

Figure 8-2.3.1 Fireplace clearance to combustible material.

8-2.3.2 Spaces between headers or trimmers of combustible material and masonry fireplaces shall be firestopped with noncombustible material. The material used for firestopping shall be galvanized steel not less than 26 gauge [0.19 in. (0.483 mm)] in thickness or noncombustible sheet material not more than 1/2 in. (12.7 mm) thick.

8-2.3.3 Woodwork, such as wood trim, mantels, and other combustible material, shall not be placed within 6 in. (152 mm) of a fireplace opening. Combustible material above and projecting more than 1 1/2 in. (38 mm) from a fireplace opening shall not be placed less than 12 in. (305 mm) from the top of the fireplace opening. (See Figure 8-2.3.3.)

8-2.4 Accessibility. For cleaning purposes, means shall be provided for access to the venting area above and immediately

behind any movable damper valve plate in masonry fireplaces and steel fireplace units.

8-3 Hearth Extensions.

8-3.1 Masonry fireplaces shall have hearth extensions of brick, concrete, stone, tile, or other approved noncombustible material properly supported and with no combustible material against the underside thereof. Wooden forms used during the construction of hearth and hearth extension shall be removed when the construction is completed.

8-3.2 Where the fireplace opening is less than 6 ft² (0.56 m²), the hearth extension shall extend at least 16 in. (406 mm) in front of the facing material and at least 8 in. (203 mm) beyond each side of the fireplace opening. (See Figure 8-3.2.)

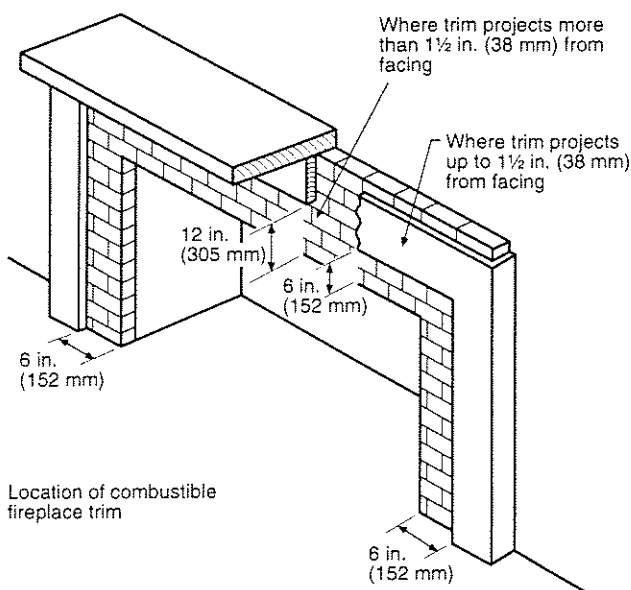


Figure 8-2.3.3 Fireplace clearance to combustible material.

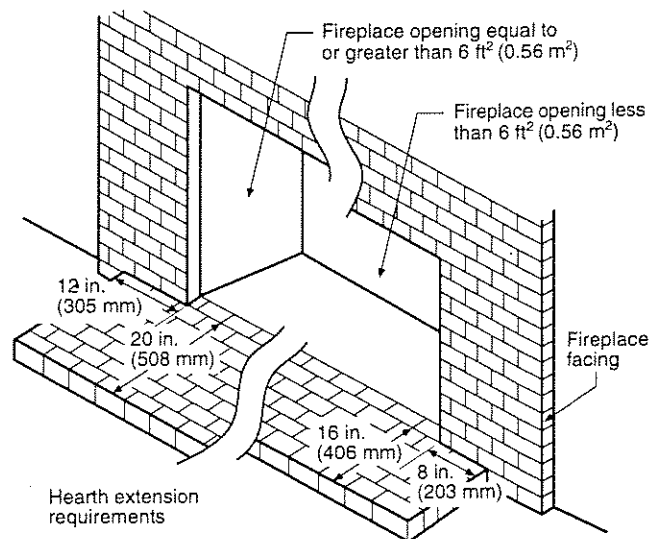


Figure 8-3.2 Fireplace hearth extension details.

11.5.6 The exterior inlet of the combustion air duct shall be screened.

11.5.7 Combustion air ducts shall not originate in any of the following:

- (1) An attic
- (2) A basement
- (3) A garage
- (4) Another interior space

Chapter 12 Solid Fuel-Burning Appliances

12.1 Appliances. Solid fuel-burning appliances shall be one of the following:

- (1) Listed and installed in accordance with the terms of their listing and this chapter
- (2) Approved by the AHJ

12.1.1 Unlisted appliances approved by the AHJ shall be installed as follows:

- (1) In accordance with the manufacturer's instructions
- (2) As specified in this chapter

12.1.2 The requirements in 12.1.1 shall not apply to mobile home installations.

12.2 Location of Appliances.

12.2.1* Every appliance shall be located with respect to building construction and other equipment to allow access to the appliance.

12.2.2 Solid fuel-burning appliances shall not be installed in alcoves or enclosed spaces less than 512 ft³ (14.5 m³) unless specifically listed for such use.

12.2.2.1 Solid fuel-burning appliances listed for installation in enclosed spaces or alcoves less than 512 ft³ (14.5 m³) shall be installed in accordance with the requirements of the listing and the manufacturer's instructions.

12.2.2.2 The space or room shall be sized to allow circulation of heated air.

12.2.2.3 Appliances shall be so located as not to interfere with the circulation of air within the heated space.

12.2.3 Solid fuel-burning appliances shall not be installed in any location where gasoline or any other flammable vapors or gases are present.

12.2.4 Solid fuel-burning appliances shall not be installed in any garage.

12.3 Air for Combustion and Ventilation.

12.3.1 Solid fuel-burning appliances shall be installed in a location and manner so as to provide ventilation and combustion air supply to allow proper combustion of fuel, chimney draft, and maintenance of safe temperatures.

12.3.2 Where buildings are so tight that normal infiltration does not provide the necessary air, outside air shall be introduced.

12.4 Chimney Connections and Usage.

12.4.1 Chimney Connection. All solid fuel-burning appliances shall be connected to chimneys in accordance with Chapter 9.

