustion byproducts of condensing appliances shall be collected and discharged to an approved plumbing fixture or disposal area in accordance with the manufacturer's instructions. Condensate piping shall be of approved corrosion-resistant material and shall be not smaller than the drain connection on the appliance. Such piping shall maintain a minimum slope in the direction of discharge of not less than ⅛ unit vertical in 12 units horizontal (1-percent slope). The termination of concealed condensate piping shall be marked to indicate whether the piping is connected to the primary drain or to the secondary drain

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307.6 Condensate pumps

Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions.

 169

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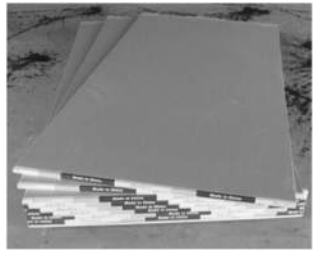
308.1 Clearance Reduction



- This section shall govern the reduction in required clearances to combustible materials, including gypsum board, and combustible assemblies for chimneys, vents, appliances, devices and equipment.
- Clearance requirements for air-conditioning equipment and central heating boilers and furnaces shall comply with Sections 308.3 and 308.4.

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310.3 Arc-resistant CSST (2018)

- Must be listed to ANSI LC 1/CSA 6026
- Must be bonded to an effective ground fault current path
- Shall be considered bonded when connected to a grounded appliance

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IFGC 401.7 Piping meter identification

- Piping from multiple meter installations shall be marked with an approved permanent identification by the installer so that the piping system supplied by each meter is readily identifiable.

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401.9 Identification

- Each length of pipe and tubing and each pipe fitting, utilized in a fuel gas system, shall bear the identification of the manufacturer.

Exceptions: New 2018

1. Steel pipe sections that are: two feet and less in length, cut from longer sections of pipe in the field and threaded in the field.
2. Steel pipe fittings 2 inch and less in size.
3. Where identification is provided on the product packaging or crating.
4. Where other approved documentation is provided.

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401.10 Piping materials standards. (2018)

401.10 ~~Third-party testing and certification.~~ **Piping materials standards**

~~Piping, tubing and fittings shall comply with the applicable referenced standards, specifications and performance criteria of this code and shall be identified in accordance with Section 401.9. Piping, tubing and fittings shall either be tested by an approved third-party testing agency or certified by an approved third-party certification agency.~~

Piping, tubing and fittings shall be manufactured to the applicable referenced standards, specifications an performance criteria listed in Section 403 of this code and shall be identified in accordance with Section 401.9.

403.4.2 Steel.
Steel and wrought-iron pipe shall be not less than standard weight (Schedule 40) and shall comply with one of the following standards:

1. ASME B36.10, 10M.
2. ASTM A 53/A53M.
3. ASTM A 106.

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401.10 Third-party testing and certification

- All piping, tubing and fittings shall comply with the applicable referenced standards, specifications and performance criteria of this code and shall be identified in accordance with Section 401.9.
- Piping, tubing and fittings shall either be tested by an approved third-party testing agency or certified by an approved third-party certification agency.

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402.2 Maximum gas demand

- The volumetric flow rate of gas to be provided shall be the sum of the maximum input of the appliances served.
- The total connected hourly load shall be used as the basis for pipe sizing, assuming that all appliances could be operating at full capacity simultaneously.
- Where a diversity of load can be established, pipe sizing shall be permitted to be based on such loads.
- The volumetric flow rate of gas to be provided shall be adjusted for altitude where the installation is above 2,000 feet in elevation.

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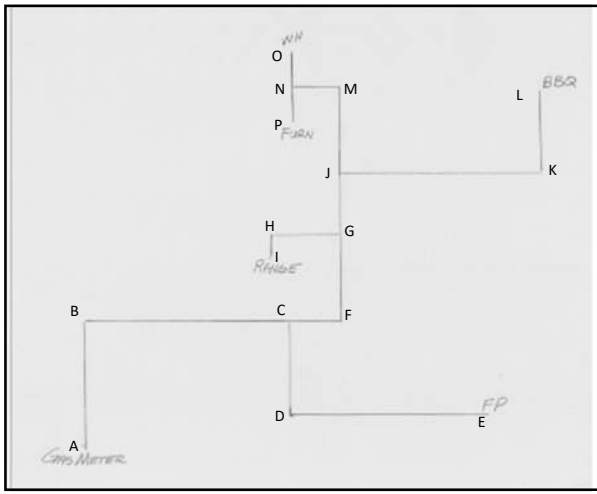

Gas Meter- 8” w.c.
Fireplace- 27,000
Range – 65,000
BBQ- 50,000
Furnace- 60,000
Water Heater- 50,000

A-B = 25’ J-M = 12’
B-C = 35’ M-N = 5’
C-D = 10’ N-P = 2’
D-E = 20’ N-O = 2’
C-F = 5’
F-G = 15’
G-H = 7’
H-I = 2’
G-J = 8’
J-K = 50’
K-L = 22’ 177

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TABLE 402.4(1)
SCHEDULE 40 METALLIC PIPE

Gas	Natural
Inlet Pressure	Less than 2 psi
Pressure Drop	0.3 in. w.c.
Specific Gravity	0.60

PIPE SIZE (inch)														
Nominal	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12
Actual ID	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026	5.047	6.065	7.981	10.020	11.938
Length (ft)	Capacity in Cubic Feet of Gas Per Hour													
10	131	273	514	1,060	1,580	3,050	4,860	8,580	17,500	31,700	51,300	105,000	191,000	303,000
20	90	188	353	726	1,090	2,090	3,340	5,900	12,000	21,800	35,300	72,400	132,000	208,000
30	72	151	284	583	873	1,680	2,680	4,740	9,660	17,500	28,300	58,200	106,000	167,000
40	62	129	243	499	747	1,440	2,290	4,050	8,270	15,000	24,200	49,800	90,400	143,000
50	55	114	215	442	662	1,280	2,030	3,590	7,330	13,300	21,500	44,100	80,100	127,000
60	50	104	195	400	600	1,160	1,840	3,260	6,640	12,000	19,500	40,000	72,600	115,000
70	46	95	179	368	552	1,060	1,690	3,000	6,110	11,100	17,900	36,800	66,800	106,000
80	42	89	167	343	514	989	1,580	2,790	5,680	10,300	16,700	34,200	62,100	98,400
90	40	83	157	322	482	928	1,480	2,610	5,330	9,650	15,600	32,100	58,300	92,300
100	38	79	148	304	455	877	1,400	2,470	5,040	9,110	14,800	30,300	55,100	87,200
125	33	70	131	269	403	777	1,240	2,190	4,460	8,080	13,100	26,900	48,800	77,300
150	30	63	119	244	366	704	1,120	1,980	4,050	7,320	11,900	24,300	44,200	70,000
175	28	58	109	224	336	648	1,030	1,820	3,720	6,730	10,900	22,400	40,700	64,400
200	26	54	102	209	313	602	960	1,700	3,460	6,260	10,100	20,800	37,900	59,900

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TABLE 402.4(2)
SCHEDULE 40 METALLIC PIPE

Gas	Natural
Inlet Pressure	Less than 2 psi
Pressure Drop	0.5 in. w.c.
Specific Gravity	0.60

PIPE SIZE (inch)														
Nominal	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12
Actual ID	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026	5.047	6.065	7.981	10.020	11.938
Length (ft)	Capacity in Cubic Feet of Gas Per Hour													
10	172	360	678	1,390	2,090	4,020	6,400	11,300	23,100	41,800	67,600	139,000	252,000	399,000
20	118	247	466	957	1,430	2,760	4,400	7,780	15,900	28,700	46,500	95,500	173,000	275,000
30	95	199	374	768	1,150	2,220	3,530	6,250	12,700	23,000	37,300	76,700	139,000	220,000
40	81	170	320	657	985	1,900	3,020	5,350	10,900	19,700	31,900	65,600	119,000	189,000
50	72	151	284	583	873	1,680	2,680	4,740	9,660	17,500	28,300	58,200	106,000	167,000
60	65	137	257	528	791	1,520	2,430	4,290	8,760	15,800	25,600	52,700	95,700	152,000
70	60	126	237	486	728	1,400	2,230	3,950	8,050	14,600	23,600	48,500	88,100	139,000
80	56	117	220	452	677	1,300	2,080	3,670	7,490	13,600	22,000	45,100	81,900	130,000
90	52	110	207	424	635	1,220	1,950	3,450	7,030	12,700	20,600	42,300	76,900	122,000
100	50	104	195	400	600	1,150	1,840	3,260	6,640	12,000	19,500	40,000	72,600	115,000
125	44	92	173	355	532	1,020	1,630	2,890	5,890	10,600	17,200	35,400	64,300	102,000
150	40	83	157	322	482	928	1,480	2,610	5,330	9,650	15,600	32,100	58,300	92,300
175	37	77	144	296	443	854	1,360	2,410	4,910	8,880	14,400	29,500	53,600	84,900
200	34	71	134	275	412	794	1,270	2,240	4,560	8,260	13,400	27,500	49,900	79,000

