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# NFPA 90B Warm Air Heating and Air Conditioning Systems 1989 Edition

National Fire Protection Association Batterymarch Park. Quincy, MA 02269

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### Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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NATIONAL FIRE PROTECTION ASSOCIATION

# NFPA 90B

## Standard for the Installation of

# Warm Air Heating and Air Conditioning Systems

## 1989 Edition

This edition of NFPA 90B, *Standard for the Installation of Warm Air Heating and Air Conditioning Systems*, was prepared by the Technical Committee on Air Conditioning, released by the Correlating Committee on Building Construction, and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 15-18, 1989 in Washington, DC. It was issued by the Standards Council on July 14, 1989, with an effective date of August 7, 1989, and supersedes all previous editions.

The 1989 edition of this standard has been approved by the American National Standards Institute.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

## Origin and Development of NFPA 90B

This standard dates from 1899, when Committee attention was first given to blower and exhaust systems. Prior to 1936, the subject of air conditioning was covered in NFPA standards on blower systems. In 1937 it was decided to prepare a separate *Standard on Air Conditioning, Warm Air Heating and Ventilating Systems*. This standard was initially adopted in 1937 with subsequent amendments in 1938, 1939, 1940, 1942, 1950, 1952, 1955, 1956, 1960, 1961, 1963, 1964, 1965, 1968, 1971, 1973, 1976, 1980, 1984, and 1989.

For *Standard for the Installation of Air Conditioning and Ventilating Systems*, see NFPA 90A.

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## Contents

# NFPA 90B

## Standard for the Installation of

# Warm Air Heating and Air Conditioning Systems

## 1989 Edition

For information on referenced publications, see Chapter 5 and Appendix A.

## Chapter 1 General

**1-1 Scope.**[1] This standard applies to all systems for the movement of environmental air in structures which:

(a) Serve one- or two-family dwellings, or

(b) Serve spaces not exceeding 25,000 cu ft (708 $m^3$) in volume in any occupancy.

*Exception: Buildings of combustible construction over three stories in height are covered by NFPA 90A, Installation of Air Conditioning and Ventilating Systems.*

**1-2 Purpose.** This standard is intended to prescribe reasonable provisions based on minimum requirements for safety to life and property. Nothing in this standard is intended to prevent the use of methods or devices, provided that sufficient technical data is submitted to the authority having jurisdiction to demonstrate that the proposed method or device is equivalent in quality, strength, fire endurance, effectiveness, durability, and safety to that prescribed by this standard.

**1-3 Definitions.**

**Air Filter.** A device used to reduce or remove airborne solids from heating, ventilating, and air conditioning systems.

**Approved.** Acceptable to the "authority having jurisdiction."

NOTE: The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

**Authority Having Jurisdiction.** The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the "authority having jurisdiction." In many circumstances the property owner or his designated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

**Central Warm Air Heating System.** A heating system consisting of a heat exchanger with an outer casing or jacket, a solar collection system, or an electric heating unit, connected to a supply system and a return system.

**Combustible Material.** Material made of or surfaced with wood, compressed paper, plant fibers, or other material that will ignite and burn, whether flameproofed or not, or whether plastered or unplastered.

**Duct Covering.** Duct covering includes materials such as adhesive, insulation, banding, coating(s), film, and jackets used to cover the outside surface of a duct, fan casing, or duct plenum.

**Duct Lining.** Duct lining includes materials such as adhesive, insulation, coating, and film used to line the inside surface of a duct, fan casing, or duct plenum.

**Forced Air System.** A central warm air heating system that is equipped with a fan or blower which provides the primary means for circulation of air.

**Gravity System.** A central warm air heating system through which air is circulated by gravity. It may also use an integral fan or blower that is used only to overcome the internal furnace resistance to airflow.

**Heat Exchanger.** A chamber in which heat resulting directly from combustion of fuel, or heat from a medium such as air, water, or steam is transferred through the walls of the chamber to the air entering the supply system, or in which heat from electrical resistors is transferred to the air entering the supply system.

**Heat Pump.** A refrigeration system arranged to accomplish either (a) heating or (b) heating and cooling.

**Listed.** Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some

[1] For other type systems, see NFPA 90A. For installation of blower and exhaust systems, see NFPA 91. For removal of smoke and grease-laden vapors from commercial cooking equipment, see NFPA 96.

of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

**Noncombustible Material.** A material which, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. When tested in accordance with ASTM E136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C*, materials that successfully pass the test shall be considered noncombustible.