12.4.1.1 The chimney provided shall be in accordance with Table 5.2.2.

12.4.1.2 Galvanized steel pipe shall not be used for solid fuel-burning appliances.

12.4.2 Clearance. The clearance of chimney connectors to combustible material shall be in accordance with Table 9.5.1.1.

12.4.3 Inspection and Cleaning Access. Connectors and chimneys for solid fuel-burning appliances shall be designed, located, and installed to allow access for internal inspection and cleaning.

12.4.4* Flue Cross-Sectional Area. For residential-type, natural draft solid fuel-burning appliances, the flue shall meet the following conditions:

- (1) The cross-sectional area of the flue shall not be less than the cross-sectional area of the appliance flue collar, unless specified by the appliance manufacturer.
- (2) The cross-sectional area of the flue of a chimney with no walls exposed to the outside below the roofline shall not be more than three times the cross-sectional area of the appliance flue collar.
- (3) The cross-sectional area of the flue of a chimney with one or more walls exposed to the outside below the roofline shall not be more than two times the cross-sectional area of the appliance flue collar.

12.4.5 Connection to Masonry Fireplaces.

12.4.5.1 A natural draft solid fuel-burning appliance such as a stove or insert shall be permitted to use a masonry fireplace flue where the following conditions are met:

- (1) There is a connector that extends from the appliance to the flue liner.
- (2) The cross-sectional area of the flue is no smaller than the cross-sectional area of the flue collar of the appliance, unless otherwise specified by the appliance manufacturer.
- (3)*The cross-sectional area of the flue of a chimney with no walls exposed to the outside below the roofline is no more than three times the cross-sectional area of the appliance flue collar.
- (4) The cross-sectional area of the flue of a chimney with one or more walls exposed to the outside below the roofline is no more than two times the cross-sectional area of the appliance flue collar.
- (5) If the appliance vents directly through the chimney wall above the smoke chamber, there shall be a noncombustible seal below the entry point of the connector.
- (6) The installation shall be such that the chimney system can be inspected and cleaned.
- (7) Means shall be provided to prevent dilution of combustion products in the chimney flue with air from the habitable space.

12.4.5.2 Listed fireplace accessories shall be permitted to use a masonry fireplace flue in accordance with their listing.

12.4.6 Existing Flue Use. Another solid fuel-burning appliance shall not be installed using an existing flue serving a factory-built fireplace unless the appliance is specifically listed for such installation.

12.5 Mounting.

12.5.1 Mounting for Residential-Type Appliances.

12.5.1.1 General Requirements.

12.5.1.1.1 Residential-type solid fuel-burning appliances that are tested and listed by a recognized testing laboratory for installation on floors constructed of combustible materials shall be placed on floors in accordance with the requirements of the listing and the conditions of approval.

12.5.1.1.2 Appliances that are not listed by a recognized testing laboratory shall be provided with floor protection in accordance with the provisions of 12.5.1.2 or 12.5.1.3.

12.5.1.1.3 Residential-type solid fuel-burning appliances shall be permitted to be placed without floor protection in any of the following manners:

- (1) On concrete bases adequately supported on compacted soil, crushed rock, or gravel
- (2) On concrete slabs or masonry arches that do not have combustible materials attached to the underside
- (3) On approved assemblies constructed of only noncombustible materials and having a fire resistance rating of not less than 2 hours, with floors constructed of noncombustible material
- (4) On properly stabilized ground that can support the load of the appliance

12.5.1.1.4 Any floor assembly, slab, or arch shall extend not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.1.5 In lieu of the requirements for floor protection specified herein, a floor protector listed by a recognized testing laboratory and installed in accordance with the installation instructions shall be permitted to be employed.

12.5.1.1.6 Concrete bases, concrete slabs, masonry arches, and floor-ceiling assemblies and their supports shall be designed and constructed to support the appliances.

12.5.1.2 Room Heaters, Fireplace Stoves, Room Heater/Fireplace Stove Combinations, and Ranges.

12.5.1.2.1 Room heaters, fireplace stoves, room heater/fireplace stove combinations, or ranges that are set on legs or pedestals that provide not less than 6 in. (152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the following conditions exist:

- (1) The floor under the appliance is protected with closely spaced solid masonry units not less than 2 in. (51 mm) in thickness.
- (2) The top surface of the masonry is covered with sheet metal not less than 24 gauge [0.024 in. (0.61 mm)].
- (3) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.2.2 Room heaters, fireplace stoves, room heater/fireplace stove combinations, or ranges that are set on legs or pedestals providing 2 in. to 6 in. (51 mm to 152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the following conditions exist:

- (1) The floor under the appliance is protected with one course of hollow masonry units not less than 4 in. (102 mm) in nominal thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with sheet metal not less than 24 gauge [0.024 in. (0.61 mm)].

- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.2.3 Room heaters, fireplace stoves, room heater/fireplace stove combinations, or ranges with legs or pedestals that provide less than 2 in. (51 mm) of ventilated open space beneath the fire chamber or base of the appliance shall not be placed on floors of combustible construction.

12.5.1.3 Furnaces and Boilers.

12.5.1.3.1 Furnaces or boilers with legs or pedestals that provide not less than 6 in. (152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the floor under the appliance has the following characteristics:

- (1) It is protected with one course of hollow masonry units not less than 4 in. (102 mm) in thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.3.2 Furnaces or boilers that are set on legs or pedestals that provide 2 in. to 6 in. (51 mm to 152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the floor under the appliance has the following characteristics:

- (1) It is protected with two courses of hollow masonry units, each not less than 4 in. (102 mm) in thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.3.3 Furnaces or boilers with legs or pedestals that provide less than 2 in. (51 mm) of ventilated open space beneath the fire chamber or base of the appliance shall not be placed on floors of combustible construction.

12.5.2 Mounting for Low-Heat Nonresidential Appliances.

12.5.2.1 Low-heat nonresidential solid fuel-burning appliances that have been tested and listed by a recognized testing laboratory for placement on floors constructed with a combustible material shall be placed on floors in accordance with the requirements of the listing and conditions of approval.

