

Description

 This course reviews and analyzes selected requirements for combustion air & venting systems. Summarize the purpose and content of combustion air & venting systems contained in the 2018 IFGC and 2018 IMC.

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Seminar Goal

 The goal of this seminar is for you to understand and apply key areas of the 2018 International Mechanical Code, 2018 International Fuel Gas Code, to case scenarios regarding combustion air & venting systems.

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Chapter 6 & Section 601.1 Scope Approval 601.1 Scope. This chapter shall govern the approval, design, installation, construction, maintenance, alteration and repair Design of the appliances and equipment specifically identified herein. Installation Construction This chapter regulates all aspects of appliances Maintenance and equipment to the extent found in each of Sections 602 through 636. Alteration Repair center 2018 IMC and IFGC Combustion Air & Venting



Decorative Gas-Fired Appliances for Installation in Vented Fireplaces (Section 602)



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Decorative Gas-Fired Appliances for Installation in Vented Fireplaces (Section 602)



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Specific Appliances Floor Furnaces (Section 609)

- Non-recirculating Direct-Fired Industrial Air Heaters (Section 611)
- Recirculating Direct-Fired Industrial Air Heaters (Section 612)
- Cloths Dryers (Section 613)
- Clothes Dryer exhaust (Section 614)



othes Drye	2 – er Exhaust	
- GC 614.2 – Exi	haust penetrations	
Fire dampers are	not allowed in dryer ex	haust ducts
with IBC. See IBC	C Table 705.8 below for	discussion.
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Section 614.2 – Clothes Dryer Exhaust

614.2 Exhaust penetrations



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614.5 Dryer Exhaust Duct Power Ventilators

 IFGC 614.5 recognizes dryer exhaust duct power ventilators (DEDPVs) listed and labeled to UL 705 for use in dryer exhaust duct systems.



614.5 Dryer Exhaust Duct Power Ventilators

The UL 705 standard contains requirements for the construction, testing and installation of DEDPVs and requires them to be equipped with features such as interlocks, limit controls, and monitoring controls to make certain that the dryers or dryer operators are aware of the operating status of the DEDPVs



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Section 614.8 – Clothes Dryer Exhaust 614.8 – Domestic clothes dryer ducts Requirements for items addressed in this section, such as: Material type and minimum nominal diameter. Support and joint requirements. May parallel or exceed the applicable requirements in the manufacturer's installation instructions.



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614.8.2 – Duct installation

Exhaust ducts shall be supported at 4-foot intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch into the inside of the duct.









Section 614.8.3 – Clothes Dryer Exhaust

- 614.8.3 Transition ducts
- Transition ducts for clothes dryers shall be listed and labeled in accordance with UL 2158 A and shall be a maximum of 8 feet in length. Transition ducts shall not be concealed within construction.













Questions and Answers

Question 1: Given: A dryer exhaust duct is run 33'-6" feet horizontally above a ceiling with one 10" radius 90° elbow for a "future" dryer as indicated below.

What is the total equivalent length of dryer exhaust duct for this installation? Does this length comply with the IFGC?



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Section 504 – Clothes Dryer Exhaust

614.8.4.2 – Manufacturer's instructions

- The maximum length of a clothes dryer exhaust duct may be based on the <u>manufacturer's installation</u> <u>instructions</u> in lieu of what is required in Section 614.6.4.1. The manufacturer's installation instructions shall be provided to the code official before concealment of the duct.





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Section 614.8.5 – Length Identification

- Why identify dryer exhaust duct length?
- If the "concealed" duct system equivalent length is <u>not</u> identified in a conspicuous manner, the new resident will be unaware of the potentially hazardous situation that has been created by the dryer and exhaust duct







Specific Appliances Water Heaters (Section 624) Air Conditioning Equipment (Section 627) Illuminating Appliances (Section 628) Boilers (Section 631) 2018 IMC and IFGC Combustion Air & Venting







The manufacturer's rating data and the nameplate shall be attached to the boiler.







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Section 1007 (IMC) – Boiler Low-water Cutoff

Section 1007.2 Operation. Low-water cutoff controls and flow-sensing controls required by Section 1007.1 shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer or when water circulation stops, respectively.