**Plenum.** An air compartment or chamber to which one or more ducts are connected and which forms part of either the supply or return systems.

**Return System.** An assembly of connected ducts, air passages, or plenums and fittings through which air from the space or spaces to be conditioned is conducted back to the heat exchanger.

**Rooms Large in Comparison with the Size of the Appliance.** Rooms having a volume equal to at least 12 times the total volume of the furnace and at least 16 times the total volume of a boiler. Total volume of furnace or boiler is determined from exterior dimensions and is to include fan compartments and burner vestibules, when used. When the actual ceiling height of a room is greater than 8 ft (2.44 m), the volume of a room shall be figured on the basis of a ceiling height of 8 ft (2.44 m).

**Shall.** Indicates a mandatory requirement.

**Should.** Indicates a recommendation or that which is advised but not required.

**Supply Systems.** An assembly of connected ducts, air passages, or plenums and fittings through which air is conducted from the heat exchanger to the space or spaces to be conditioned.

## Chapter 2 System Components

### 2-1 Supply Systems.

### 2-1.1 Duct Materials.

**2-1.1.1** Supply ducts shall be:

(a) Class 0 or Class 1[1] rigid or flexible air ducts tested in accordance with UL 181, *Standard for Factory-Made Air Ducts and Connectors*, or

(b) Of sheet metal having a nominal thickness as shown in Table 2-1.1. Furnace plenums shall be constructed of metal of minimum thickness as shown in Table 2-1.1 for a minimum of 36 in. (914 mm) from the heat exchanger measured along the center line of airflow. Other plenums shall conform to the requirements for supply ducts.

*Exception No. 1: Supply ducts that are completely encased in not less than 2 in. (51 mm) of concrete in a floor slab need not meet the requirements of 2-1.1.1 except within 2 ft (0.61 m) of the furnace supply plenum, and within 2 ft (0.61 m) of a vertical connection to a riser or register.*

*Exception No. 2: Supply ducts for a separate air cooling system, not interconnected to any warm air heating system, serving a single-family dwelling need not meet the requirements of 2-1.1.1, provided that they are not closer than 2 ft (0.61 m) to any furnace or its supply plenum, boiler, or other heat producing appliances, and that they comply with 2-2.1.1, 2-2.1.3, 2-2.2, 2-2.3, and 2-2.4 as specified for return ducts.*

*Exception No. 3: Vibration isolation connectors in duct systems shall be made of approved flame retardant fabric or shall consist of sleeve joints with packing of approved noncombustible material. The fabric shall not exceed 10 in. (254 mm) in length in direction of airflow.*

*Exception No. 4: Class 0 or Class 1 rigid or flexible air ducts shall not be used as a vertical air duct which is more than two stories in height.*

*Exception No. 5: Class 0 or Class 1 rigid or flexible air ducts shall not be used in air ducts containing air at temperatures in excess of 250 °F (121 °C).*

**Table 2-1.1 Nominal Thickness of Sheet Metal Ducts**

(a) Round Ducts & Enclosed Rectangular Ducts:

| Diam. or Width, Inches/mm | Nominal Thickness Inches/mm | Galvanized Sheet Min. Thickness Inches/mm | Aluminum Thickness Inches/mm | Tin Plate Min. Wt. (lb/kg) per base box |
|---|---|---|---|---|
| 14 (356) or less | 0.016/0.406 | 0.013/0.330 | 0.016/0.406 | 135/61 |
| Over 14 (356) | 0.019/0.483 | 0.016/0.406 | 0.020/0.508 | – |
| (b) Exposed Rectangular Ducts: | | | | |
| 14 (356) or less | 0.019/0.483 | 0.016/0.406 | 0.020/0.508 | – |
| Over 14 (356) | 0.022/0.559 | 0.019/0.483 | 0.023/0.584 | – |

**2-1.1.2** Supply ducts shall be installed in conformance with:

(a) Conditions of their listing,

(b) SMACNA *Fibrous Glass Duct Construction Standards*, Fifth Edition,

(c) SMACNA *HVAC Duct Construction Standards*, First Edition, 1988, or

(d) SMACNA *Installation Standards for Residential Heating and Air Conditioning Systems*, Sixth Edition.