12.5.2.1.1 Appliances that are not listed by a recognized testing laboratory shall be provided with floor protection in accordance with the provisions of 12.5.2.3 or 12.5.2.4.

12.5.2.1.2 Low-heat nonresidential solid fuel-burning appliances shall be permitted to be placed without floor protection in any of the following manners:

- (1) On floors constructed of noncombustible materials and having a fire resistance rating of not less than 2 hours that extend not less than 18 in. (457 mm) beyond the appliance on all sides

Table 9.5.1.1 Chimney Connector and Vent Connector Clearances from Combustible Materials

Description of Appliance	Minimum Clearance (see Note 1)	
	in.	mm
Residential-Type Appliances		
<i>Single-Wall Metal Pipe Connectors</i>		
Gas appliances without draft hoods	18	457
Electric, gas, and oil incinerators	18	457
Oil and solid-fuel appliances	18	457
Unlisted gas appliances with draft hoods	9	229
Boilers and furnaces equipped with listed gas burners and with draft hoods	9	229
Oil appliances listed as suitable for use with Type L vents	9	229
Listed gas appliances with draft hoods and other Category I gas appliances listed for use with Type B vents (see Note 3)	6	152
<i>Type L Vent Piping Connectors</i>		
Gas appliances without draft hoods	9	229
Electric, gas, and oil incinerators	9	229
Oil and solid-fuel appliances	9	229
Unlisted gas appliances with draft hoods	6	152
Boilers and furnaces equipped with listed gas burners and with draft hoods	6	152
Oil appliances listed as suitable for use with Type L vents	(See Note 2)	
Listed gas appliances with draft hoods and other Category I gas appliances listed for use with Type B vents	(See Note 3)	
<i>Type B Gas Vent Piping Connectors</i>		
Listed gas appliances with draft hoods and other Category I gas appliances listed for use with Type B vents	(See Note 3)	
Low-Heat Appliances		
<i>Single-Wall Metal Pipe Connectors</i>		
Gas, oil, and solid-fuel boilers, furnaces, and water heaters	18	457
Ranges, restaurant-type	18	457
Oil unit heaters	18	457
Unlisted gas unit heaters	18	457
Listed gas unit heaters with draft hoods	6	152
Other low-heat nonresidential appliances	18	457
Medium-Heat Appliances		
<i>Single-Wall Metal Pipe Connectors</i>		
All gas, oil, and solid-fuel appliances	36	914
High-Heat Appliances		
<i>Masonry or Metal Connectors</i>		
All gas, oil, and solid-fuel appliances	(See Note 4)	

Notes:

1. If the listing of an appliance specifies a different clearance, the listed clearance takes precedence.
2. If listed Type L vent piping is used, the clearance is permitted to be in accordance with the vent listing.
3. If listed Type B or Type L vent piping is used, the clearance is permitted to be in accordance with the appliance and vent listing.
4. See 9.5.1.2.

9.5.1.2.6 If a single-wall connector passes through a masonry wall used as a wall shield, there shall be at least ½ in. (13 mm) of open, ventilated air space between the connector and the masonry.

9.5.1.2.7 There shall be at least 1 in. (25.4 mm) between the connector and the protector.

9.5.1.2.8 In no case shall the clearance between the connector and the wall surface be reduced below that allowed in the table.

9.5.2* Engineered systems installed for the protection of combustible materials shall reduce the temperature rise of such materials to 90°F (50°C) above ambient.

9.5.3 All clearances shall be measured from the outer surface of the connector to the combustible material, disregarding any intervening protection applied to the combustible material.

9.5.3.1 The clearance protection material shall not interfere with the accessibility of the connector.

9.5.4 Materials and products listed for the purpose of reducing clearance to combustibles shall be installed in accordance with the conditions of the listing and the manufacturer's instructions.

9.5.5 For clearance reduction systems using an air space between the combustible wall and the wall protector, air circulation shall be provided by one of the methods specified in 9.5.5.1 through 9.5.5.3.

9.5.5.1 Air circulation shall be provided by leaving all edges of the wall protector open with at least a 1-in. (25.4-mm) air gap.

9.5.5.2 Where wall protectors are mounted on a single flat wall away from corners, air circulation shall be provided by leaving only the bottom and top edges or only the side and top edges open with at least a 1-in. (25.4-mm) air gap.

9.5.5.3 Wall protectors that cover two walls in a corner shall be open at the bottom and top edges with at least a 1-in. (25.4-mm) air gap.

9.6 Location. Where the connector used for a gas appliance having a draft hood or for Category I appliances is located in or passes through an attic, crawl space, or other cold area, that portion of the connector shall be one of the following:

- (1) Listed Type B or Type L vent material
- (2) Listed vent connector material having at least an equivalent insulating value

9.7 Installation.

9.7.1 A connector to a masonry chimney shall comply with the following:

- (1) Extend through the wall to the inner face or liner, but not beyond
- (2) Be firmly cemented to masonry

9.7.1.1 If a thimble is used to facilitate removal of the chimney connector for cleaning, the thimble shall be permanently cemented in place with high-temperature cement.

9.7.2 A chimney connector or vent connector shall not pass through any floor or ceiling or through a fire wall or fire partition.

Table 9.5.1.2 Reduction of Connector Clearance with Specified Forms of Protection

Clearance Reduction Applied to and Covering All Combustible Surfaces within the Distance Specified as Required Clearance with No Protection (See 9.5.1 and Table 9.5.1.1.)	Maximum Allowable Reduction in Clearance (%)		Minimum Clearance			
	As Wall Protector	As Ceiling Protector	As Wall Protector		As Ceiling Protector	
			in.	mm	in.	mm
3½-in. (90-mm) thick masonry wall without ventilated air space	33	—	12	305	—	—
½-in. (13-mm) thick noncombustible insulation board over 1-in. (25.4-mm) glass fiber or mineral wool batts without ventilated air space	50	33	9	229	12	305
0.024-in. (0.61-mm), 24-gauge sheet metal over 1-in. (25.4-mm) glass fiber or mineral wool batts reinforced with wire, or equivalent, on rear face with ventilated air space	66	50	6	152	9	229
3½-in. (90-mm) thick masonry wall with ventilated air space	66	—	6	152	—	—
0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space	66	50	6	152	9	229
½-in. (13-mm) thick noncombustible insulation board with ventilated air space	66	50	6	152	9	229
0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space over 0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space	66	50	6	152	9	229
1-in. (25.4-mm) glass fiber or mineral wool batts sandwiched between two sheets 0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space	66	50	6	152	9	229

Notes:

- All clearances and thicknesses are minimum; larger clearances and thicknesses may be permitted.
- To calculate the minimum allowable clearance, the following formula can be used: $C_{pr} = C_{un} (1 - R/100)$, where C_{pr} is the minimum allowable clearance, C_{un} is the required clearance with no protection, and R is the maximum allowable reduction in clearance.

