Recommended Standards For the Installation Of Solid Fuel Burning Stoves

Prepared By

Office of Maine State Fire Marshal
52 State House Station
Augusta, ME 04333-0052
September 2008

Recommended Standards for the Installation of Solid Fuel Burning Stoves

This guide has been prepared to inform the people of the State of Maine of the recommended standards for the installation of solid fuel burning stoves. These standards have been approved by the Office of State Fire Marshal in accordance with the National Fire Protection Association's standards.

These standards cover all solid fuel burning appliances with the exception of on-site constructed masonry stoves and fireplaces; stoves with water jackets or coils; outdoor wood boilers; and wood fueled central heating systems utilizing pipes, ducts, or similar distribution systems. Stoves for use in mobile homes should be specifically listed for such use. All listed wood burning stoves should be installed according to the manufacturers' recommendations.

Table of Contents

DEFINITIONS

Approved: Acceptable to the authority having jurisdiction (AHJ).

Chimney: A structure containing one or more vertical or nearly vertical passageways for conveying flue gases to the outside atmosphere.

Chimney Connector: The pipe that connects a fuel-burning appliance to a Chimney.

Chimney Flue: The passage in a chimney for conveying the flue gases to the outside atmosphere

Circulating Stove: A solid fuel burning appliance surrounded by an outer jacket with openings at the top and bottom so that air passes between the stove and the jacket.

Combustible Wall: Any wall section that has the potential to burn. Only solid masonry or corrugated steel walls are considered non-combustible. Merely covering a wood studded wall with a non-combustible material does not constitute a non-combustible wall.

Cook Stove: A wood burning stove used for cooking which includes an oven and surface heating areas.

Draft: A pressure difference that causes gases or air to flow through a chimney, vent, flue, or fuel burning equipment.

Thimble: Liner for the passageway where the chimney connector enters the chimney flue.

Draft, Mechanical: Draft produced by a fan or an air or steam jet. When a fan is located so as to push the flue gases through the chimney or vent, the draft is forced. When the fan is located so as to pull the flue gases through the chimney or vent, the draft is induced.

Draft, Natural: Draft produced by the difference in the weight of a column of flue gases within a chimney or vent and a corresponding column of air of equal dimension outside the chimney or vent.

Fire Resistant Insulating Board: Listed or approved materials suitable for protecting combustible surfaces.

Flue Collar: That portion of an appliance designed for attachment to the chimney connector.

Flue Liner: A material which resists high temperatures and is designed specifically for lining chimneys or connectors.

Listed: Equipment or materials which meet nationally recognized standards or tests which determine suitability of usage in a specified manner.

Radiant Stove: Any solid fuel burning appliance not designed as a circulating stove.

Solid Fuel Burning Appliance: Any chimney-connected device that burns solid fuel designed for purposes of heating, cooking, or both.

I. Installation of Solid Fuel Burning Stoves

1. Solid fuel–burning stoves shall be one of the following:
    a. Listed and installed in accordance with the terms of their listing and this section
    b. Approved by the AHJ
2. Unlisted stoves approved by the AHJ shall be installed as follows:
    a. In accordance with the manufacturer's instructions
    b. As specified in this section
3. Solid fuel–burning stoves shall not be installed in alcoves or enclosed spaces less than 512 cubic feet unless specifically listed for such use.
4. Solid fuel–burning appliances shall not be installed in any location where gasoline or any other flammable vapors or gases are present.
5. Solid fuel–burning appliances shall not be installed in any garage.
6. 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.
7. 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.
8. Unless listed for such connection, solid fuel–burning appliances shall not be connected to a chimney flue serving another appliance.

II. Clearances from Solid Fuel Burning Stoves

Stoves must be provided with adequate clearances from combustible materials. The minimum clearances needed for safety are specified in National Fire Protection Association Standard #211, Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances, 2006 Edition.

A. Walls and Ceilings

Clearances indicated in Table 1 (below) are the minimum clearances from solid fuel burning stoves to unprotected combustible wall and ceiling surfaces.

