

## CHAPTER 7

# COMBUSTION AIR

### SECTION 701 GENERAL

**701.1 Air supply.** Fuel-burning equipment shall be assured a sufficient supply of combustion air. The methods of providing combustion air in this chapter do not apply to direct vent appliances, appliances listed as having separated combustion systems, enclosed furnaces, listed cooking appliances, refrigerators and domestic clothes dryers.

**701.2 Unusually tight construction.** In buildings of unusually tight construction, combustion air shall be obtained from outside. All new enclosed buildings shall be provided with 100 percent outside combustion air.

**701.3 Ordinary construction.** In existing buildings of ordinary tightness (buildings built without gasketed doors, windows or vapor barriers) insofar as infiltration is concerned, all or a portion of the combustion air for fuel-burning appliances may be obtained from infiltration when the requirement for 50 cubic feet per 1,000 Btu/h (4.831 L/w) input is met.

**701.4 Existing buildings.** No change in combustion air is required when an existing fuel-burning appliance is replaced with a new appliance having the same or smaller Btu/h input capacity. When an existing fuel-burning appliance is replaced by a higher-capacity appliance or when one or more additional fuel-burning appliances are installed in an existing building containing other fuel-burning appliances, the room or space shall be provided with combustion air as required by this chapter for new buildings.

### SECTION 702 COMBUSTION AIR OPENINGS

**702.1 Location.** Two openings shall be required. The top edge of one opening shall be located within the upper 12 inches (305 mm) of the enclosure and the bottom edge of the second opening shall be located within the lower 12 inches (305 mm) of the enclosure.

**702.2 Dampers prohibited.** Combustion air ducts or plenums shall not be installed so as to require openings in or penetrations through construction where fire dampers are required. Manually-operated dampers shall not be installed in combustion air openings. With prior approval, power-actuated movable louvers admitting combustion air may be used and, if installed, shall be electrically interlocked with the main burner fuel-supply valve so as to prevent fuel delivery unless the louvers are in the fully open position.

**702.3 Louvers, grilles and screens.** Combustion air openings shall be covered with a corrosion-resistant screen of  $\frac{1}{4}$ -inch (6.4 mm) mesh, except as provided in Section 704.3. In calcu-

lating the free area, consideration shall be given to the blocking effect of louvers, grilles and screens protecting openings. The free area through louvers, grilles and screens shall be used in calculating the size of the opening required to provide the free area specified.

### SECTION 703 SOURCES OF COMBUSTION AIR

**703.1 Air from outside.** Combustion air obtained from outside the building shall be supplied as follows:

**703.1.1** Through permanent openings of the required area directly to the outside of the building through the floor, roof or walls of the appliance enclosure; or,

**703.1.2** Through continuous ducts of the required cross-sectional area extending from the appliance enclosure to the outside of the building. The required upper combustion air duct shall extend horizontally or upwards to the outside of the building. Where not otherwise prohibited, combustion air may be obtained from an attic area, provided the attic ventilating openings are not subject to ice or snow blockage, and further provided:

**703.1.2.1** The attic has not less than 30 inches (762 mm) vertical clear height at the maximum point.

**703.1.2.2** Attic ventilation is sufficient to provide the required volume of combustion air and complies with the requirements of Section 706.

**703.1.2.3** The combustion-air opening is provided with a galvanized sleeve of not less than 0.019-inch (0.48 mm) (No. 26 gage) steel or other approved material extending from the appliance enclosure to at least 6 inches (152 mm) above the top of the ceiling joists and insulation.

**703.2 Under-floor supply.** Lower combustion air openings may connect with under-floor areas conforming to the following requirements:

**703.2.1** Under-floor spaces having unobstructed openings to the exterior at least twice the area of the required air openings.

**703.2.2** The height of the under-floor space shall comply with the requirements of the *International Building Code* and be without obstruction to the free flow of air.

**703.3 Prohibited sources.** Openings and ducts shall not connect appliance enclosures with space in which the operation of a fan may adversely affect the flow of combustion air. Combustion air shall not be obtained from a hazardous location or from any area in which objectionable quantities of flammable vapor,

lint or dust are released. Combustion air shall not be taken from a refrigeration machinery room.

**703.4 Interior spaces.** In existing buildings of ordinary tightness, combustion air provided by infiltration may be obtained from freely communicating interior spaces, provided the combined volume in cubic feet complies with the following conditions:

**703.4.1 Adequate volume—gas and liquid.** If the volume of the room or space in which fuel-burning appliances are installed is equal to or greater than 50 cubic feet (1.42 m<sup>3</sup>) per 1000 Btu/h (293 kW) of aggregate input rating of appliances, infiltration may be regarded as adequate to provide combustion air. Exclude from the calculation the input ratings of listed direct vent appliances, enclosed furnaces, cooking appliances, refrigerators and domestic clothes dryers.