9.7.3 Connectors for listed gas appliances with draft hoods, other listed Category I gas appliances (Table 5.2.3.1, Column I), and oil appliances listed for Type L vents (Table 5.2.3.1, Column III) shall be permitted to pass through walls or partitions constructed of combustible material provided one of the following conditions is met:

- They are made of listed Type B or Type L vent material for gas appliances or of listed Type L vent material for oil appliances and are installed with not less than listed clearances to combustible material.
- They are made of single-wall metal pipe and guarded by a ventilated metal thimble not less than 4 in. (102 mm) larger in diameter than the vent connector.

9.7.4 Connectors for residential-type appliances (Table 5.2.2, Column I) shall be permitted to pass through walls or partitions constructed of combustible material if one of the following is true of the connector:

- It is listed for wall pass-through.
- It is routed through a device listed for wall pass-through and is installed in accordance with the conditions of the listing.

9.7.5 Connectors for residential-type appliances (Table 5.2.2, Column I) with inside diameters less than or equal to 10 in. (254 mm) shall be permitted to pass through walls or partitions

constructed of combustible material to a masonry chimney, provided the connector system selected or fabricated is installed in accordance with the conditions and clearances specified in Figure 9.7.5.

9.7.5.1 Any unexposed metal that is used as part of a wall pass-through system and is exposed to flue gases shall be constructed of stainless steel or other equivalent material that resists corrosion, softening, or cracking from flue gases at temperatures up to 1800°F (982°C).

9.7.6 A connector for a medium- or high-heat appliance (Table 5.2.2, Columns IV and V) shall not pass through walls or partitions constructed of combustible material.

9.7.7 Connectors shall maintain a pitch or rise of at least ¼ in./ft (6.4 mm/305 mm) of horizontal length of pipe from the appliance to the chimney.

9.7.8 Connectors shall be installed without sharp turns or other construction features that would create excessive resistance to the flow of flue gases.

9.7.9* A device, other than a damper, that obstructs the free flow of flue gas shall not be installed in a connector, chimney, or vent unless listed for such use. (For requirements regarding dampers, see Section 9.9.)

12.5.1.1.1 Residential-type solid fuel-burning appliances that are tested and listed by a recognized testing laboratory for installation on floors constructed of combustible materials shall be placed on floors in accordance with the requirements of the listing and the conditions of approval.

12.5.1.1.2 Appliances that are not listed by a recognized testing laboratory shall be provided with floor protection in accordance with the provisions of 12.5.1.2 or 12.5.1.3.

12.5.1.1.3 Residential-type solid fuel-burning appliances shall be permitted to be placed without floor protection in any of the following manners:

- (1) On concrete bases adequately supported on compacted soil, crushed rock, or gravel
- (2) On concrete slabs or masonry arches that do not have combustible materials attached to the underside
- (3) On approved assemblies constructed of only noncombustible materials and having a fire resistance rating of not less than 2 hours, with floors constructed of noncombustible material
- (4) On properly stabilized ground that can support the load of the appliance

12.5.1.1.4 Any floor assembly, slab, or arch shall extend not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.1.5 In lieu of the requirements for floor protection specified herein, a floor protector listed by a recognized testing laboratory and installed in accordance with the installation instructions shall be permitted to be employed.

12.5.1.1.6 Concrete bases, concrete slabs, masonry arches, and floor-ceiling assemblies and their supports shall be designed and constructed to support the appliances.

12.5.1.2 Room Heaters, Fireplace Stoves, Room Heater/Fireplace Stove Combinations, and Ranges.

12.5.1.2.1 Room heaters, fireplace stoves, room heater/fireplace stove combinations, or ranges that are set on legs or pedestals that provide not less than 6 in. (152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the following conditions exist:

- (1) The floor under the appliance is protected with closely spaced solid masonry units not less than 2 in. (51 mm) in thickness.
- (2) The top surface of the masonry is covered with sheet metal not less than 24 gauge [0.024 in. (0.61 mm)].
- (3) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.2.2 Room heaters, fireplace stoves, room heater/fireplace stove combinations, or ranges that are set on legs or pedestals providing 2 in. to 6 in. (51 mm to 152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the following conditions exist:

- (1) The floor under the appliance is protected with one course of hollow masonry units not less than 4 in. (102 mm) in nominal thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with sheet metal not less than 24 gauge [0.024 in. (0.61 mm)].

- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.2.3 Room heaters, fireplace stoves, room heater/fireplace stove combinations, or ranges with legs or pedestals that provide less than 2 in. (51 mm) of ventilated open space beneath the fire chamber or base of the appliance shall not be placed on floors of combustible construction.

12.5.1.3 Furnaces and Boilers.

12.5.1.3.1 Furnaces or boilers with legs or pedestals that provide not less than 6 in. (152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the floor under the appliance has the following characteristics:

- (1) It is protected with one course of hollow masonry units not less than 4 in. (102 mm) in thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.3.2 Furnaces or boilers that are set on legs or pedestals that provide 2 in. to 6 in. (51 mm to 152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the floor under the appliance has the following characteristics:

- (1) It is protected with two courses of hollow masonry units, each not less than 4 in. (102 mm) in thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.1.3.3 Furnaces or boilers with legs or pedestals that provide less than 2 in. (51 mm) of ventilated open space beneath the fire chamber or base of the appliance shall not be placed on floors of combustible construction.