TABLE 1
Minimum Clearances from Solid Fuel Burning Stoves to Combustible Surfaces with No Added Protection

	Radiant	Circulating	Cookstove clay lined fire pot	Cookstove Unlined fire pot	Stovepipe	Listed Stoves
Ceiling	**36 “**	**36”**	**30”**	**30”**	**18”**	**Install According to Manufacturers Recommendations**
Front	**36”**	**24”**			**18”**	
Side	**36”**	**Firing Side 24” Opposite Side 18”**			**18”**	
Rear	**36”**	**12”**	**24”**	**36”**	**18”**	

NOTE:
Stoves may be installed with clearances less than those specified in Table 1 provided the combustible material is protected as described in Table 2 (below) or Figure 1.

TABLE 2

Table 12.6.2.1 Reduction of Appliance Clearance with Specified Forms of Protection

		Maximum Allowable Reduction in Clearance (%)		Minimum Clearance			
				As Wall Protector		As Ceiling Protector	
	Clearance Reduction Applied to and Covering All Combustible Surfaces Within the Distance Specified as Required Clearance with No Protection*	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 are permitted.

(2) To calculate the minimum allowable clearance, the following formula can be used: $C_{pr} = C_{un} \times [1 - (R/100)]$, 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.

(3) Refer to Figure 12.6.2.1(e) and Figure 12.6.2.1(f) for other reduced clearances using materials found in this table.

*See 12.6.1 through 12.6.1.3.

Table 2 Guidelines and Details

1. Where the required clearance with no protection is 36 in. the clearances in Table 2 shall be the minimum allowable clearances. For other required clearances with no protection, minimum allowable clearance shall be calculated from maximum allowable reduction.

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

- 12 in. to combustible walls
- 18 in. to combustible ceilings

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

4. With all clearance reduction systems using a ventilated air space, adequate air circulation shall be provided as described in #5. There shall be at least 1 in. between the clearance reduction system and combustible walls and ceilings for clearance reduction systems using a ventilated air space.

5. Air circulation shall be permitted to be provided by leaving all edges of the wall protector open with at least a 1 in. air gap. (see figure 12.6.2.4)

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

6. 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.

7. 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).

8. Insulation material used as part of clearance reduction system shall have a thermal conductivity of 1.0 Btu-in./hr-ft2-°F (4.88 kg-cal/hr-m2-°C) or less. Insulation board shall be formed of noncombustible material.

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

10. There shall be at least 1 in. 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 Table 2.

11. Clearances in front of the loading door, ash removal door, or both of the appliance shall not be less than 18 inches.

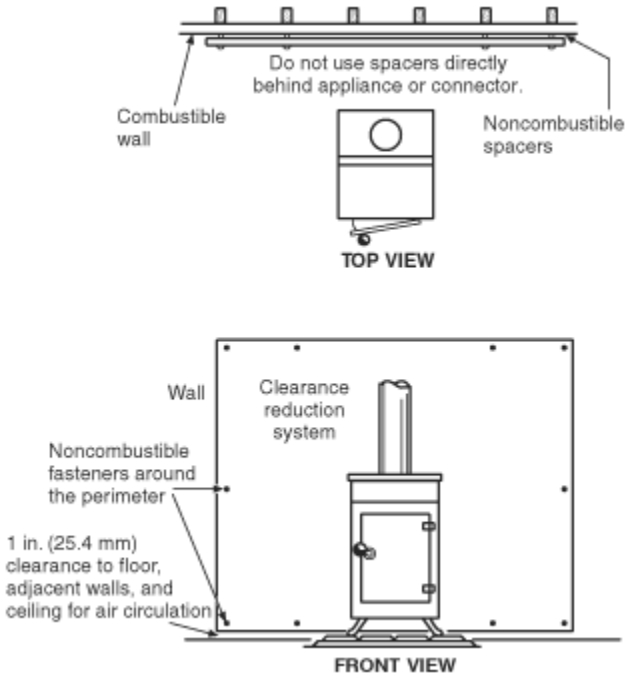


FIGURE 12.6.2.1(a) Clearance Reduction System — Fastener Location.