**2-1.2 Air Connectors.** Air connectors are limited-use, flexible air ducts that need not conform to the requirements for air ducts if they conform to the following provisions:

(a) Air connectors shall conform to the requirements for Class 0 or Class 1 connectors when tested in accordance with UL 181, *Standard for Factory-Made Air Ducts and Connectors*.

(b) Class 0 or Class 1 air connectors shall not be used

[1]Air duct materials are classified in UL 181 as follows:

Class 0 — Air duct materials having a fire hazard classification of zero (flame spread and smoke developed).

Class 1 — Air duct materials having a flame-spread rating of not over 25 without evidence of continued progressive combustion and a smoke-developed rating of not over 50.

in ducts containing air at temperatures in excess of 250 °F (121 °C).

(c) An air connector run shall not exceed 14 ft (4.3 m) in length.

(d) Air connectors shall not pass through any wall, partition, or enclosure of a vertical shaft which is required to have a fire-resistance rating of 1 hour or more.

(e) Air connectors shall not pass through floors.

**2-1.3 Furnace Plenums.** Furnace plenums shall be constructed of metal of minimum thickness as shown in Table 2-1.1 for a minimum of 36 in. (914 mm) from the heat exchanger measured along the center line of airflow. Other plenums shall conform to the requirements for supply ducts.

**2-1.4 Use of Under Floor Space as Supply Plenum.** When heated air is discharged downward into an air chamber which forms a plenum of an under floor space, the following shall apply:

(a) Use of such spaces shall be restricted to one-story portions of single-family dwellings.

(b) Such spaces shall be cleaned of all combustible material, shall be tightly and substantially enclosed, and shall not be used for storage or habitation.

(c) The enclosing material of the under floor space including the side wall insulation and ground cover shall not be more flammable than 1-in. (25.4-mm) (nominal) wood boards. Ground cover not complying with this requirement shall be covered over with at least 2 in. (50.8 mm) of sand or other noncombustible material.

(d) Access, if provided to such spaces, shall be through an opening in the floor and shall not be greater than 24 by 24 in. (610 × 610 mm).

(e) Units supplying warm air to such space shall be equipped with an automatic control that will start the air circulating fan when the air in the unit bonnet reaches a temperature not higher than 150 °F (66 °C). Such control shall be one that cannot be set higher than 150 °F (66 °C).

(f) Units supplying warm air to such space shall be equipped with an approved temperature limit control that will limit outlet air temperature to 200 °F (93 °C).

(g) A noncombustible receptacle shall be placed below each floor type opening into the air chamber. Such receptacles shall conform to the following:

(1) The receptacle shall be securely suspended from the floor members and shall not be more than 18 in. (457 mm) below the floor opening.

(2) The size of the horizontal projected area of the receptacle shall extend 3 in. (76 mm) beyond the opening.

(3) The perimeter of the receptacle shall have a vertical lip at least 1 in. (25.4 mm) high at the open sides if it is at the level of the bottom of the joists, or 3 in. (76 mm) high if the receptacle is suspended.

(h) Floor registers shall be designed for easy removal in order to give access for cleaning the receptacles.

(i) Exterior walls and interior stud partitions shall be firestopped at the floor.

(j) Each wall register shall be connected to the air chamber with a duct or boot complying with 2-1.1, 3-1.3.1, and 3-1.3.2.

(k) Supply ducts to the air chamber shall comply with the provisions of 2-1.1, 3-1.1, and 3-1.2 and shall terminate approximately under the center of a room above, at a distance of not less than 6 ft (1.83 m) from the plenum chamber.

(l) Furnaces, boilers, or other heat-producing appliances shall not be installed in such a supply plenum. (*See NFPA 31, Standard for the Installation of Oil Burning Equipment, and NFPA 54, National Fuel Gas Code.*)

## 2-2 Return Systems.

### 2-2.1 Duct Material.

**2-2.1.1** Return ducts may be constructed of metal, of 1-in. (25.4-mm) (nominal) wood boards, or other suitable material, provided that no material more flammable than 1-in. (25.4-mm) boards shall be used.

*Exception: As required by 2-2.1.2.*

**2-2.1.2** Portions of return ducts directly above the heating surface, or closer than 2 ft (0.61 m) from the outer jacket or casing of the heater shall be constructed in accordance with provisions of 2-1.1 for supply ducts.

**2-2.1.3** The interior of combustible ducts shall be lined with noncombustible material at points where there might be danger from incandescent particles dropped through the register or heater, such as directly under floor registers and the bottom of vertical ducts or directly under heaters having a bottom return.