12.5.2 Mounting for Low-Heat Nonresidential Appliances.

12.5.2.1 Low-heat nonresidential solid fuel-burning appliances that have been tested and listed by a recognized testing laboratory for placement on floors constructed with a combustible material shall be placed on floors in accordance with the requirements of the listing and conditions of approval.

12.5.2.1.1 Appliances that are not listed by a recognized testing laboratory shall be provided with floor protection in accordance with the provisions of 12.5.2.3 or 12.5.2.4.

12.5.2.1.2 Low-heat nonresidential solid fuel-burning appliances shall be permitted to be placed without floor protection in any of the following manners:

- (1) On floors constructed of noncombustible materials and having a fire resistance rating of not less than 2 hours that extend not less than 18 in. (457 mm) beyond the appliance on all sides

- (2) On concrete bases adequately supported on compacted soil, crushed rock, or gravel
- (3) On properly stabilized ground that can support the load of the appliance

12.5.2.2 Concrete bases, concrete slabs, and floors shall be designed and constructed to support the appliances.

12.5.2.3 Low-heat nonresidential solid fuel-burning appliances that are set on legs or pedestals that provide not less than 18 in. (457 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the following conditions exist:

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- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.2.4 Low-heat nonresidential solid fuel-burning appliances that are set on legs or pedestals that provide 6 in. to 18 in. (152 mm to 457 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the following conditions exist:

- (1) The floor under the appliance is protected with two courses of hollow masonry units, each not less than 4 in. (102 mm) in thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 18 in. (457 mm) beyond the appliance on all sides.

12.5.2.5 Low-heat nonresidential solid fuel-burning appliances with legs or pedestals that provide less than 6 in. (152 mm) of ventilated open space beneath the fire chamber or base of the appliance shall not be placed on floors of combustible construction.

12.5.3 Mounting for Medium-Heat Nonresidential Appliances.

12.5.3.1 Medium-heat nonresidential solid fuel-burning appliances that have been tested and listed by a recognized testing laboratory for placement on floors constructed with a combustible material shall be placed on floors in accordance with the requirements of the listing and conditions of approval.

12.5.3.1.1 Appliances that are not listed by a recognized testing laboratory shall be provided with floor protection in accordance with the provisions of 12.5.3.3 or 12.5.3.4.

12.5.3.1.2 Medium-heat nonresidential solid fuel-burning appliances shall be permitted to be placed without floor protection in any of the following manners:

- (1) On concrete bases adequately supported on compacted soil, crushed rock, or gravel
- (2) On floors constructed of noncombustible materials and having a fire resistance rating of not less than 2 hours that

extend not less than 3 ft (0.92 m) beyond the appliance on all sides and 8 ft (2.45 m) beyond the front or side where ashes are removed

- (3) On properly stabilized ground that can support the load of the appliance

12.5.3.2 Concrete bases, concrete slabs, and floors shall be designed and constructed to support the appliances.

12.5.3.3 Medium-heat nonresidential solid fuel-burning appliances that are set on legs or pedestals that provide not less than 24 in. (610 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the floor under the appliance has the following characteristics:

- (1) It is protected with one course of hollow masonry units not less than 4 in. (102 mm) in thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 3 ft (0.92 m) beyond the appliance on all sides and 8 ft (2.45 m) beyond the front or side where ashes are removed.

12.5.3.4 Medium-heat nonresidential solid fuel-burning appliances that are set on legs or pedestals that provide 18 in. to 24 in. (457 mm to 610 mm) of ventilated open space beneath the fire chamber or base of the appliance shall be permitted to be placed on floors of combustible construction, provided the floor under the appliance has the following characteristics:

- (1) It is protected with two courses of hollow masonry units, each not less than 4 in. (102 mm) in thickness.
- (2) The masonry units are laid with ends unsealed and joints matched in such a way as to provide free circulation of air through the core spaces of the masonry.
- (3) The top surface of the masonry is covered with a steel plate not less than $\frac{3}{16}$ in. (4.8 mm) in thickness.
- (4) The floor protection extends not less than 3 ft (0.92 m) beyond the appliance on all sides and 8 ft (2.45 m) beyond the front or side where ashes are removed.

12.5.3.5 Medium-heat nonresidential solid fuel-burning appliances with legs or pedestals that provide less than 18 in. (457 mm) of ventilated open space beneath the fire chamber or base of the appliance shall not be placed on floors of combustible construction.

12.5.4 Mounting of High-Heat Nonresidential Appliances.

12.5.4.1 High-heat nonresidential solid fuel-burning appliances shall be placed in one of the following manners:

- (1) On concrete bases adequately supported on compacted soil, crushed rock, or gravel
- (2) On floors constructed of noncombustible materials and having a fire resistance rating of not less than 2 hours that extend not less than 10 ft (3.1 m) beyond the appliance on all sides and not less than 30 ft (9.2 m) beyond the front or side where hot products are removed
- (3) On properly stabilized ground that can support the load of the appliance

12.5.4.2 Concrete bases and floors shall be designed and constructed to support the appliances.

12.5.4.3 High-heat nonresidential solid fuel-burning appliances shall not be placed on floors of combustible construction.

12.6. Clearances from Solid Fuel-Burning Appliances.

12.6.1 The clearance shall be not less than specified in Table 12.6.1.

12.6.1.1 Appliances listed for installation with clearances less than specified in Table 12.6.1 shall be permitted to be installed in accordance with the terms of their listing and the manufacturer's instructions.

12.6.1.2 Heating furnaces and boilers and water heaters specifically listed for installation in spaces such as alcoves shall be permitted to be so installed in accordance with the terms of their listing, provided the specified clearance is maintained regardless of whether the enclosure is of combustible or noncombustible material.

12.6.1.3 These clearances shall apply to appliances installed in rooms that are large in comparison with the size of the appliances.

12.6.2 Clearance Reduction.

12.6.2.1 Clearances from listed and unlisted solid fuel-burning appliances to combustible material shall be permitted to be reduced if the combustible material is protected as described in Table 12.6.2.1 and in Figure 12.6.2.1(a) through Figure 12.6.2.1(f).