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TABLE 402.4(3)
SCHEDULE 40 METALLIC PIPE

Gas	Natural
Inlet Pressure	Less than 2 psi
Pressure Drop	3.0 in. w.c.
Specific Gravity	0.60

INTENDED USE: INITIAL SUPPLY PRESSURE OF 8.0-INCH W.C. OR GREATER									
PIPE SIZE (inch)									
Nominal	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Actual ID	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026
Length (ft)	Capacity in Cubic Feet of Gas Per Hour								
10	454	949	1,790	3,670	5,500	10,600	16,900	29,800	60,800
20	312	652	1,230	2,520	3,780	7,280	11,600	20,500	41,800
30	250	524	986	2,030	3,030	5,840	9,310	16,500	33,600
40	214	448	844	1,730	2,600	5,000	7,970	14,100	28,700
50	190	397	748	1,540	2,300	4,430	7,070	12,500	25,500
60	172	360	678	1,390	2,090	4,020	6,400	11,300	23,100
70	158	331	624	1,280	1,920	3,700	5,890	10,400	21,200
80	147	308	580	1,190	1,790	3,440	5,480	9,690	19,800
90	138	289	544	1,120	1,680	3,230	5,140	9,090	18,500
100	131	273	514	1,060	1,580	3,050	4,860	8,580	17,500
125	116	242	456	936	1,400	2,700	4,300	7,610	15,500
150	105	219	413	848	1,270	2,450	3,900	6,890	14,100
175	96	202	380	780	1,170	2,250	3,590	6,340	12,900
200	90	188	353	726	1,090	2,090	3,340	5,900	12,000

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TABLE 402.4(4)
SCHEDULE 40 METALLIC PIPE

Gas	Natural
Inlet Pressure	Less than 2 psi
Pressure Drop	6.0 in. w.c.
Specific Gravity	0.60

INTENDED USE: INITIAL SUPPLY PRESSURE OF 11.0-INCH W.C. OR GREATER									
PIPE SIZE (inch)									
Nominal	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Actual ID	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026
Length (ft)	Capacity in Cubic Feet of Gas Per Hour								
10	660	1,380	2,600	5,340	8,000	15,400	24,600	43,400	88,500
20	454	949	1,790	3,670	5,500	10,600	16,900	29,900	60,800
30	364	782	1,440	2,950	4,420	8,500	13,600	24,000	48,900
40	312	652	1,230	2,520	3,780	7,280	11,600	20,500	41,800
50	276	578	1,090	2,240	3,350	6,450	10,300	18,200	37,100
60	250	524	986	2,030	3,030	5,840	9,310	16,500	33,600
70	230	482	907	1,860	2,790	5,380	8,570	15,100	30,900
80	214	448	844	1,730	2,600	5,000	7,970	14,100	28,700
90	201	420	792	1,630	2,440	4,690	7,480	13,200	27,000
100	190	397	748	1,540	2,300	4,430	7,070	12,500	25,500

181

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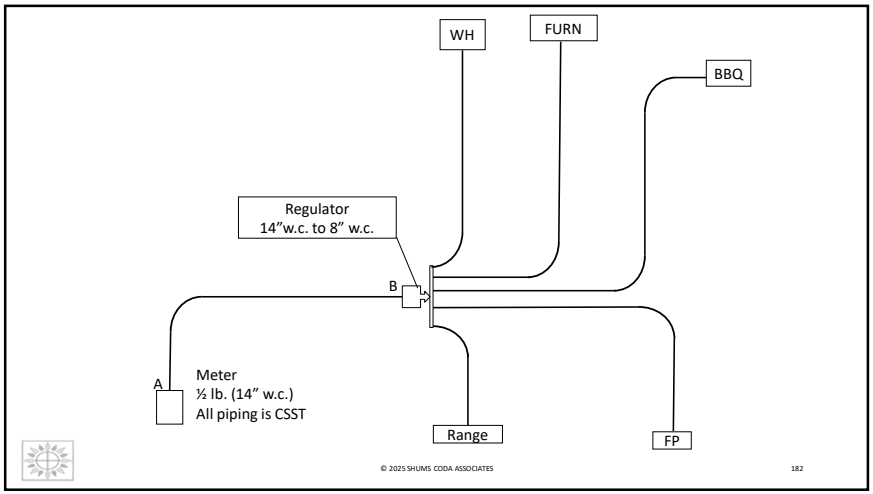

182

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TABLE 402.4(15)
CORRUGATED STAINLESS STEEL TUBING (CSST)

Gas	Natural
Inlet Pressure	Less than 2 psi
Pressure Drop	0.5 in. w.c.
Specific Gravity	0.60

TUBE SIZE (EHD)														
Flow Designation	13	15	18	19	23	25	30	31	37	39	46	48	60	62
Length (ft)	Capacity in Cubic Feet of Gas Per Hour													
5	46	63	115	134	225	270	471	546	895	1,037	1,790	2,070	3,660	4,140
10	32	44	82	95	161	192	330	383	639	746	1,260	1,470	2,600	2,930
15	25	35	66	77	132	157	267	310	524	615	1,030	1,200	2,140	2,400
20	22	31	58	67	116	137	231	269	456	536	888	1,050	1,850	2,080
25	19	27	52	60	104	122	206	240	409	482	793	936	1,660	1,860
30	18	25	47	55	96	112	188	218	374	442	723	856	1,520	1,700
40	15	21	41	47	83	97	162	188	325	386	625	742	1,320	1,470
50	13	19	37	42	75	87	144	168	292	347	559	665	1,180	1,320
60	12	17	34	38	68	80	131	153	267	318	509	608	1,080	1,200
70	11	16	31	36	63	74	121	141	248	295	471	563	1,000	1,110
80	10	15	29	33	60	69	113	132	232	277	440	527	940	1,040

Size (inch)	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
EHD (AGA size)	15	19	25	31	39	46	62

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TABLE 402.4(16)
CORRUGATED STAINLESS STEEL TUBING (CSST)

Gas	Natural
Inlet Pressure	Less than 2 psi
Pressure Drop	3.0 in. w.c.
Specific Gravity	0.60

INTENDED USE: INITIAL SUPPLY PRESSURE OF 8.0-INCH W.C. OR GREATER														
TUBE SIZE (EHD)														
Flow Designation	13	15	18	19	23	25	30	31	37	39	46	48	60	62
Length (ft)	Capacity in Cubic Feet of Gas Per Hour													
5	120	160	277	327	529	649	1,180	1,370	2,140	2,423	4,430	5,010	8,800	10,100
10	83	112	197	231	380	462	828	958	1,530	1,740	3,200	3,560	6,270	7,160
15	67	90	161	189	313	379	673	778	1,250	1,433	2,540	2,910	5,140	5,850
20	57	78	140	164	273	329	580	672	1,090	1,249	2,200	2,530	4,460	5,070
25	51	69	125	147	245	295	518	599	978	1,123	1,960	2,270	4,000	4,540
30	46	63	115	134	225	270	471	546	895	1,029	1,790	2,070	3,660	4,140
40	39	54	100	116	196	234	407	471	778	897	1,550	1,800	3,180	3,590
50	35	48	89	104	176	210	363	421	698	806	1,380	1,610	2,850	3,210
60	32	44	82	95	161	192	330	383	639	739	1,260	1,470	2,600	2,930
70	29	41	76	88	150	178	306	355	593	686	1,170	1,360	2,420	2,720
80	27	38	71	82	141	167	285	331	555	644	1,090	1,280	2,260	2,540

Size (inch)	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
EHD (AGA size)	15	19	25	31	39	46	62

184

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TABLE 402.4(17)
CORRUGATED STAINLESS STEEL TUBING (CSST)

Gas	Natural
Inlet Pressure	Less than 2 psi
Pressure Drop	6.0 in. w.c.
Specific Gravity	0.60