**2-2.2 Duct Openings.** In buildings where vertical openings are required to be enclosed by walls or partitions having a fire-resistance rating, openings in the enclosures for connections to vertical ducts carrying return air from more than one story shall be protected by approved fire dampers in such openings.

### 2-2.3 Continuous Ducts.

**2-2.3.1** Return air shall be conducted to the appliance through continuous ducts, except as indicated in 2-2.3.2 and 2-2.3.3.

**2-2.3.2** Under floor spaces may be used as plenums for return of air from rooms directly above, provided such spaces are cleaned of all combustible material, are tightly and substantially enclosed, and are not used for storage or habitation. Furnaces, boilers, and other heat-producing appliances shall not be installed in such a return plenum. (*See NFPA 31, Standard for the Installation of Oil Burning Equipment, and NFPA 54, National Fuel Gas Code.*)

**2-2.3.3** In a single-story residence, the return air may travel through the first floor living space to the return air inlet on the furnace. (*See 4-3.3.*)

**2-2.4 Public Corridors.** Public corridors shall not be used as a portion of a supply, return, or exhaust air system serving adjoining areas other than toilet rooms, bathrooms, shower rooms, sink closets, and similar auxiliary spaces opening directly on the corridor.

*Exception: This requirement shall not prohibit the use of a corridor as:*

*(a) A source of make-up air through normal leakage around doors*

*for interior exhaust fans in kitchens, appliances, bathrooms, and toilets.*

*(b) A portion of a smoke control system, subject to the approval of the authority having jurisdiction.*

**2-2.5 Negative Pressure from Circulating Fan.** The return system and circulating fan shall be arranged so that negative pressure from the circulating fan cannot affect the air supply for combustion or act to draw products of combustion from joints or openings in the furnace or flue.

## 2-3 Common Requirements.

### 2-3.1 Duct Coverings and Linings.

**2-3.1.1** Duct coverings (*see Section 1-3*), duct linings (*see Section 1-3*), and tapes used in duct systems shall have a flame spread rating not over 25 without evidence of continued progressive combustion and a smoke developed rating no higher than 50. If coverings and linings are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating no higher than 50 when in the final dry state.

*Exception: Duct coverings (see Section 1-3) shall not be required to meet these requirements when they are located entirely outside of a building, do not penetrate a wall or roof, and do not create an exposure hazard.*

**2-3.1.2** Duct coverings and linings shall not flame, glow, smolder, or smoke when tested in accordance with ASTM C411, *Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation*, at the temperature to which it is exposed in service. In no case shall the test temperature be below 250 °F (121 °C).

**2-3.1.3** Appliances, such as fan coil units, self-contained air conditioning units, furnaces, etc., shall be considered to meet the requirements of 2-3.1.1 if they are listed. Unlisted solar energy air distribution system components shall be accompanied by supportive information showing they have flame spread and smoke developed characteristics not exceeding those of the duct system to which they are connected.

**2-3.1.4** Duct coverings shall not extend through walls or floors required to be firestopped or required to have a fire-resistance rating.

**2-3.1.5** Duct coverings and linings shall be interrupted at the immediate area of operation of heat sources in a duct system involving electric resistance, fuel burning heaters, or heat exchangers connected to solar energy collection systems and shall be in accordance with the manufacturer's instructions.

*Exception: Solar energy heat exchangers not capable of creating sustained operating temperatures higher than 200 °F (93 °C).*

**2-3.1.6** Duct coverings shall not conceal any service opening.

*Exception: When a label is permanently attached to the covering indicating the exact location of the opening.*

**2-3.2 Joints.** Joints and seams shall be securely fastened and made substantially airtight. Slip joints shall have a lap of at least 1 in. (25.4 mm) and shall be individually fastened. (*See Figure 2-3.2.*) Tape may be used for sealing joints but, where exposed to the air in the system, it shall not be more combustible than fabric complying with NFPA 701, *Standard Methods of Fire Tests for Flame-Resistant Textiles and Films*. (*See Flame-Retarded Fabrics in the Building Materials Directory, published by Underwriters Laboratories Inc.*)