12.6.2.1.1 Where the required clearance with no protection is 36 in. (914 mm), the clearances in Table 12.6.2.1 shall be the minimum allowable clearances. For other required clearances with no protection, minimum allowable clearance shall be calculated from maximum allowable reduction.

12.6.2.1.2 Unless the appliance is specifically listed for lesser clearance, the clearance after reduction shall be not less than the following:

- (1) 12 in. (305 mm) to combustible walls
- (2) 18 in. (457 mm) to combustible ceilings

12.6.2.1.3 Spacers and ties shall be of noncombustible material. No spacers or ties shall be used directly behind appliance or conductor.

12.6.2.1.4 With all clearance reduction systems using a ventilated air space, adequate air circulation shall be provided as described in 12.6.2.4. There shall be at least 1 in. (25.4 mm) between the clearance reduction system and combustible walls and ceilings for clearance reduction systems using a ventilated air space.

12.6.2.1.5 Mineral wool batts (blanket or board) shall have a minimum density of 8 lb/ft³ (128.7 kg/m³) and have a minimum melting point of 1500°F (816°C).

12.6.2.1.6 Insulation material used as part of clearance reduction system shall have a thermal conductivity of 1.0 (Btu-in.)/(ft²-hr-°F) or less. Insulation board shall be formed of noncombustible material.

12.6.2.1.7 If a single-wall connector passes through a masonry wall used as a wall shield, there shall be at least ½ in. (13 mm) of open, ventilated air space between the connector and the masonry.

12.6.2.1.8 There shall be at least 1 in. (25.4 mm) between the appliance and the protector. In no case shall the clearance between the appliance and the wall surface be reduced below that allowed in this table.

Table 12.6.1 Standard Clearances for Solid Fuel-Burning Appliances

Type of Appliance	Above Top of Casing or Appliance; Above Top and Sides of Furnace Plenum or Bonnet		From Front		From Back ^c		From Sides ^c	
	in.	mm	in.	mm	in.	mm	in.	mm
<i>Residential Appliances</i>	6	152	48	1219	6 ^b	152 ^b	6 ^b	152 ^b
Steam boilers — 15 psi (103 kPa)								
Water boilers — 250°F (121°C) max.								
Water boilers — 200°F (93°C) max.								
All water walled or jacketed								
<i>Furnaces</i>								
Gravity and forced air ^d	18	457	48	1219	18	457	18	457
<i>Room Heaters, Fireplace Stoves, Fireplace Inserts, Combinations</i>	36	914	36	914	36	914	36	914
<i>Ranges</i>								
							Firing Side	Opposite Side
Lined fire chamber	30 ^a	762 ^a	36	914	24	610	18	457
Unlined fire chamber	30 ^a	762 ^a	36	914	36	914	18	457

^a To combustible material or metal cabinets. If the underside of such combustible material or metal cabinet is protected with sheet metal of not less than 24 gauge [0.024 in. (0.61 mm)], spaced out 1 in. (25.4 mm), the distance shall be permitted to be reduced to not less than 24 in. (610 mm).

^b Adequate clearance for cleaning and maintenance shall be provided.

^c Provisions for fuel storage shall be located at least 36 in. (914 mm) from any side of the appliance.

^d For clearances from air ducts, see NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*.

Table 12.6.2.1 Reduction of Appliance Clearance with Specified Forms of Protection

Clearance Reduction Applied to and Covering All Combustible Surfaces within the Distance Specified as Required Clearance with No Protection (See 12.6.1 through 12.6.1.3)	Maximum Allowable Reduction in Clearance (%)		Minimum Clearance			
	As Wall Protector	As Ceiling Protector	As Wall Protector		As Ceiling Protector	
			in.	mm	in.	mm
(a) 3½ in. (90 mm) thick masonry wall without ventilated air space	33	—	24	610	—	—
(b) ½ in. (13 mm) thick noncombustible insulation board over 1-in. (25.4-mm) glass fiber or mineral wool batts without ventilated air space	50	33	18	457	24	610
(c) 0.024-in. (0.61-mm), 24-gauge sheet metal over 1-in. (25.4-mm) glass fiber or mineral wool batts reinforced with wire, or equivalent, on rear face with ventilated air space	66	50	12	305	18	457
(d) 3½ in. (90 mm) thick masonry wall with ventilated air space	66	—	12	305	—	—
(e) 0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space	66	50	12	305	18	457
(f) ½ in. (13 mm) thick noncombustible insulation board with ventilated air space	66	50	12	305	18	457
(g) 0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space over 0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space	66	50	12	305	18	457
(h) 1-in. (25.4-mm) glass fiber or mineral wool batts sandwiched between two sheets 0.024-in. (0.61-mm), 24-gauge sheet metal with ventilated air space	66	50	12	305	18	457

Notes:

1. All clearances and thicknesses are minimums; larger clearances and thicknesses may be permitted.
2. To calculate the minimum allowable clearance, the following formula can be used: $C_{pr} = C_{un} (1 - R/100)$. C_{pr} is the minimum allowable clearance, C_{un} is the required clearance with no protection, and R is the maximum allowable reduction in clearance.
3. Refer to Figures 12.6.2.1 (e) and 12.6.2.1 (f) for other reduced clearances using materials found in (a) through (h) of this table.

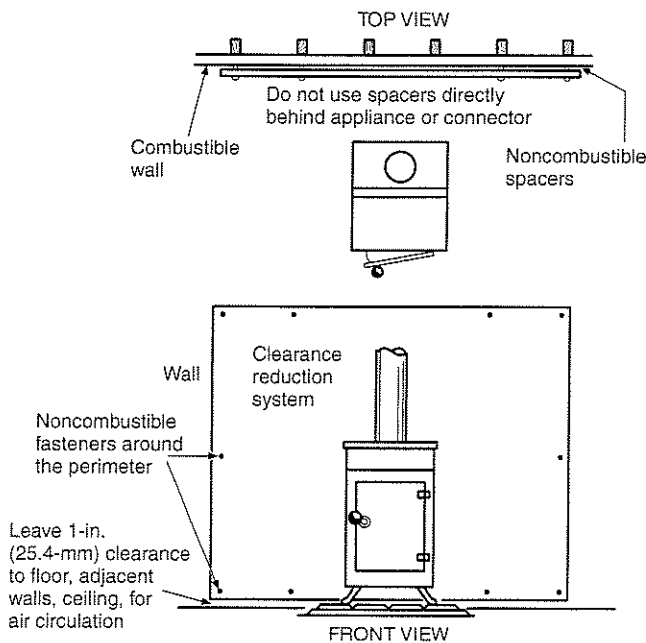


FIGURE 12.6.2.1(a) Clearance Reduction System — Fastener Location.