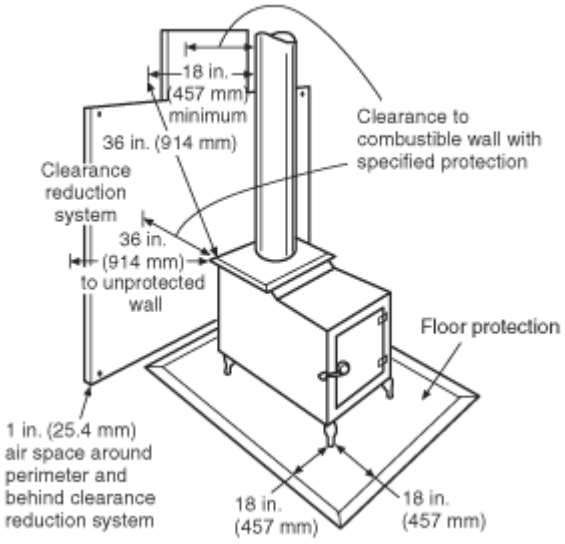


FIGURE 12.6.2.1(b) Distance to Combustible Wall/Floor.

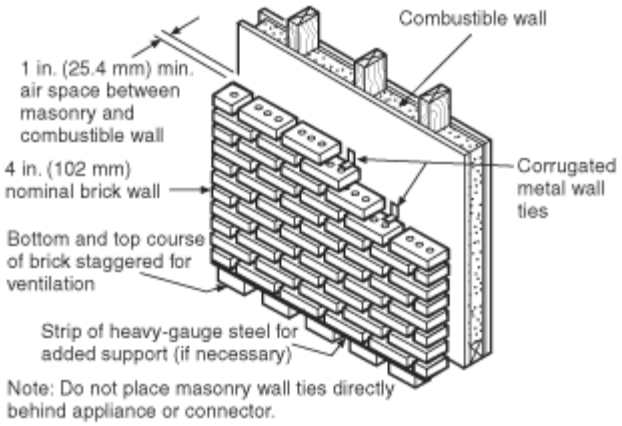
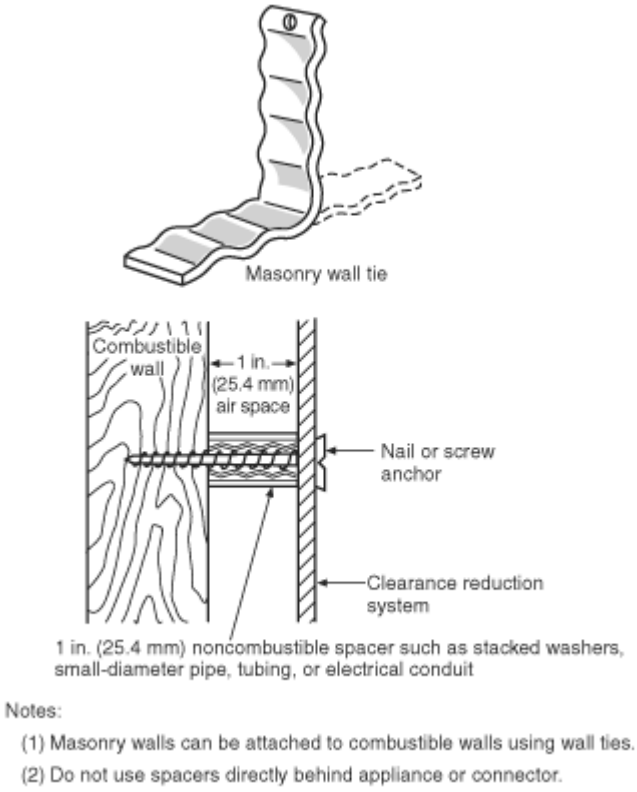


FIGURE 12.6.2.1(c) Masonry Clearance Reduction System.