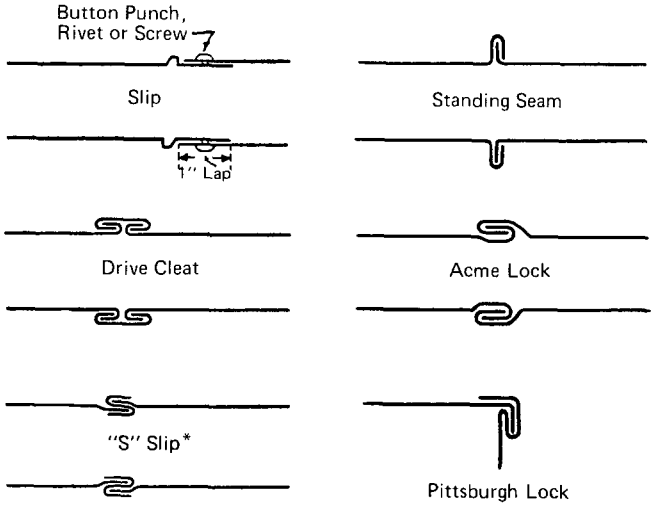



**Figure 2-3.2 Types of duct joints.**

*Used where the joint is otherwise fastened on two sides.

**2-3.3 Duct Hangers.** Ducts shall be securely supported by metal hangers, straps, lugs, or brackets. No nails shall be driven through the duct walls and no unnecessary holes shall be cut therein.

**2-3.4 Protection of Vertical Ducts.** Where vertical ducts are installed within closets or rooms, they shall be enclosed with materials equivalent to those used in the closet or room construction. (*See 3-1.3.*)

### 2-3.5 Registers for Ducts and Plenums.

**2-3.5.1** Registers shall be constructed of metal or conform with the following:

(a) Be made of a material classified "(94 HB)" when tested as described in UL 94, *Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*.

(b) Floor registers shall resist without structural failure a 200-lb (90.7-kg) concentrated load on a 2-in. (51-mm) diameter disc applied to the most critical area of the exposed face of the register. For this test the register is to be at a temperature not less than 165 °F (74 °C) and is to be supported in accordance with the manufacturer's instructions.

**2-3.5.2** Electric or fuel-fired furnace systems shall have at least one register or grill without closeable shutter, and the duct leading thereto shall be without a damper.

*Exception: Where dampers and shutters cannot shut off more than 80 percent of the duct area.*

**2-3.5.3** Fittings connecting the registers to the duct system shall be constructed of metal or material which com-

plies with the requirements of Class 0, Class 1, or Class 2 ducts under UL 181, *Standard for Factory-Made Air Ducts and Connectors*.

**2-3.6 Pipeless Furnace Registers.** Where registers are installed in the floor over the furnace (as in the "pipeless" furnace) the register box shall be constructed double with an air space not less than 4 in. (102 mm) between, except where the warm air passage is surrounded by a cold air passage.

**2-3.7 Use of Concealed Ceiling Spaces as Supply or Return Plenums.** When concealed ceiling spaces are to be used for air chambers or plenums, the following shall apply:

(a) Such installations shall be limited to detached single-family dwellings, and no concealed ceiling space plenum shall serve more than one story of such residence. This shall not preclude separate installations on each floor.

(b) The concealed space plenum shall be separated from any other concealed spaces and shall be completely enclosed with construction not more flammable than 1-in. (25.4-mm) (nominal) wood boards.

(c) Such spaces shall not be used for storage.

(d) No ventilating system shall discharge into such spaces.

(e) Units supplying such spaces shall be designed to limit the temperature of the air discharged into the supply plenum or chamber to 165 °F (74 °C).

(f) Where units incorporate heating elements, heated surfaces, or combustion chambers, developing temperatures higher than 165 °F (74 °C), such components shall be shielded so as to prevent direct radiation onto combustible material when the unit is installed.

(g) The installation of the unit supplying such spaces shall not produce negative pressure in the attic when the attic is the source of air for combustion for fuel-fired equipment.

## Chapter 3 Fire Integrity of Building Construction

### 3-1 Clearances to Combustible Material.

**3-1.1 General.** Where ducts are adjacent to plaster on metal lath, or to other noncombustible finish attached to a combustible material, the clearance shall be measured to the combustible material, except that the clearance shall be measured to the surface of the plaster or other noncombustible finish where a clearance of 2 in. (51 mm) or less is specified above a bonnet or plenum chamber or above supply ducts. This shall not be construed to prohibit closure of openings with noncombustible material where ducts pass through walls and partitions, as provided in 3-1.2.