**703.4.2 Insufficient volume—gas and liquid.** Rooms or spaces containing gas- or liquid-fuel-burning appliances which do not have the volume as specified above shall be provided with minimum unobstructed combustion air openings as specified in Section 707 and arranged as specified in Section 702.

#### SECTION 704 COMBUSTION AIR DUCTS

**704.1 General.** Combustion air ducts shall:

**704.1.1** Be of galvanized steel complying with Chapter 6 or equivalent corrosion-resistant material approved for this use.

**Exception:** In Group R, Division 3 occupancies, unobstructed stud and joist spaces may be used, provided not more than one required fire stop is removed.

**704.1.2** Have a minimum cross-sectional dimension of 3 inches (76 mm).

**704.1.3** Terminate in a space at least 3 inches (76 mm) in depth open to the front or firebox side of the appliance. Such space shall extend from the floor to the ceiling of the appliance enclosure.

**704.1.4** Have the same cross-sectional areas to the free area of the openings to which they connect.

**704.1.5** Service a single appliance enclosure.

**704.1.6** Serve only upper or lower combustion air openings; the separation between ducts serving upper and lower combustion air openings shall be maintained to the source of combustion air.

**704.2 Dampers.** Combustion air ducts shall not be installed so as to pass through construction where fire dampers are required. Volume dampers shall not be installed in combustion air ducts.

**704.3 Screens.** Neither end of ducts which terminate in an attic shall be screened.

#### SECTION 705 GRAVITY-TYPE WARM-AIR FURNACES

**705.1 General.** Gravity-type warm-air furnaces shall be provided with combustion air as specified in Sections 701, 702, 703 and 707 of this code. Combustion and cold air returned for gravity-type warm-air furnaces may be obtained from the same area.

#### SECTION 706 SPECIAL CONDITIONS CREATED BY MECHANICAL EXHAUSTING OR FIREPLACES

**706.1 General.** Operation of exhaust fans, kitchen ventilation systems, clothes dryers or fireplaces shall be considered in determining combustion air requirements to avoid unsatisfactory operation of installed gas appliances.

#### SECTION 707 AREA OF COMBUSTION AIR OPENINGS

**707.1 General.** The net free area of openings, ducts or plenums supplying the combustion air to an area containing fuel-burning appliances shall be as specified in Table 7-1. When grilles, screens or louvers are inserted in combustion-air openings, the provisions of Section 702.3 apply. Permanent mechanically pressurized combustion-air facilities in central heating plants, fossil-fueled steam electric generating plants, district heating plants, industrial facilities and power boiler plants are exempt from the requirements of Table 7-1.

**707.2 Designed installations.** In lieu of the requirements of Table 7-1, combustion air supply may be designed in accordance with recognized engineering principles when first approved by the building official.

#### SECTION 708 COMBUSTION AIR FOR FIREPLACES

**708.1 General.** Fireplaces shall be provided with an outside combustion air opening ducted directly into the firebox with not less than 1 square inch (645.2 mm<sup>2</sup>) of combustion air per 100 square inches (64 526 mm<sup>2</sup>) of fireplace opening or per manufacturers' installation instructions, whichever is greater.

**TABLE 7-1  
SIZE OF COMBUSTION-AIR OPENINGS OR DUCTS<sup>1</sup>**

COLUMN 1 BUILDINGS OF ORDINARY TIGHTNESS		COLUMN 2 NEW BUILDINGS AND UNUSUALLY TIGHT CONSTRUCTION <sup>2</sup>	
CONDITION	SIZE OF OPENINGS OR DUCTS	CONDITION	SIZE OF OPENINGS OR DUCTS
Appliance in Unconfined space:	May rely on infiltration alone.	Appliance in Unconfined <sup>2</sup> space: Obtain combustion air from outdoors or from space freely communicating with outdoors.	Provide two openings, minimum 50 sq. in. per opening. <sup>3</sup>
Appliance in Confined <sup>4</sup> space: 1. All air from inside building.	Provide two openings into enclosure, each having 1 sq. in. (645 mm <sup>2</sup> ) per 1,000 Btu/h (293 W) input freely communicating with other unconfined interior spaces. Minimum 100 sq. in. (0.06 m <sup>2</sup> ) each opening. <sup>3</sup>	Appliance in Confined <sup>4</sup> space: Obtain combustion air from outdoors or from space freely communicating with outdoors.	1. Provide two openings into the enclosure, minimum 50 sq. in. per opening. <sup>3</sup>
2. All air from outdoors. Obtain from outdoors or from space freely communicating with outdoors.	Use the methods listed for confined space in unusually tight construction as indicated in Column 2.		

1. For location of openings, see Section 702.1.
2. As defined in Section 202.
3. When the total input Btu/h rating of all enclosed appliances/equipment exceeds 100,000 Btu/h (29.3 kW), the combined net free area of all combustion air openings shall be increased by not less than one (1) additional square inch (645 mm<sup>2</sup>) for each 1,000 Btu/h (293 W) in excess of 100,000 Btu/h (29.3 kW).
4. As defined in Section 202.