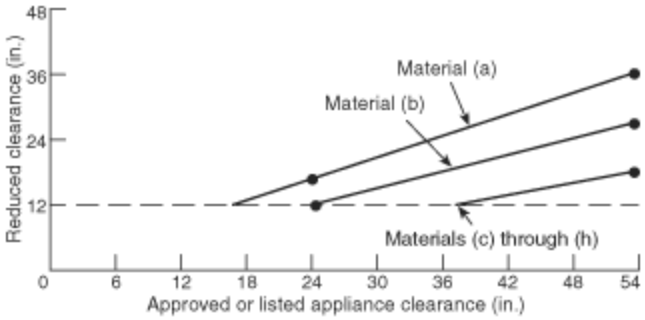


Notes:

(1) Masonry walls can be attached to combustible walls using wall ties.

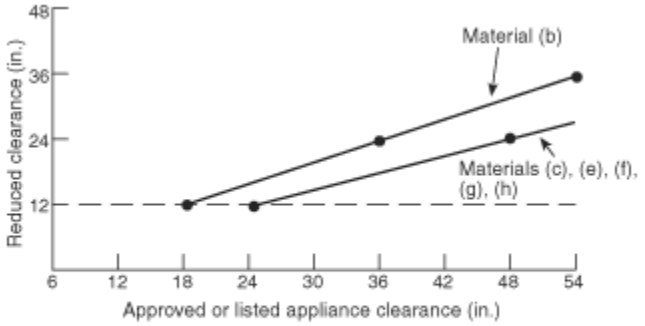
(2) Do not use spacers directly behind appliance or connector.

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.



Notes:

(1) Materials (a) and (d) are not expected to be used as ceiling protection.

(2) For SI units: 1 in. = 25.4 mm.

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

B. **Floors**

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.

2. Appliances that are not listed by a recognized testing laboratory shall be provided with floor protection in accordance with the provisions listed in Table 3.

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

- On concrete bases adequately supported on compacted soil, crushed rock, or gravel
- On concrete slabs or masonry arches that do not have combustible materials attached to the underside

- 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

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

4. Any floor assembly, slab, or arch shall extend not less than 18 in. beyond the appliance on all sides.

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.

Table 3
Floor Clearances for Listed and Unlisted Appliances

FLOOR CLEARANCES	
Length of Stove Leg	**Floor Clearance and Protection**
Less than 2 inches	**Fire resistant floor**
2 – 6 inches	**Combustible floor protection by 4 inches of hollow masonry, laid to provide circulation through the masonry layer, covered by 24-guage sheet metal.**
Over 6 inches	**Combustible floor protected by 2 inch thick masonry, placed over a sheet of 24-gauge sheet metal.**

• Listed fire-resistant insulating board can be installed according to the manufacturer's recommendations.

III. Chimney Connectors

A chimney connector links a stove to the chimney flue. Chimney connectors should be made from steel of minimum 24 gage thickness. Lower gage numbers indicate thicker stovepipe.

A. Clearances from Connectors

1. The clearance from a chimney connector to a combustible material should be not less than three times the diameter of the connector. Where the combustible material is protected, the clearance may be reduced to that indicated in Table 2 and illustrated in Figure 1.

2. Connectors for residential-type appliances 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.

3. The following shall apply to connectors for residential-type appliances with inside diameters less than or equal to 10 in.:

    - They 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 2 (Figure 5.7.5 from NFPA 211 2006 Edition)
    - 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.

B. Connector Pipe Installation

1. Keep the connector pipe as short as possible. It should be no longer than 75% of the vertical chimney height above the thimble where the connector pipe enters the chimney.

2. The stovepipe should be straight as well as short. Use no more than two right-angle bends in the stovepipe installation. Additional bends cause soot and creosote to collect in the stovepipe or chimney, block flue gas flow, and increase the danger of fire.

3. The connector pipe's horizontal runs should rise ¼" for each foot of pipe, with the highest point being at the thimble.

4. When joining the pipe, overlap the joints at least two inches, with the crimped end pointing down to prevent creosote drips or leaks. Secure each joint with three sheet metal screws. A fireproof sealant may be used in addition.

5. All connector pipe joints should fit snugly, including connections with the stove and thimble.

6. The connector pipe must not stick into the chimney flue itself because this would hamper the draft.

7. Connector pipes shall not pass through ceilings. Factory built, listed, all-flue chimneys should be utilized when passing through ceilings. Follow manufacturers' installation instructions for these chimneys.