INTENDED USE: INITIAL SUPPLY PRESSURE OF 11.0-INCH W.C. OR GREATER														
TUBE SIZE (EHD)														
Flow Designation	13	15	18	19	23	25	30	31	37	39	46	48	60	62
Length (ft)	Capacity in Cubic Feet of Gas Per Hour													
5	173	229	389	461	737	911	1,690	1,950	3,000	3,375	6,280	7,050	12,400	14,260
10	120	160	277	327	529	649	1,180	1,379	2,140	2,423	4,430	5,010	8,800	10,100
15	96	130	227	267	436	532	960	1,110	1,760	1,996	3,610	4,100	7,210	8,260
20	83	112	197	231	380	462	828	958	1,530	1,740	3,120	3,550	6,270	7,160
25	74	99	176	207	342	414	739	855	1,370	1,564	2,790	3,190	5,620	6,400
30	67	90	161	189	313	378	673	778	1,250	1,433	2,540	2,910	5,140	5,850
40	57	78	140	164	273	329	580	672	1,090	1,249	2,200	2,530	4,460	5,070
50	51	69	125	147	245	295	518	599	978	1,123	1,960	2,270	4,000	4,540
60	46	63	115	134	225	270	471	546	895	1,029	1,790	2,070	3,660	4,140
70	42	58	106	124	209	250	435	505	830	956	1,660	1,920	3,390	3,840
80	39	54	100	116	196	234	407	471	778	897	1,550	1,800	3,180	3,590
Size (inch)			3/8"		1/2"		3/4"		1"		1-1/4"	1-1/2"	2"	
EHD (AGA size)			15		19		25		31		39	46	62	

185

185

402.7 Maximum operating pressure

- The maximum operating pressure for piping systems located inside buildings shall not exceed 5 pounds per square inch gauge (psig) except where one or more of the following conditions are met:
- 1.The piping joints are welded or brazed.
- 2.The piping is joined by fittings listed to ANSI LC-4/CSA 6.32 and installed in accordance with the manufacturer's instructions.

186

186

403 Piping Materials

- Metallic pipe/Tubing
  - Steel pipe/tubing
  - Copper & Brass pipe/tubing
  - Aluminum pipe/tubing
  - Corrugated Stainless Steel Tubing

187

187

403.5 Fuel Pipe Material

- Plastic Piping
  - Outside, underground only

188

188

403.5 Plastic pipe, tubing and fittings

- Polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) plastic pipe, tubing and fittings shall not be used to supply fuel gas

 189

189

403.8.3Threaded joint sealing

- Threaded joints shall be made using a thread joint sealing material. Thread joint sealing materials shall be nonhardening and shall be resistant to the chemical constituents of the gases to be conducted through the piping. Thread joint sealing materials shall be compatible with the pipe and fitting materials on which the sealing materials are used.

 190

190

404.1 Installation of materials

- All materials used shall be installed in strict accordance with the standards under which the materials are accepted and approved. In the absence of such installation procedures, the manufacturer's instructions shall be followed.
- Where the requirements of referenced standards or manufacturer's instructions do not conform to minimum provisions of this code, the provisions of this code shall apply.

 191

191

404.2 Corrugated Stainless Steel Tubing

- CSST piping systems shall be installed in accordance with the terms of their approval, the conditions of listing, the manufacturer's instructions and this code.

 192

192

Prohibited piping locations 404.3

- Piping shall not be installed in or through a ducted supply, return or exhaust, or a clothes chute, chimney or gas vent, dumbwaiter or elevator shaft.
- Piping installed downstream of the point of delivery shall not extend through any townhouse unit other than the unit served by such piping

 193

193

404.5 Fittings in concealed locations

Fittings installed in concealed locations shall be limited to the following types:

1. Threaded elbows, tees and couplings, plugs and caps
2. Brazed fittings.
3. Welded fittings.
4. Fittings listed to ANSI LC-1/CSA 6.26 or ANSI LC-4.

 194

194

404.7 Protection against physical damage

- Where piping will be concealed within light-frame construction assemblies, the piping shall be protected against penetration by fasteners in accordance with Sections 404.7.1 through 404.7.3.

  Exception: Black steel piping and galvanized steel piping shall not be required to be protected.

Note: Although not in the code this section is not intended for CSST piping. CSST manufactures have their own (and generally more restrictive) requirements

 195

195

- **404.7.1 Piping through holes or notches**
- Where piping is installed through holes or notches in framing members and the piping is located less than 11/2 inches from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend not less than 4 inches to each side of the framing member.
- Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend not less than 4 Inches above the bottom framing member and not less than 4 inches below the top framing member.
- **404.7.2 Piping installed in other locations**
- Where the piping is located within a framing member and is less than 1 ½ inches from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1 ½ inches from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping.

 196

196

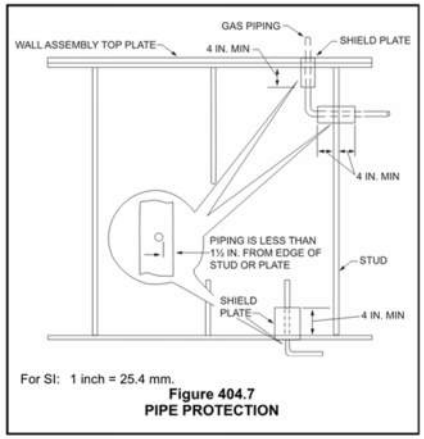


Figure 404.7
PIPE PROTECTION

197

197

406.5.1 Detection methods

- The leakage shall be located by means of a listed combustible gas detector, a noncorrosive leak detection fluid or other approved leak detection methods.

198

198

406.7.3.1 Abandoned fuel gas piping

- Where fuel gas piping is removed from service for an indefinite time period, it shall be purged

199

199

IFGC 408.2 Drips

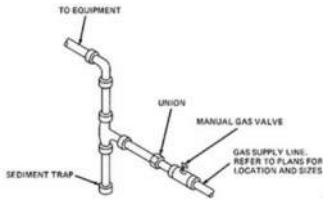
- Where wet gas exists, a drip shall be provided at any point in the line of pipe where condensate could collect.
- A drip shall also be provided at the outlet of the meter and shall be installed so as to constitute a trap wherein an accumulation of condensate will shut off the flow of gas before the condensate will run back into the meter.

200

200

408.4 Sediment trap

- Illuminating appliances, ranges, clothes dryers, decorative vented appliances for installation in vented fireplaces, gas fireplaces, and outdoor grills need not be equipped with a sediment trap.



 201

201

Appliance shutoff valve IFGC 409.5

- Each appliance shall be provided with a shutoff valve in accordance with Section 409.5.1, 409.5.2 or 409.5.3.
  - Located within same room
  - Vented decorative appliances and room heaters
  - Located at manifold

 202

202

Located within same room IFGC 409.5.1 (2018)

- The shutoff valve shall be located in the same room as the appliance
- The shutoff valve shall be within 6 feet of the appliance , and shall be installed upstream of the union, connector or quick disconnect device it serves. Such shutoff valves shall be provided with access
- Appliance shutoff valves located in the firebox of a fireplace shall be installed in accordance with the appliance manufacturer's instructions
- Shutoff valves serving movable appliances, such as cooking appliances and clothes dryers, shall be considered to be provided with *access* where installed behind such appliances

 203

203

Vented decorative appliances and room heaters - IFGC 409.5.2

- Shutoff valves for vented decorative appliances, room heaters and decorative appliances for installation in vented fireplaces shall be permitted to be installed in an area remote from the appliances where such valves are provided with ready access
- Such valves shall be permanently identified and shall serve no other appliance .
- The piping from the shutoff valve to within 6 feet of the appliance shall be designed, sized and installed in accordance with Sections 401 through 408.

 204

204

Located at manifold
IFGC 409.5.3

- Where the appliance shutoff valve is installed at a manifold, such shutoff valve shall be located within 50 feet of the appliance served and shall be readily accessible and permanently identified. The piping from the manifold to within 6 feet of the appliance shall be designed, sized and installed in accordance with Sections 401 through 408.

 205

205

409.7 Shutoff valves in tubing systems (New 2018)

Shutoff valves installed in tubing systems shall be rigidly and securely supported independently of the tubing

 206

206

IFGC 410.1
Pressure regulators

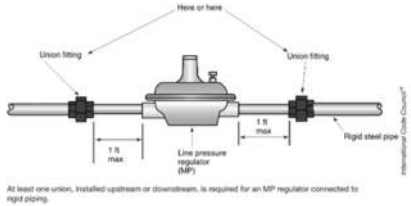
- A line pressure regulator shall be installed where the appliance is designed to operate at a lower pressure than the supply pressure.
- Line gas pressure regulators shall be listed as complying with ANSI Z21.80.
- Access shall be provided to pressure regulators.
- Pressure regulators shall be protected from physical damage.
- Regulators installed on the exterior of the building shall be approved for outdoor installation.

 207

207

410.2 MP regulators

7. Where connected to rigid piping, a union shall be installed within 1 foot of either side of the MP regulator



 208

208

Regulator Vent Piping
IFGC 410.3.1

- Vent piping for relief vents and breather vents shall be constructed of materials allowed for gas piping in accordance with Section 403.
- Regulator vent piping shall not exceed the length specified in the regulator manufacturer's installation instructions.