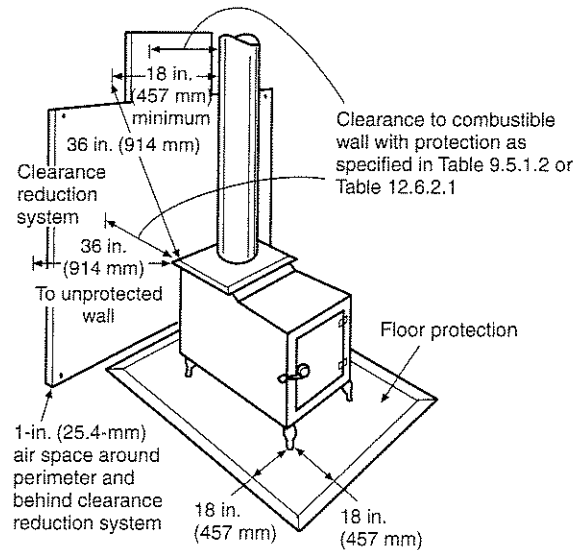


FIGURE 12.6.2.1(b) Distance to Combustible Wall/Floor.

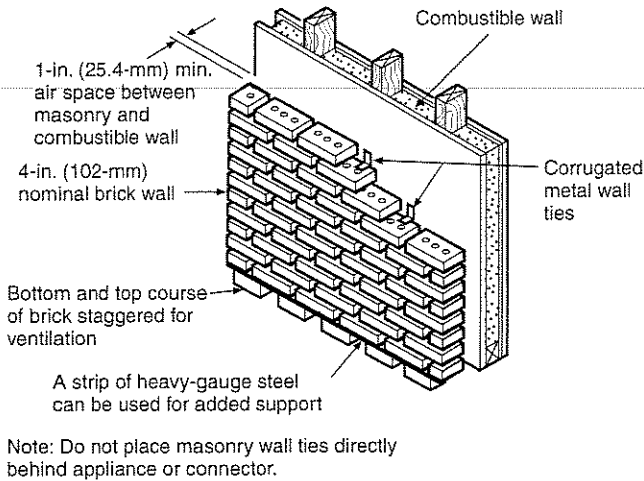
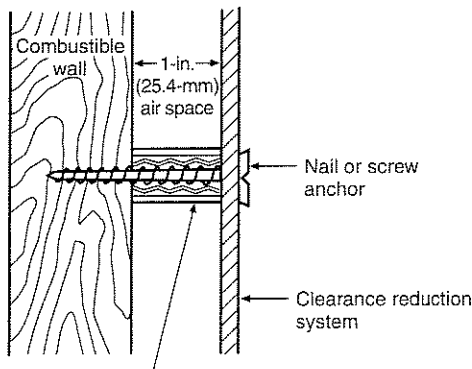
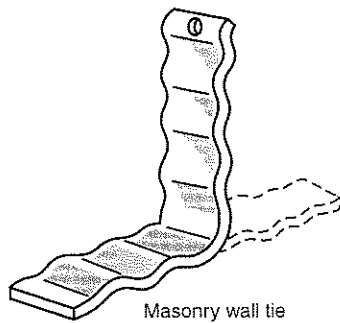


FIGURE 12.6.2.1(c) Masonry Clearance Reduction System.

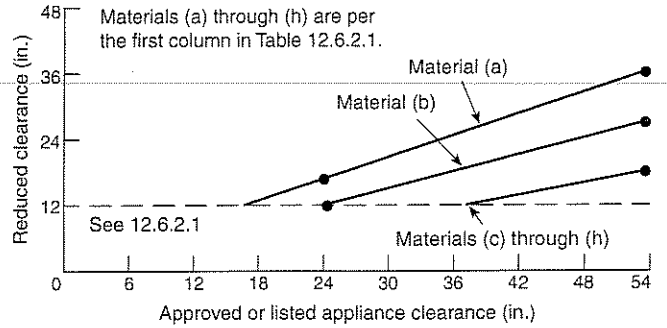


1-in. (25.4-mm) noncombustible spacer such as stacked washers, small-diameter pipe, tubing, or electrical conduit

Masonry walls can be attached to combustible walls using wall ties.

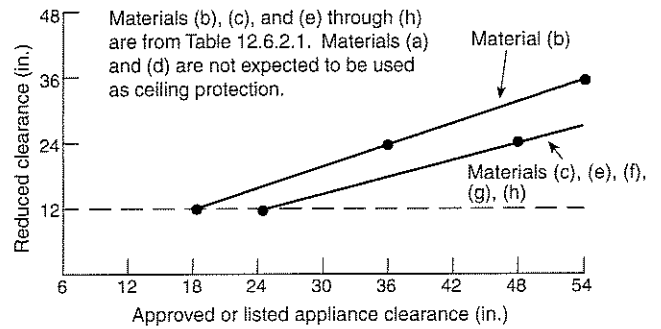
Do not use spacers directly behind appliance or connector.

FIGURE 12.6.2.1(d) Fastener Detail.



For SI units: 1 in. = 25.4 mm

FIGURE 12.6.2.1(e) Wall Protection Using Materials in Table 12.6.2.1.



For SI units: 1 in. = 25.4 mm

FIGURE 12.6.2.1(f) Ceiling Protection Using Materials in Table 12.6.2.1.

12.6.2.1.9 Clearances in front of the loading door or ash removal door, or both, of the appliance shall not be reduced from those in Section 12.5.

12.6.2.2 Clearances from solid fuel-burning appliances to combustible material shall be permitted to be reduced, provided the combustible material is protected by an engineered protection system acceptable to the AHJ.