8. Connector pipe shall not pass through closets. A closet fire could solder and spread undiscovered.

9. The entire length of a connector shall be accessible for inspection, cleaning, and replacement.

10. Devices, other than a damper, that obstruct the free flow of flue gas shall not be installed in a connector or chimney, unless listed for such use.

C. Interconnections

1. Connectors serving appliances operating under natural draft shall not be connected into any portion of a mechanical draft system operating under positive pressure.

2. Unless listed for such connection, solid fuel–burning appliances shall not be connected to a chimney flue serving another appliance or fireplace.

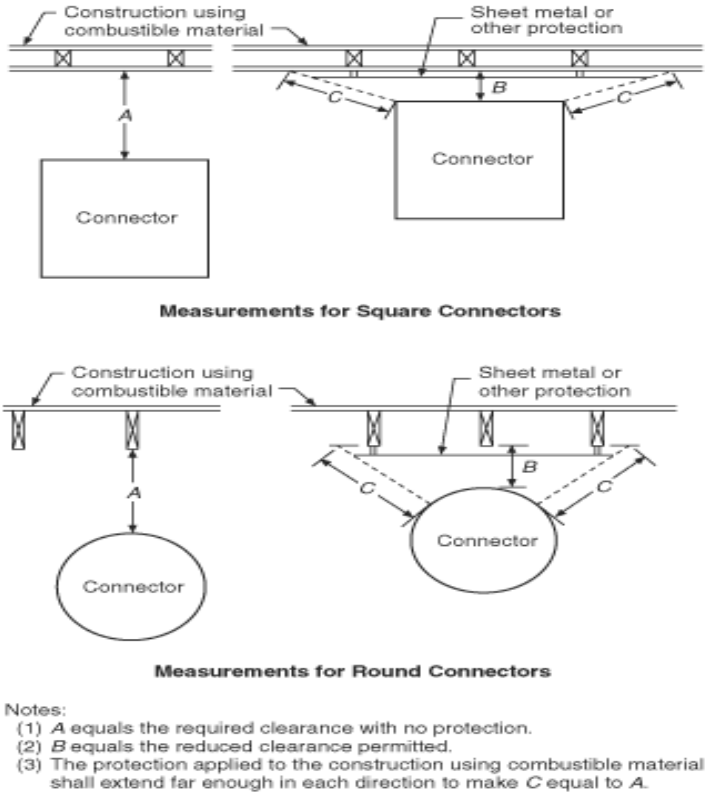


FIGURE 9.5.1.1 Extent of Protection Required to Reduce Clearances from Chimney or Vent Connectors.

D. Chimneys

Masonry Chimneys

1. Chimneys should always be inspected before considering the installation of a solid fuel burning appliance. Inspections shall be conducted by a qualified agency and should be at a minimum a Level 2 inspection as described in Table 4. (Table 14.3.1 from NFPA 211 2006 Edition)