 209

209

411.1 Connecting appliances

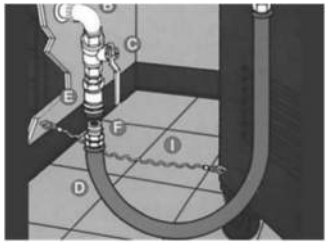
8. Listed outdoor gas hose connectors in compliance with ANSI Z21.54 used to connect portable outdoor appliances. The gas hose connection shall be made only in the outdoor area where the appliance is used, and shall be to the gas piping supply at an appliance shutoff valve, a listed quick-disconnect device or listed gas convenience outlet

 210

210

411.1.1 Commercial cooking appliances

- ……The commercial cooking appliance connector installation shall be configured in accordance with the manufacturer’s instructions
- Movement of appliances with casters shall be limited by a restraining device installed in accordance with the connector and appliance manufacturer’s instructions



 211

211

411.4 Injection Bunsen-type burners (2018)

Injection Bunsen-type burners used in laboratories and educational facilities shall be connected to the gas supply system by either a listed or unlisted hose.

 212

212

IFGC 501 Chimneys and vents

- This chapter shall govern the installation, maintenance, repair and approval of factory-built chimneys, chimney liners, vents and connectors and the utilization of masonry chimneys serving gas-fired appliances.
- The requirements for the installation, maintenance, repair and approval of factory-built chimneys, chimney liners, vents and connectors serving appliances burning fuels other than fuel gas shall be regulated by the International Mechanical Code .
- The construction, repair, maintenance and approval of masonry chimneys shall be regulated by the International Building Code.

 213

213

Venting Gas Appliance Category I

- **Category I**
- An appliance that operates with a nonpositive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.

 214

214

Venting Gas Appliance Category II

- **Category II**

An appliance that operates with a nonpositive vent static pressure and with a vent gas temperature that is capable of causing excessive condensate production in the vent.

 215

215

Venting Gas Appliance Category III

- **Category III**

An appliance that operates with a positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.

 216

216

Venting Gas Appliance Category IV

- **Category IV**

An appliance that operates with a positive vent static pressure and with a vent gas temperature that is capable of causing excessive condensate production in the vent.

 217

217

502 Vents

- All vents, except as provided in Section 503.7, shall be listed and labeled .
- Type B and BW vents shall be tested in accordance with UL 441.
- Type L vents shall be tested in accordance with UL 641.
- Vents for Category II and III appliances shall be tested in accordance with UL 1738.
- Plastic vents for Category IV appliances shall not be required to be listed and labeled where such vents are as specified by the appliance manufacturer and are installed in accordance with the appliance manufacturer's installation instructions.

 218

218

502.7.1 Door swing

- Appliance and equipment vent terminals shall be located such that doors cannot swing within 12 inches horizontally of the vent terminal.
- Door stops or closer shall not be installed to obtain this clearance.

 219

219

503.4.1 Plastic piping

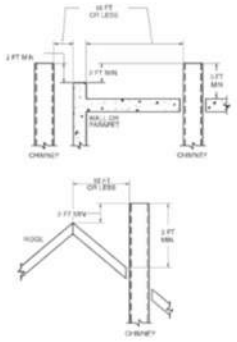
- Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer’s installation instructions shall identify the specific plastic piping material

 220

220

503.5.4 Chimney Termination

- Chimneys for residential-type or low-heat appliances shall extend at least 3 feet above the highest point where they pass through a roof of a building and at least 2 feet higher than any portion of a building within a horizontal distance of 10 feet.
- Chimneys for medium-heat appliances shall extend at least 10 feet higher than any portion of any building within 25 feet.
- Chimneys shall extend at least 5 feet above the highest connected appliance draft hood outlet or flue collar.



 221

221

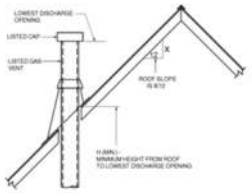
503.5.6.1 Chimney lining

- Chimneys shall be lined in accordance with NFPA 211.
- ~~Exception: Where an existing chimney complies with Sections 503.5.6 through 503.5.6.3 and its sizing is in accordance with Section 503.5.5, its continued use shall be allowed where the appliance vented by such chimney is replaced by an appliance of similar type, input rating and efficiency~~

 222

222

503.6.5 Gas vent termination



ROOF SLOPE	H (min) ft
Flat to 6/12	1.0
Over 6/12 to 7/12	1.25
Over 7/12 to 8/12	1.5
Over 8/12 to 9/12	2.0
Over 9/12 to 10/12	2.5
Over 10/12 to 11/12	3.25
Over 11/12 to 12/12	4.0
Over 12/12 to 14/12	5.0
Over 14/12 to 16/12	6.0
Over 16/12 to 18/12	7.0
Over 18/12 to 20/12	7.5
Over 20/12 to 21/12	8.0

1. Gas vents that are 12 inches or less in size and located not less than 8 feet from a vertical wall or similar obstruction shall terminate above the roof in accordance with Figure 503.6.4.

2. Gas vents that are over 12 inches in size or are located less than 8 feet from a vertical wall or similar obstruction shall terminate not less than 2 feet above the highest point where they pass through the roof and not less than 2 feet above any portion of a building within 10 feet horizontally.

 223

223

503.6.9.3 Category II, III and IV Appliances

- The sizing of plastic pipe that is specified by the appliance manufacturer as a venting material for Category II, III and IV appliances, shall be in accordance with the manufacturer's instructions

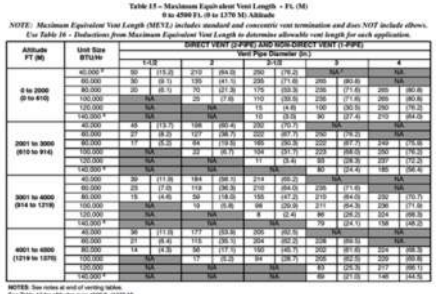


Table 15 – Maximum Equivalent Vent Length – Ft. (M)
0 to 4500 Ft. (0 to 1370 M) Altitude

NOTE: Maximum Equivalent Vent Length (MEVL) includes standard and concentric vent termination and does NOT include elbows. Use Table 16 – Deductions from Maximum Equivalent Vent Length to determine allowable vent length for each application.

Altitude FT (M)	Unit Size BTU/Hr	DIRECT VENT (2-PIPE) AND NON-DIRECT VENT (1-PIPE) Vent Pipe Diameter (in.)							
		1-1/2		2		2-1/2		3	4
0 to 2000 (0 to 610)	40,000 [a]	50	(15.2)	210	(64.0)	250	(76.2)	NA	NA
	80,000	30	(9.1)	130	(41.1)	235	(71.6)	250 (80.6)	NA
	100,000	20	(6.1)	70	(21.3)	175	(53.3)	235 (71.6)	265 (80.8)
	120,000	NA		25	(7.6)	110	(33.5)	235 (71.6)	265 (80.8)
	140,000 [a]	NA		NA		15	(4.6)	100 (30.5)	230 (70.2)
2001 to 3000 (610 to 914)	40,000	45	(13.7)	195	(60.4)	250	(76.2)	NA	NA
	80,000	27	(8.2)	127	(38.7)	222	(67.7)	250 (76.2)	NA
	100,000	17	(5.2)	64	(19.5)	165	(50.3)	222 (67.7)	249 (75.9)
	120,000	NA		22	(6.7)	104	(31.7)	222 (68.0)	250 (76.2)
	140,000 [a]	NA		NA		11	(3.4)	93 (28.3)	227 (72.2)
3001 to 4000 (914 to 1219)	40,000	39	(11.9)	184	(56.1)	214	(65.2)	NA	NA
	80,000	23	(7.0)	118	(36.0)	210	(64.0)	235 (71.6)	NA
	100,000	15	(4.6)	59	(18.0)	155	(47.2)	210 (64.0)	232 (70.7)
	120,000	NA		19	(5.8)	98	(29.9)	211 (64.3)	236 (71.9)
	140,000 [a]	NA		NA		8	(2.4)	86 (26.2)	224 (68.3)
4001 to 4500 (1219 to 1370)	40,000	36	(11.0)	177	(53.9)	205	(62.5)	NA	NA
	80,000	21	(6.4)	113	(34.1)	204	(62.2)	228 (69.5)	NA
	100,000	14	(4.3)	56	(17.1)	150	(45.7)	202 (61.6)	224 (68.3)
	120,000	NA		17	(5.2)	94	(28.7)	205 (62.5)	229 (69.8)
	140,000 [a]	NA		NA		NA		83 (25.3)	217 (66.1)
		NA		NA		NA		69 (21.0)	196 (54.5)

NOTES: See notes at end of venting tables.
See Table 17 for altitudes over 4500 ft. (1370 M).