Section 1009 (IMC) – Hot Water Boiler Expansion Tank

Closed-type expansion tanks shall be installed in accordance with the manufacturer's instructions. Expansion tanks for systems designed to have an operating pressure in excess of 30 psi shall be constructed and certified in accordance with the ASME *Boiler and Pressure Vessel Code*. The size of the tank shall be based on the capacity of the hot-water-heating system (IMC 1009.2). The minimum size of the tank shall be determined in accordance with the following equation where all necessary information is known:















Combustion, Ventilation, and Dilution Air – 304

- Gas utilization equipment requires air for combustion, ventilation and dilution of flue gases
- Requirements assure:
 - Proper air supply for the combustion and venting process
 - Ventilation cooling for appliances











Outdoor Combustion Air – 304.6

- Outdoor combustion air shall be provided through opening(s) to the outdoors in accordance with Section 304.6.1 or 304.6.2. The minimum dimension of air openings shall be not less than 3 inches.
 - 1. <u>Section 304.6.1</u> Two-permanent-openings method.
 - 2. <u>Section 304.6.2</u> One-permanent-opening method.











Given: Appliance input ratings regarding a **150,000 Btu/h gas furnace** and **50,000 Btu/h gas water heater** will be installed in a mechanical room with two vertical combustion air ducts to a ventilated attic .

Calculated the minimum net free area (square inches) required for each vertical combustion air utilizing the "Two Opening Method"























Mechanical Combustion Air Supply – 304.9

- Where all combustion air is provided by a mechanical air supply system, the combustion air shall be supplied from the outdoors at a rate not less than <u>0.35 cubic feet per</u> <u>minute per 1,000 Btu/h</u> of total input rating of all appliances located within the space.
- Each of the appliances served shall be <u>interlocked</u> with the mechanical air supply system to prevent main burner operation when the mechanical air supply system is not in operation.

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Mechanical Combustion Air Calculation

 Calculate required airflow rate for the proposed combustion air fan (304.9).















IMC Chapter 8 – Chimneys and Vents

Regulates the design, construction, installation, maintenance, repair and approval of chimneys, chimney lines, vents and their associated connections to fuel-burning appliances.

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Section 801 General

The installation, maintenance, repair and approval of factory-built chimneys, chimney liners, vents and connectors is addressed throughout.

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S: • Ta	Section 802 Vents Table 802.2 Vent application		
	VENT TYPES	APPLIANCE TYPES	
	Type L oil vents	Oil-burning appliances listed and labeled for venting with Type L vents; gas appliances listed and labeled for venting with Type B vents.	
	Pellet vents	Pellet fuel-burning appliances listed and labeled for venting with pellet vents.	
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Section 803 Connectors 803.2 – Location 803.10.4 Connector pass-through. Chimney connectors - Connectors must be shall not pass through any floor or ceiling, nor through a fire-resistance-rated wall assembly. Chimney connectors for domestic-type appliances shall not pass through walls located entirely within or partitions constructed of combustible material to reach a masonry chimney except where one of the following the room in which the apply: 1. The connector is labeled for wall pass-through and is installed in accordance with the manufacturer's connecting appliance instructions. The connector is put through a device *labeled* for wall pass-through. is located except as 3. The connector has a diameter not larger than 10 inches (254 mm) and is installed in accordance with provided for in Section one of the methods in Table 803.10.4. Concealed one of the methods in Table 805.10.4. Conceated metal parts of the pass-through system in contact with flue gases shall be of stainless steel or equiva-lent material that resists corrosion, softening or cracking up to 1,800°F (980°C). 803.10.4. 2018 IMC and IFGC Combustion Air & Venting

Section 803.10.4 Connector pass-through

Example of a construction detail for a device (thimble) that must be labeled for wall pass-through in accordance with IMC Section 803.10.4 Item #2.