12.6.2.2.1 Engineered systems installed for the protection of combustible material shall reduce the temperature of such materials to 90°F (50°C) rise above ambient.

12.6.2.2.2 System design shall be based on applicable heat transfer principles, taking into account the following:

- (1) The geometry of the system
- (2) The heat loss characteristics of the structure behind the combustible material
- (3) The possible abnormal operating conditions of the heat-producing sources

12.6.2.3 Clearances from solid fuel-burning appliances to combustible material shall be permitted to be reduced by the use of materials or products listed for protection purposes.

Chapter 13 Maintenance

12.6.2.3.1 Materials and products listed for the purpose of reducing clearance to combustibles shall be installed in accordance with the conditions of the listing and the manufacturer's instructions.

12.6.2.4 For clearance reduction systems using an air space between the combustible wall and the wall protector, adequate air circulation shall be provided by one of the methods outlined in 12.6.2.4.1 through 12.6.2.4.3 and illustrated in Figure 12.6.2.4.

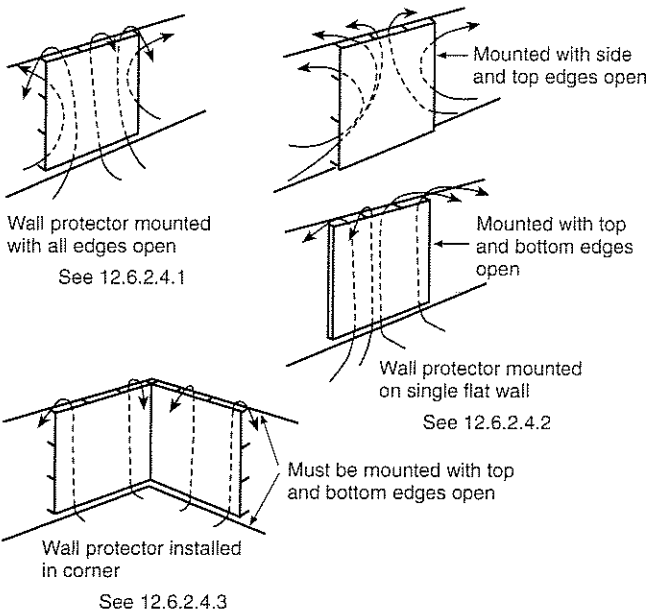


FIGURE 12.6.2.4 Air Circulation Methods.

12.6.2.4.1 Air circulation shall be permitted to be provided by leaving all edges of the wall protector open with at least a 1-in. (25.4-mm) air gap.

12.6.2.4.2 If the wall protector is mounted on a single flat wall away from corners, air circulation shall be permitted to be provided by leaving only the bottom and top edges or only the side and top edges open with at least a 1-in. (25.4-mm) air gap.

12.6.2.4.3 Wall protectors that cover two walls in a corner shall be open at the bottom and top edges with at least a 1-in. (25.4-mm) air gap.

12.6.2.5 All clearances shall be measured from the outer surface of the combustible material to the nearest point on the surface of the solid fuel-burning appliance, disregarding any intervening protection applied to the combustible material.

12.6.2.6 All clearances provided between solid fuel-burning appliances and combustible materials shall be large enough to maintain sufficient clearances between chimney connectors and combustible material as required in Section 9.5.

12.7 Accessories. Factory-built accessories for solid fuel-burning appliances such as heat exchangers, stove mats, floor pads, and protection shields shall be listed and shall be installed in accordance with the terms of their listing.

12.7.1 Unlisted accessories that are acceptable to the AHJ shall be permitted to be installed in accordance with the approval of the AHJ and the appliance and accessory manufacturers' installation instructions.

13.1 Initial Installation. Initial installation of chimneys, fireplaces, and vents shall allow inspection of the surroundings to determine that the required clearances have been maintained and that correct provisions for support, stabilization, future inspection, and maintenance are in place.

13.2 Annual Inspection. Chimneys, fireplaces, and vents shall be inspected at least once a year in accordance with the requirements of Section 14.3.

Exception: Type B and Type BW gas venting systems.

13.2.1 Connectors, spark arrestors, cleanouts, and tee fittings connected to chimneys and to oil and pellet venting systems shall be inspected at least once a year in accordance with the requirements of Section 14.3.

13.2.2 Cleaning, maintenance, and repairs shall be done if necessary.

13.3 Inspection — Connections. Connectors, spark arrestors, cleanouts, and tee fittings for chimneys and for oil and pellet venting systems shall be inspected at least once a year for soundness and deposits.

Exception: Connectors for Type B gas venting systems.

13.4 Appliance or Connector Replacement. When an existing appliance or connector is replaced or a new appliance is connected to a chimney, the chimney flue shall be inspected in accordance with Chapter 14.

13.4.1 The chimney shall be cleaned, lined or relined, or repaired as necessary.

13.5 Cleanout Doors. After any inspection or maintenance operation, cleanout doors and caps or plugs for cleanout tee fittings shall be closed tightly or secured in place.

13.6 Cleaning Methods. Cleaning of chimneys, if necessary, shall be done by methods that do not impair structural or thermal performance.

13.7 Evidence of Damage. Chimneys, vents, and fireplaces shall be inspected, cleaned, and repaired if there is any evidence of damage to the chimney, fireplace, or vent or to the surroundings.

13.7.1 Inspections required by this section shall comply with the requirements for a Level II inspection in accordance with Section 14.5.

13.8 Operating Malfunction. When inspection or an operating malfunction shows that an existing chimney, fireplace, or vent is damaged, unsuitable, or improperly sized, it shall be repaired, rebuilt, or resized to the construction and functional requirements of this standard.

13.9* Damaged or Deteriorated Liners. If the flue liner in a chimney has softened, cracked, or otherwise deteriorated so that it no longer has the continued ability to contain the products of combustion (i.e., heat, moisture, creosote, and flue gases), the liner shall be either removed and replaced, repaired, or relined with a listed liner system or other approved material that will resist corrosion, softening, or cracking from flue gases at temperatures appropriate to the class of chimney service. (See Table 5.2.2.)