 224

224

Vents - Fastener Penetrations 503.6.13

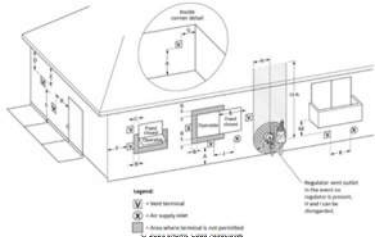
- Screws, rivets and other fasteners shall not penetrate the inner wall of double-wall gas vents, except at the transition from an appliance draft hood outlet, a flue collar or a single-wall metal connector to a double-wall vent.

 225

225

503.8 Venting system termination clearances

- The clearances for through-the-wall direct-vent and nondirect-vent terminals shall be in accordance with Table 503.8 and Figure 503.8.
- Exception: The clearances in Table 503.8 shall not apply to the combustion air intake of a direct-vent appliance.



226

226

503.10 Vent connectors for Category I appliances

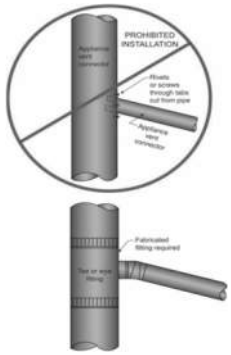
- A vent connector shall be used to connect an appliance to a gas vent, chimney or single-wall metal pipe, except where the gas vent, chimney or single-wall metal pipe is directly connected to the appliance .

 227

227

503.10.7 Connector junctions

- Where vent connectors are joined together, the connection shall be made with a tee or wye fitting.



International Code Council

 228

228

503.10.4 - Two or more appliances connected to a single vent or chimney

- Where two or more vent connectors enter a common gas vent, chimney flue or single-wall metal pipe, the smaller connector shall enter at the highest level consistent with the available headroom or clearance to combustible material.
- Vent connectors serving Category I appliances shall not be connected to any portion of a mechanical draft system operating under positive static pressure, such as those serving Category III or IV appliances.

 229

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IFGC 503.10.5 Clearance

TABLE 503.10.5[a]
CLEARANCES FOR CONNECTORS

APPLIANCE	MINIMUM DISTANCE FROM COMBUSTIBLE MATERIAL			
	Listed Type B gas vent material	Listed Type L vent material	Single-wall metal pipe	Factory-built chimney sections
Listed appliances with draft hoods and appliances listed for use with Type B gas vents	As listed	As listed	6 inches	As listed
Residential boilers and furnaces with listed gas conversion burner and with draft hood	6 inches	6 inches	9 inches	As listed
Residential appliances listed for use with Type L vents	Not permitted	As listed	9 inches	As listed
Listed gas-fired toilets	Not permitted	As listed	As listed	As listed
Unlisted residential appliances with draft hood	Not permitted	6 inches	9 inches	As listed
Residential and low-heat appliances other than above	Not permitted	9 inches	18 inches	As listed
Medium-heat appliances	Not permitted	Not permitted	36 inches	As listed

For SI: 1 inch = 25.4 mm.
a. These clearances shall apply unless the manufacturer's installation instructions for a listed appliance or connector specify different clearances, in which case the listed clearances shall apply.

 230

230

IFGC 503.10.9 Length of vent connector

- A vent connector shall be as short as practical and the appliance located as close as practical to the chimney or vent.
- The maximum horizontal length of a single-wall connector shall be 75 percent of the height of the chimney or vent except for engineered systems.
- The maximum horizontal length of a Type B double-wall connector shall be 100 percent of the height of the chimney or vent except for engineered systems.

 231

231

Outside wall penetrations IFGC 503.16

- Where vents, including those for direct-vent appliances , penetrate outside walls of buildings, the annular spaces around such penetrations shall be permanently sealed using approved materials to prevent entry of combustion products into the building.

 232

232

SECTION 504
SIZING OF CATEGORY I APPLIANCE VENTING SYSTEMS

- FAN-ASSISTED COMBUSTION SYSTEM An appliance equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber or heat exchanger.
- FAN Min. The minimum input rating of a Category I fan-assisted appliance attached to a vent or connector.
- FAN Max. The maximum input rating of a Category I fan-assisted appliance attached to a vent or connector.
- NAT Max. The maximum input rating of a Category I draft-hood-equipped appliance attached to a vent or connector

 233

233

SECTION 504
SIZING OF CATEGORY I APPLIANCE VENTING SYSTEMS

- FAN + FAN. The maximum combined appliance input rating of two or more Category I fan-assisted appliances attached to the common vent.
- FAN + NAT. The maximum combined appliance input rating of one or more Category I fan-assisted appliances and one or more Category I draft-hood-equipped appliances attached to the common vent.
- NA. Vent configuration is not allowed due to potential for condensate formation or pressurization of the venting system, or not applicable due to physical or geometric restraints.
- NAT + NAT. The maximum combined appliance input rating of two or more Category I draft-hood-equipped appliances attached to the common vent.

 234

234

SECTION 504
SIZING OF CATEGORY I APPLIANCE VENTING SYSTEMS

- The sizing tables are based on an assumed outdoor temperature of 42°F and the assumption that all portions of a vent or chimney below the roof penetration are exposed to an ambient temperature of 60°F. Long runs of vent piping through attics and long extensions above roofs should be avoided in cold climates.

TABLE 504.2(1)
TYPE B DOUBLE-WALL GAS VENT

Number of Appliances	Single																			
Appliance Type	Category I																			
Appliance Vent Connection	Connected directly to vent																			
VENT DIAMETER—Ø (inches)																				
HEIGHT H (feet)	LATERAL R (feet)	3		4		5		6		7		8		9						
		APPLIANCE INPUT RATING IN THOUSANDS OF BTU/H																		
		FAN		NAT		FAN		NAT		FAN		NAT		FAN		NAT		FAN		NAT
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max
6	0	9	78	46	9	152	86	9	251	141	9	375	205	9	524	285	9	698	379	9	897	478
	2	13	61	36	16	97	67	27	157	100	32	232	157	44	321	217	53	425	285	63	543	370
	4	21	49	34	30	94	64	39	153	103	50	227	153	66	318	211	79	419	275	93	536	362
	6	25	44	32	36	91	61	47	149	100	59	223	149	76	310	200	93	415	270	110	535	354

 235

235

- Given:
- 150,000 Btuh Fan assisted Category I appliance
- 20’ vent height
- 15’ lateral
- Vent size?

 236

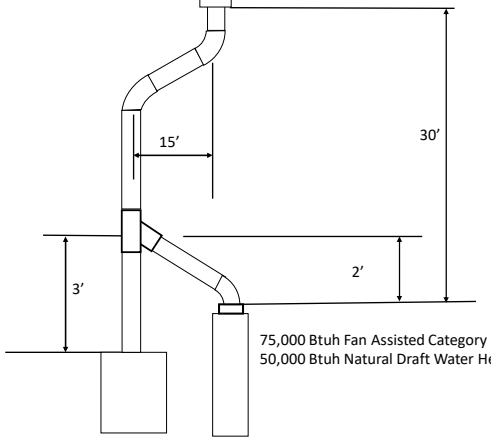
236

TABLE 504.2(1)
TYPE B DOUBLE-WALL GAS VENT

Number of Appliances	Single
Appliance Type	Category I
Appliance Vent Connection	Connected directly to vent

HEIGHT (H) (feet)	LATERAL (L) (feet)	VENT DIAMETER—(D) inches: 3 FAN Min	3 FAN Max	3 NAT Max	4 FAN Min	4 FAN Max	4 NAT Max	5 FAN Min	5 FAN Max	5 NAT Max	6 FAN Min	6 FAN Max	6 NAT Max	FA Min
		APPLIANCE INPUT RATING IN THOUSANDS OF												
6	0						86	0	251	141	0	375	205	0
	2						67	27	157	105	32	232	157	44
	4						48	39	163	103	50	227	153	66
	6									100	59	223	149	78
8	0									155	0	415	235	0
	2									120	28	263	180	42
	5	22	32	26	26	102	71	42	171	115	53	255	173	70
	8	28	49	35	39	98	66	51	164	109	64	247	165	84
10	0	0	88	53	0	175	100	0	295	166	0	447	255	0
	2	12	61	42	17	118	81	23	194	129	26	289	195	40
	5	23	57	40	32	113	77	41	187	124	52	280	188	68
	10	30	51	36	41	104	70	54	176	115	67	267	175	88
15	0	0	94	58	0	191	112	0	327	187	0	502	285	0
	2	11	69	48	15	136	93	20	226	150	22	339	226	38
	5	22	65	45	30	130	87	39	219	142	49	330	217	64
	10	29	59	41	40	121	82	51	206	135	64	315	208	84
	15	35	53	37	48	112	76	61	196	129	76	301	198	98
20	0	0	97	61	0	202	119	0	349	202	0	540	307	0
	2	10	75	51	14	149	100	18	250	166	20	377	249	33
	5	21	71	48	29	143	96	38	242	160	47	367	241	62
	10	28	64	44	38	133	89	50	229	150	62	351	228	81
	15	34	58	40	46	124	84	59	217	142	73	337	217	94
	20	48	52	35	55	116	78	69	206	134	84	322	206	107