803.10.4 Connector pass-through. Chimney connectors

shall not pass through any floor or ceiling, nor through a

fire-resistance-rated wall assembly. Chimney connectors

for domestic-type appliances shall not pass through walls

or partitions constructed of combustible material to reach a

masonry chimney except where one of the following

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Section 804 – Direct-vent, Integral Vent and Mechanical Draft Systems 804.3 – Mechanical Draft **Systems** - Mechanical draft systems of either forced or induced draft design shall be listed Figure 804.3(3) EXHAUSTER AND CONTROL PACKAG and labeled in accordance Multiple Heaters with UL 378 and shall 5 1.00 comply with Sections 804.3.1 through 804.3.7. 1 center 2018 IMC and IFGC Combustion Air & Venting



Section 804 – Direct-vent, Integral Vent and Mechanical Draft Systems

804.3.5 - Vertical terminations

- The vent system must terminate:
 - 4 feet below; or
 - 4 feet horizontally from; or
 - 1 foot above any door, window or gravity air intake area.
- The vent cap must be installed.
- Must be a minimum of 3 feet horizontally from any portion of the roof structure that the vent penetrates.

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Section 805 – Factory-built Chimneys

- Contains requirements for all types of factorybuilt chimney systems including:
 - Component assembly
 - Clearances to combustibles
 - Support
 - Terminations
 - Connections
 - Protection from damage
 - Fireblocking.

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Section 805 – Factory-built Chimneys

- 805.2 Solid fuel appliances
 - Factory-built chimneys installed in dwelling units with solid fuel-burning appliances shall comply with the Type HT requirements of UL 103 and shall be marked "Type HT" and "Residential Type and Building Heating Appliance Chimney."



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Section 805 – Factory-built Chimneys

805.3 - Factory-built chimney offsets

- Offsets in factory-built chimneys are limited to not more than 30 degrees (0.52 rad) from vertical at any point in the assembly.
- The chimney assembly must not have more than four elbows.



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Section 805 – Factory-built Chimneys

- 805.6 Decorative shrouds
 - This section prohibits the practice of installing decorative shrouds over the termination of factorybuilt chimneys, except where such shrouds are <u>listed</u> for the specific application and installed in strict accordance with the manufacturer's installation instructions.





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Definitions

APPLIANCE, VENTED. An *appliance* designed and installed in such a manner that all of the products of combustion are conveyed directly from the *appliance* to the outdoor atmosphere through an *approved* chimney or vent system.



























Sizing of venting systems/General

- <u>Minimize condensation</u>. (It is essential to operate closer to maximum than minimum capacity, and also to use the smallest allowable vent size).
- <u>Maintain</u> the required draft in Category I appliance venting systems.
- <u>Assure</u> that products of combustion are conveyed to the outdoors.
- <u>Prevent</u> damage due to possible condensation from flue gases.
- <u>Avoid</u> overheating the equipment and surrounding building materials.



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TYPE OF VI	TABLE 503.4 ENTING SYSTEM TO BE USED
APPLIANCES	TYPE OF VENTING SYSTEM
Listed Category I appliances Listed appliances equipped with draft hood Appliances listed for use with Type B gas vent	Type B gas vent (Section 503.6) Chinney (Section 503.5) Single-wall metal pipe (Section 503.7) Listed chinney linning system for gas venting (Section 503.5.3) Special gas vent listed for these appliances (Section 503.4.2)
Listed vented wall furnaces	Type B-W gas vent (Sections 503.6, 608)
Category II appliances	As specified or furnished by manufacturers of listed appliances (Sections 503.4.1, 503.4.2)
Category III appliances	As specified or furnished by manufacturers of listed appliances (Sections 503.4.1, 503.4.2)
Category IV appliances	As specified or furnished by manufacturers of listed appliances (Sections 503.4.1, 503.4.2)
Incinerators	In accordance with NFPA 82
Appliances that can be converted for use with solid fuel	Chimney (Section 503.5)
Unlisted combination gas and oil-burning appliances	Chimney (Section 503.5)
Listed combination gas and oil-burning appliances	Type L vent (Section 503.6) or chimney (Section 503.5)
Combination gas and solid fisel-burning appliances	Chimney (Section 503.5)
Appliances listed for use with chimneys only	Chimney (Section 503.5)
Unlisted appliances	Chimney (Section 503.5)
Decorative appliances in vented fireplaces	Chimney
Gas-fired toilets	Single-wall metal pipe (Section 626)
Direct-vent appliances	See Section 503.2.3
Appliances with integral vent	See Section 503.2.4

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503.6.10.3 Category II, III and IV appliances • The <u>sizing</u> of gas vents for Category II, III and IV appliances shall be in accordance with the appliance manufacturer's instructions. 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.





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