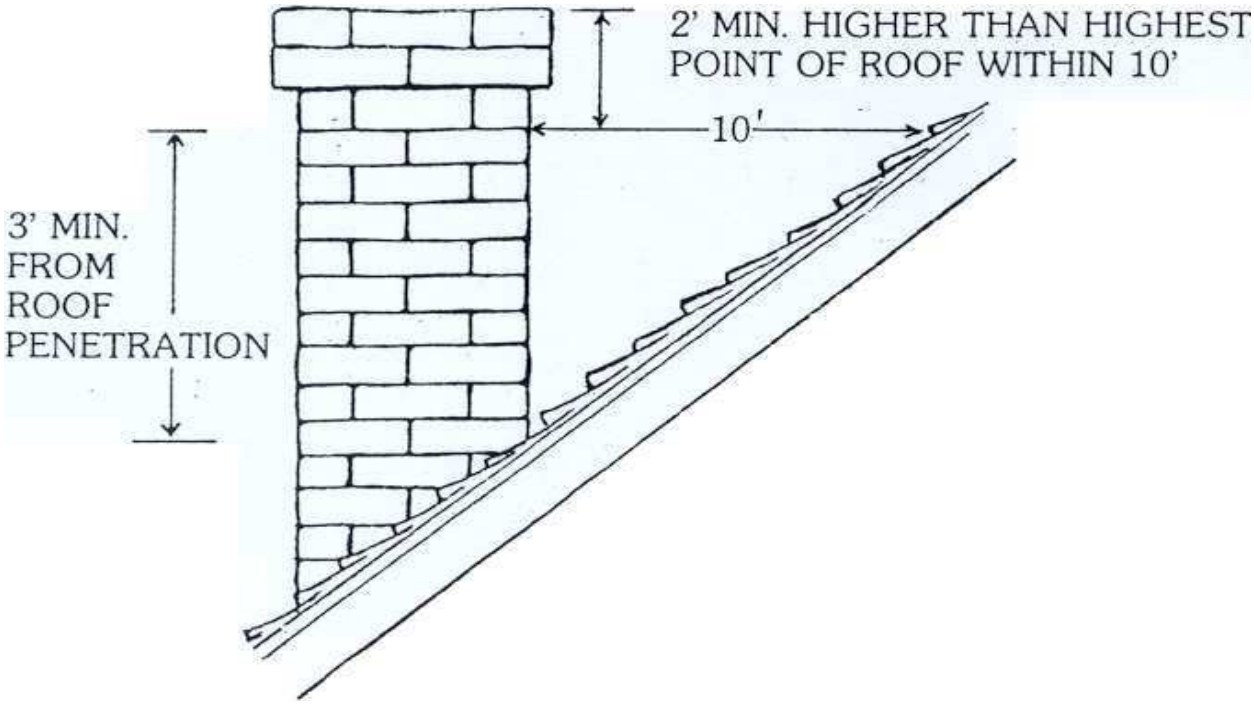
2. The chimney flue should be inspected at a minimum of once per month during the heating season.

3. Masonry chimneys for residential-type and building heating appliances shall be lined. The following materials shall be permitted:

    - Clay flue lining or fireclay brick.
    - Listed chimney lining systems.
    - Factory-built chimneys or chimney units listed for installation within masonry chimneys.
    - Other approved materials that resist corrosion, erosion, softening, or cracking from flue gases and condensate at temperatures up to 1800°F.

4. For sufficient draft a chimney shall extend at least two feet higher than any portion of the building within ten feet horizontally from it (See Figure 5). The flue area should not be smaller than the largest connector pipe.

Figure 5



Listed Solid Fuel Pre-Fabricated Metal Chimneys

The use of pre-fabricated metal chimneys listed for installation with solid fuel heaters (not furnaces) are within the guidelines of the State Standard. Care should be taken, however, with the use of such chimneys to avoid creosote accumulation and the associated potential danger of a chimney fire. Air-controlled wood burning appliances should be operated in accordance with manufacturers' instructions to reduce the potential for creosote build up. Pre-fabricated metal chimneys can break down under the intense heat of a chimney fire, resulting in possible structural fire damage. They should always be installed in accordance with the manufacturers' recommendations.

E. Organizations Governing the Installation of Solid Fuel Burning Equipment

Certain Maine communities have ordinances governing the installation of wood burning equipment. Always check with your local Fire Department or Building Inspector before attempting installation. It is also important to consult with your insurance company regarding any restrictions they may have on wood burning appliance installation. All installations in public buildings must meet standards set by the Office of State Fire Marshal.

The wood burning appliances listed below are not covered by this recommended standard. For information on their installation, refer to the appropriate agency.

When Installing:	**Consult With:**
Site Built Masonry Flues and Fireplaces	Office of State Fire Marshal
Wood Fueled Furnaces or Boilers	Oil and Solid Fuel Burner Technicians Licensing Board
Wood Burning Units with Water Jackets or Coils	Plumbing Code Enforcement Officers
Listed Wood Fueled Mobile Home Heaters	State Manufactured Housing Board or Office of State Fire Marshal
Listed Wood Burning Stoves	The manufacturers' installation recommendations