237



75,000 Btuh Fan Assisted Category I Appliance
50,000 Btuh Natural Draft Water Heater

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VENT CONNECTOR CAPACITY

TABLE 504.3(2)
TYPE B DOUBLE-WALL VENT

Number of Appliances	Two or more
Appliance Type	Category I
Appliance Vent Connection	Single-wall metal connector

VENT HEIGHT (H) (feet)	CONNECTOR RISE (R) (feet)	SINGLE-WALL METAL VENT CONNECTOR DIAMETER—(D) inches: 3 FAN Min	3 FAN Max	3 NAT Max	4 FAN Min	4 FAN Max	4 NAT Max	5 FAN Min	5 FAN Max	5 NAT Max	6 FAN Min	6 FAN Max	6 NAT Max	7 FAN Min	7 FAN Max	7 NAT Max	FA Min
		APPLIANCE INPUT RATING LIMITS IN THOUSANDS OF BTUH															
6	1	NA	NA	26	NA	NA	46	NA	NA	71							
	2	NA	NA	31	NA	NA	55	NA	NA	85							
	3	NA	NA	34	NA	NA	62	121	131	95							
8	1	NA	NA	27	NA	NA	48	NA	NA	75							
	2	NA	NA	32	NA	NA	57	125	126	86							
	3	NA	NA	35	NA	NA	64	130	138	100	191	208	144	241	287	197	302
10	1	NA	NA	28	NA	NA	50	119	121	77	182	186	110	240	253	150	302
	2	NA	NA	33	84	85	59	124	134	91	189	203	132	248	278	183	311
	3	NA	NA	36	89	91	67	129	144	102	197	217	148	257	299	203	320
15	1	NA	NA	29	79	87	52	116	138	81	177	214	116	238	291	158	312
	2	NA	NA	34	83	94	62	121	150	97	185	230	138	246	314	189	321
	3	NA	NA	39	87	100	70	127	160	109	193	243	157	255	333	215	331
20	1	49	56	30	78	97	54	115	152	84	175	238	120	233	325	165	306
	2	52	59	36	82	103	64	120	163	101	182	252	144	243	346	197	317
	3	55	62	40	87	107	72	125	172	113	190	264	164	252	363	223	326
30	1	47	60	31	77	110	57	112	175	89	169	278	129	226	380	175	296
	2	51	62	37	81	115	67	117	185	106	177	290	152	236	397	208	307
	3	54	64	42	85	119	76	122	193	120	185	300	172	244	412	235	316

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VENT CONNECTOR CAPACITY

TABLE 504.3(1)
TYPE B DOUBLE-WALL VENT

Number of Appliances	Two or more
Appliance Type	Category I
Appliance Vent Connection	Type B double-wall connector

VENT HEIGHT (H) (feet)	CONNECTOR RISE (R) (feet)	TYPE B DOUBLE-WALL VENT AND CONNECTOR DIAMETER—(D) inches: 3 FAN Min	3 FAN Max	3 NAT Max	4 FAN Min	4 FAN Max	4 NAT Max	5 FAN Min	5 FAN Max	5 NAT Max	6 FAN Min	6 FAN Max	6 NAT Max	7 FAN Min	7 FAN Max	7 NAT Max	8 FAN Min	8 FAN Max	8 NAT Max
		APPLIANCE INPUT RATING LIMITS IN THOUSANDS OF BTUH																	
6	1	22	37	26	35	66	46	46	106	72									
	2	23	41	31	37	75	55	48	121	86									
	3	24	44	35	38	81	62	49	132	96									
8	1	22	40	27	35	72	48	49	114	76									
	2	23	44	32	36	80	57	51	128	90									
	3	24	47	36	37	87	64	53	139	101	67	210	145	88	290	198	105	384	258
10	1	22	43	28	34	78	50	49	123	78	65	189	113	89	257	154	106	341	200
	2	23	47	33	36	86	59	51	136	93	67	206	134	91	282	182	109	374	238
	3	24	50	37	37	92	67	52	146	104	69	220	150	94	303	205	111	402	268
15	1	21	50	30	33	89	53	47	142	83	64	220	120	88	298	163	110	389	214
	2	22	53	35	35	96	63	49	153	99	66	235	142	91	320	193	112	419	253
	3	24	55	40	36	102	71	51	163	111	68	248	160	93	339	218	115	445	286
20	1	21	54	31	33	99	56	46	157	87	62	246	125	86	334	171	107	436	224
	2	22	57	37	34	105	66	48	167	104	64	259	149	89	354	202	110	463	265
	3	23	60	42	35	110	74	50	176	116	66	271	168	91	371	228	113	486	300
30	1	20	62	33	31	113	59	45	181	93	60	288	134	83	391	182	103	512	238
	2	21	64	39	33	118	70	47	190	110	62	299	158	85	408	215	105	535	282
	3	22	66	44	34	123	79	48	198	124	64	309	178	88	423	242	108	555	317

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TABLE 504.3(1)
TYPE B DOUBLE-WALL VENT

Number of Appliances	Two or more
Appliance Type	Category I
Appliance Vent Connection	Type B double-wall connector

COMMON VENT CAPACITY

VENT HEIGHT (H) (feet)	4			5			6			7			8	
	COMBINED APPLIANCE INPUT RATING IN THOUSANDS OF BTU/H													
	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT
6	92	81	65	140	116	103	204	161	147	309	248	200	404	314
8	101	90	73	155	129	114	224	178	163	339	275	223	444	348
10	110	97	79	169	141	124	243	194	178	367	299	242	477	377
15	125	112	91	195	164	144	283	228	206	427	352	280	556	444
20	136	123	102	215	183	160	314	255	229	475	394	310	621	499
30	152	138	118	244	210	185	351	297	266	547	459	360	720	585

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TABLE 504.3(2)
TYPE B DOUBLE-WALL VENT

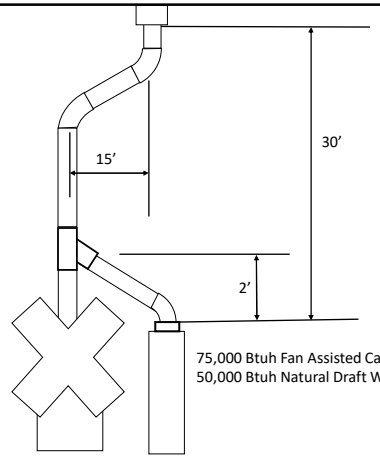
Number of Appliances	Two or more
Appliance Type	Category I
Appliance Vent Connection	Single-wall metal connector

COMMON VENT CAPACITY

VENT HEIGHT (H) (feet)	TYPE B DOUBLE-WALL COMMON VENT DIAMETER—(D) inches													
	4			5			6			7			8	
	COMBINED APPLIANCE INPUT RATING IN THOUSANDS OF BTU/H													
	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT
6	NA	78	64	NA	113	99	200	158	144	304	244	196	398	310
8	NA	87	71	NA	126	111	218	173	159	331	269	218	436	342
10	NA	94	76	163	137	120	237	189	174	357	292	236	467	369
15	121	108	88	189	159	140	275	221	200	416	343	274	544	434
20	131	118	98	208	177	156	305	247	223	463	383	302	606	487
30	145	132	113	236	202	180	350	286	257	533	446	349	703	570
50	159	145	128	268	233	208	406	337	296	622	529	410	833	686
100	166	153	NA	297	263	NA	469	398	NA	726	633	464	999	846

 242

242



75,000 Btuh Fan Assisted Category I Appliance
50,000 Btuh Natural Draft Water Heater

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TABLE 504.2(2)—continued
TYPE B DOUBLE-WALL GAS VENT

Number of Appliances	Single
Appliance Type	Category I
Appliance Vent Connection	Single-wall metal connector

HEIGHT (H) (feet)	LATERAL (L) (feet)	VENT DIAMETER—(D) inches															
		3			4			5			6			7			
		APPLIANCE INPUT RATING IN THOUSANDS O															
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FA
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min
30	0	34	99	63	53	211	127	76	372	219	110	584	334	144	849	472	184
	2	37	80	56	55	164	111	76	291	183	109	429	279	139	610	392	175
	5	49	74	52	72	157	106	98	271	173	136	417	271	171	595	382	215
	10	NA	NA	NA	91	144	98	122	255	168	171	397	257	213	570	367	265
	15	NA	NA	NA	115	131	NA	151	239	157	208	377	242	255	547	349	312
	20	NA	NA	NA	NA	NA	NA	181	223	NA	246	357	228	298	524	333	360
	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	389	477	305	461

 244

244

TABLE 504.2(1)—continued
TYPE B DOUBLE-WALL GAS VENT

Number of Appliances	Single
Appliance Type	Category I
Appliance Vent Connection	Connected directly to vent

HEIGHT (H) (feet)	LATERAL (L) (feet)	VENT DIAMETER—(D) inches													
		3			4			5			6			7	
		APPLIANCE INPUT RATING IN THOUSANDS OF BTU/H													
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN	
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max
30	0	0	100	64	0	213	128	0	374	220	0	587	336	0	853
	2	9	81	56	13	166	112	14	283	185	18	432	280	27	613
	5	21	77	54	28	160	108	36	275	176	45	421	273	58	600
	10	27	70	50	37	150	102	48	262	171	59	405	261	77	580
	15	33	64	NA	44	141	96	57	249	163	70	389	249	90	560
	20	56	58	NA	53	132	90	66	237	154	80	374	237	102	542
	30	NA	NA	NA	73	113	NA	88	214	NA	104	346	219	131	507

 245

245

504.2 Application of single-appliance vent Tables 504.2(1) through 504.2(6).
The application of Tables 504.2(1) through 504.2(6) shall be subject to the requirements of Sections 504.2.1 through 504.2.17.

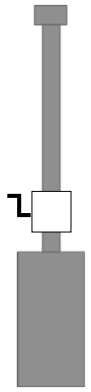
 246

246

504.2.1 Vent obstructions.
These venting tables shall not be used where obstructions, as described in Section 503.15, are installed in the venting system. The installation of vents serving listed appliances with vent dampers shall be in accordance with the appliance manufacturer's instructions or in accordance with the following:

1. The maximum capacity of the vent system shall be determined using the "NAT Max" column.

2. The minimum capacity shall be determined as if the appliance were a fan-assisted appliance, using the "FAN Min" column to determine the minimum capacity of the vent system. Where the corresponding "FAN Min" is "NA," the vent configuration shall not be permitted and an alternative venting configuration shall be utilized.



 247

247

504.2.2 Minimum size.
Where the vent size determined from the tables is smaller than the appliance draft hood outlet or flue collar, the smaller size shall be permitted to be used provided that all of the following requirements are met:

1. The total vent height (H) is not less than 10 feet

2. Vents for appliance draft hood outlets or flue collars 12 inches in diameter or smaller are not reduced more than one table size.

3. Vents for appliance draft hood outlets or flue collars larger than 12 inches in diameter are not reduced more than two table sizes.

4. The maximum capacity listed in the tables for a fan assisted appliance is reduced by 10 percent (0.90 × maximum table capacity).

5. The draft hood outlet is greater than 4 inches in diameter. Do not connect a 3-inch-diameter vent to a 4-inch-diameter draft hood outlet. This provision shall not apply to fan assisted appliances.

 248

248

504.2.3 Vent offsets

- Single-appliance venting configurations with zero (0) lateral lengths in Tables 504.2(1), 504.2(2) and 504.2(5) shall not have elbows in the venting system.

 249

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TABLE 504.2(1)
TYPE B DOUBLE-WALL GAS VENT

Number of Appliances	Single
Appliance Type	Category I
Appliance Vent Connection	Connected directly to vent

TABLE 504.2(2)
TYPE B DOUBLE-WALL GAS VENT

Number of Appliances	Single
Appliance Type	Category I
Appliance Vent Connection	Single-wall metal connector

TABLE 504.2(5)
SINGLE-WALL METAL PIPE OR TYPE B ASBESTOS CEMENT VENT

Number of Appliances	Single
Appliance Type	Draft hood equipped
Appliance Vent Connection	Connected directly to pipe or vent

 250

250

504.2.3 Vent offsets

- Single-appliance venting configurations with zero (0) lateral lengths in Tables 504.2(1), 504.2(2) and 504.2(5) shall not have elbows in the venting system.
- Single-appliance venting configurations with lateral lengths include two 90-degree elbows.

 251

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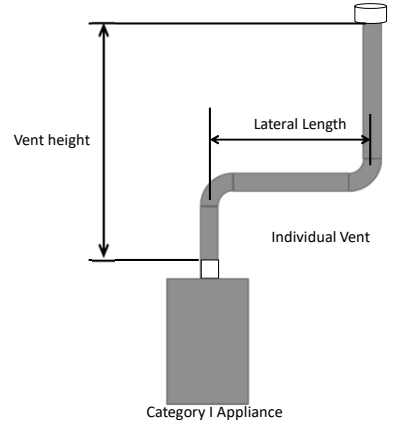

 252

252

504.2.3 Vent offsets

- Single-appliance venting configurations with zero (0) lateral lengths in Tables 504.2(1), 504.2(2) and 504.2(5) shall not have elbows in the venting system.
- Single-appliance venting configurations with lateral lengths include two 90-degree elbows.
- For each additional elbow up to and including 45 degrees, the maximum capacity listed in the venting tables shall be reduced by 5 percent.
- For each additional elbow greater than 45 degrees up to and including 90 degrees, the maximum capacity listed in the venting tables shall be reduced by 10 percent.
- Where multiple offsets occur in a vent, the total lateral length of all offsets combined shall not exceed that specified in Tables 504.2(1) through 504.2(5).

 253

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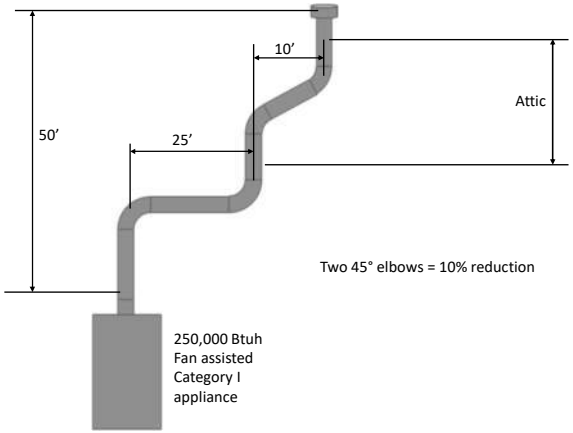

 254

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TABLE 504.2(1)—continued
TYPE B DOUBLE-WALL GAS VENT

Number of Appliances	Single
Appliance Type	Category I
Appliance Vent Connection	Connected directly to vent

HEIGHT (H) (feet)	LATERAL (L) (feet)	VENT DIAMETER—(D) Inches												
		3			4			5			6			
		APPLIANCE INPUT RATING IN THOUSAN												
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	I
30	0	0	100	64	0	213								
	2	9	81	56	13	166								
	5	21	77	54	28	160								
	10	27	70	50	37	150								
	15	33	64	NA	44	141								
	20	56	58	NA	53	132								
	30	NA	NA	NA	73	113	NA	88	214	NA	104	346	219	
50	0	0	101	67	0	216	134	0	397	232	0	633	363	
	2	8	86	61	11	183	122	14	320	206	15	497	314	
	5	20	82	NA	27	177	119	35	312	200	43	487	308	
	10	26	76	NA	35	168	114	45	299	190	56	471	298	
	15	59	70	NA	42	158	NA	54	287	180	66	455	288	
	20	NA	NA	NA	50	149	NA	63	275	169	76	440	278	
	30	NA	NA	NA	69	131	NA	84	250	NA	99	410	259	

 255

255

504.2.5 High-altitude installations.
Sea-level input ratings shall be used when determining maximum capacity for high altitude installation. Actual input (derated for altitude) shall be used for determining minimum capacity for high altitude installation.

What is the deration for altitude?

Per manufacturer many at 4% per 1000’ some at 2% per 1000’

Say at 5000’
250,000 x .8 = 200,000

 256

256

504.2.6 Multiple input rate appliances

For appliances with more than one input rate, the minimum vent capacity (FAN Min) determined from the tables shall be less than the lowest appliance input rating, and the maximum vent capacity (FAN Max/NAT Max) determined from the tables shall be greater than the highest appliance rating input.

 257

257

504.2.7 Liner system sizing and connections.

Listed corrugated metallic chimney liner systems in masonry chimneys shall be sized by using Table 504.2(1) or 504.2(2) for Type B vents with the maximum capacity reduced by 20 percent (0.80 × maximum capacity) and the minimum capacity as shown in Table 504.2(1) or 504.2(2). Corrugated metallic liner systems installed with bends or offsets shall have their maximum capacity further reduced in accordance with Section 504.2.3. The 20-percent reduction for corrugated metallic chimney liner systems includes an allowance for one long-radius 90-degree turn at the bottom of the liner.

Connections between chimney liners and listed double-wall connectors shall be made with listed adapters designed for such purpose.

 258

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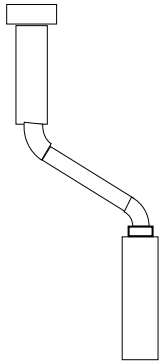
504.2.8 Vent area and diameter.

Where the vertical vent has a larger diameter than the vent connector, the vertical vent diameter shall be used to determine the minimum vent capacity, and the connector diameter shall be used to determine the maximum vent capacity.

The flow area of the vertical vent shall not exceed seven times the flow area of the listed appliance categorized vent area, flue collar area or draft hood outlet area unless designed in accordance with approved engineering methods.



 259

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504.2.9
Chimney & vent locations

- Tables 504.2(1), 504.2(2), 504.2(3), 504.2(4) and 504.2(5) shall be used only for chimneys and vents not exposed to the outdoors below the roof line.
- *The sizing tables are based on an assumed outdoor temperature of 42°F and the assumption that all portions of a vent or chimney below the roof penetration are exposed to an ambient temperature of 60°F. Long runs of vent piping through attics and long extensions above roofs should be avoided in cold climates.*

 260

260

504.2.9
Chimney & vent locations

- Where vents extend outdoors above the roof more than 5 feet higher than required by Figure 503.6.5, and where vents terminate in accordance with Section 503.6.5, Item 2, the outdoor portion of the vent shall be enclosed as required by this section for vents not considered to be exposed to the outdoors or such venting system shall be engineered.

 261

261

504.2.9 & 504.3.20
Chimney & vent locations

- Where vents extend outdoors above the roof more than 5 feet higher than required by Figure 503.6.4, and where vents terminate in accordance with Section 503.6.4, Item 2, the outdoor portion of the vent shall be enclosed as required by this section for vents not considered to be exposed to the outdoors or such venting system shall be engineered.

 262

262

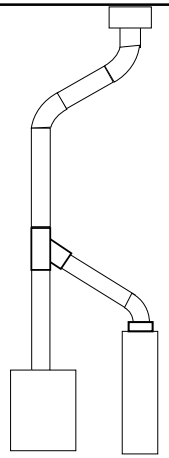
504.2.9
Chimney & vent locations

- A Type B vent shall not be considered to be exposed to the outdoors where it passes through an unventilated enclosure or chase insulated to a value of not less than R8.

 263

263

504.3 Application of multiple appliance vent Tables 504.3(1) through 504.3(7).
The application of Tables 504.3(1) through 504.3(7b) shall be subject to the requirements of Sections 504.3.1 through 504.3.28.



 264

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504.3.2 Connector length limit
The vent connector shall be routed to the vent utilizing the shortest possible route. Except as provided in Section 504.3.3, the maximum vent connector horizontal length shall be 1-1/2 feet for each inch of connector diameter as shown in Table 504.3.2.

TABLE 504.3.2
MAXIMUM VENT CONNECTOR LENGTH

CONNECTOR DIAMETER (inches)	CONNECTOR MAXIMUM HORIZONTAL LENGTH (feet)
3	4 1/2
4	6
5	7 1/2
6	9
7	10 1/2
8	12
9	13 1/2
10	15
12	18
14	21
16	24
18	27
20	30
22	33
24	36

 265

265

504.3.3 Connectors with longer lengths.
Connectors with longer horizontal lengths than those listed in Section 504.3.2 are permitted under the following conditions:

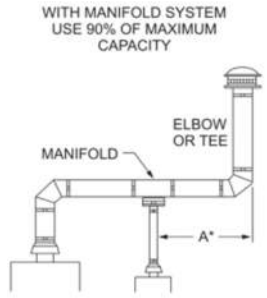
1. The maximum capacity (FAN Max or NAT Max) of the vent connector shall be reduced 10 percent for each additional multiple of the length allowed by Section 504.3.2. For example, the maximum length listed in Table 504.3.2 for a 4-inch connector is 6 feet. With a connector length greater than 6 feet but not exceeding 12 feet, the maximum capacity must be reduced by 10 percent (0.90 × maximum vent connector capacity). With a connector length greater than 12 feet but not exceeding 18 feet, the maximum capacity must be reduced by 20 percent (0.80 × maximum vent capacity).

2. For a connector serving a fan-assisted appliance, the minimum capacity (FAN Min) of the connector shall be determined by referring to the corresponding single-appliance table. For Type B double-wall connectors, Table 504.2(1) shall be used. For single wall connectors, Table 504.2(2) shall be used. The height (H) and lateral (L) shall be measured according to the procedures for a single-appliance vent, as if the other appliances were not present.

 266

266

504.3.4 Vent connector manifold.
Where the vent connectors are combined prior to entering the vertical portion of the common vent to form a common vent manifold, the size of the common vent manifold and the common vent shall be determined by applying a 10-percent reduction (0.90 × maximum common vent capacity) to the common vent capacity part of the common vent tables. The length of the common vent connector manifold (L_m) shall not exceed 1-1/2 feet for each inch of common vent connector manifold diameter (D).



 267

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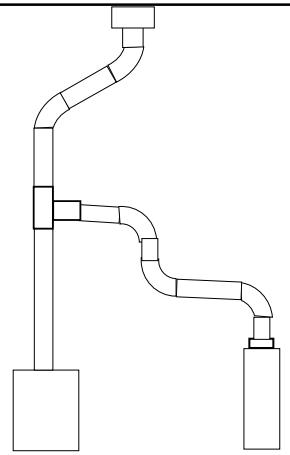
504.3.7 Elbows in connectors.
The vent connector capacities listed in the common vent sizing tables include allowance for two 90-degree elbows. For each additional elbow up to and including 45 degrees, the maximum vent connector capacity listed in the venting tables shall be reduced by 5 percent. For each elbow greater than 45 degrees up to and including 90 degrees, the maximum vent connector capacity listed in the venting tables shall be reduced by 10 percent.



 268

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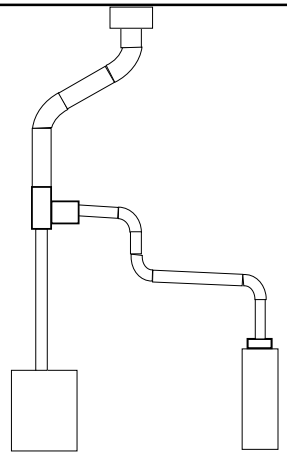
504.3.9 Common vent fittings.
At the point where tee or wye fittings connect to a common vent, the opening size of the fitting shall be equal to the size of the common vent. Such fittings shall not be prohibited from having reduced size openings at the point of connection of appliance vent connectors.

504.3.9.1 Tee and wye fittings.
Tee and wye fittings connected to a common gas vent shall be considered to be part of the common gas vent and shall be constructed of materials consistent with that of the common gas vent.



 269

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614.7 Clothes Dryer Makeup Air

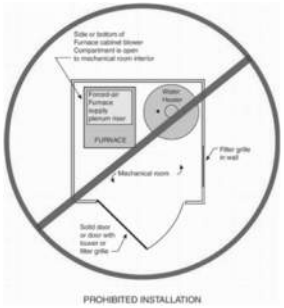
- **614.7 Makeup air.** Installations exhausting more than 200 cfm shall be provided with makeup air. ~~Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches (645 mm2) for makeup air shall be provided in the closet enclosure, or makeup air shall be provided by other approved means.~~
- **614.7.1 Closet Installation.** Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches for makeup air shall be provided in the closet enclosure, or makeup air shall be provided by other approved means.

 270

270

618.6 Furnace plenums and air ducts

- Where a furnace is installed so that supply ducts carry air circulated by the furnace to areas outside of the space containing the furnace, the return air shall be handled by a duct(s) sealed to the furnace casing and terminating outside of the space containing the furnace. Return air shall not be taken from the mechanical room containing the furnace.



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623.1 Cooking appliances

- **623.2 Prohibited location**
- Cooking appliances designed, tested, listed and labeled for use in commercial occupancies shall not be installed within dwelling units or within any area where domestic cooking operations occur.
- **Exception:**

1. Appliances that are also listed as domestic cooking appliances
2. ~~Where the installation is designed by a licensed Professional Engineer, in compliance with the manufacturer's installation instructions~~

 272

272

636
Outdoor Decorative Appliances

- Permanently fixed-in-place outdoor decorative appliances shall be tested in accordance with ANSI Z21.97 and shall be installed in accordance with the manufacturer's instructions.

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