*Exception: Where an appliance, duct work, or chimney or vent connection is listed for different clearances, the listed clearances shall apply.*

**3-1.2 Clearances from Horizontal Supply Ducts.** Minimum clearances from horizontal supply ducts shall be as follows:

(a) Within a distance of 3 ft (0.91 m) of the plenum of a system classified under A, C, or G of Table 3-1.3, the clearance shall be not less than that specified above the bonnet or plenum.

(b) Within a distance of 6 ft (1.83 m) of the plenum of a system classified under B or D of Table 3-1.3, the clearance shall be not less than 6 in. (152 mm). From ducts of furnaces classified under D, the clearance shall be not less than 1 in. (25.4 mm) beyond 6 ft (1.83 m) from the plenum to a point where there is a change in direction equivalent to 90 degrees or more.

(c) From ducts of furnaces classified under Item F of Table 3-1.3, the clearance shall be not less than 18 in. (457 mm) out to 3 ft (0.91 m) from the bonnet or plenum, not less than 6 in. (152 mm) from 3 ft (0.91 m) to 6 ft (1.83 m), and not less than 1 in. (25.4 mm) beyond 6 ft (1.83 m).

(d) Beyond the distances from the plenum or change in direction specified in 3-1.2(a) and (b), no clearance is required.

(e) Where a horizontal supply duct passes through or pierces a partition or enclosure constructed of combustible material, within the distances, or point of change in direction specified in 3-1.2(a), (b), and (c), the clearance shall be not less than that specified in those paragraphs. The ends of the space providing this clearance may be closed with a thimble and collar or the wall surfaces extended to the duct with noncombustible building material such as plaster on metal lath. [*See Figures 3-1.2(a) and (b).*]

(f) Separate air cooling system ducts that are made of other than noncombustible material shall be installed with clearances to warm air ducts as required in 3-1.2(a), (b), and (c).

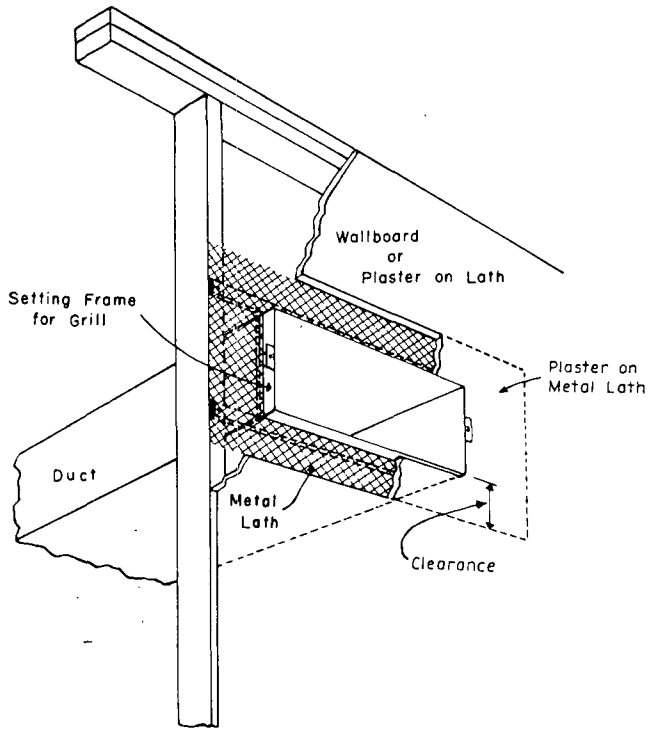



**Figure 3-1.2(a) An arrangement for closing ends of clearance space around a supply duct. A similar arrangement can be used where a duct continues on through the partition.**

Table 3-1.3

**Clearances to Combustible Material for Furnaces, Boilers, Solar Energy Heating Devices, and Heat Exchangers Installed in Rooms which are Large in Comparison with Size of Appliance**

| | Minimum Clearance, Inches (For SI Units: 1 in. = 25.4 mm) | | | | |
|---|---|---|---|---|---|
| | Above & Sides of Bonnet or Plenum | Jacket Sides & Rear | Front[1] | Projecting Flue Box or Draft Hood | Chimney or Vent Connector |
| A. Listed automatically fired, forced air or gravity system, with 250°F (121°C) temperature limit control. | | | | | |
| Burning Liquid Fuel . . . | 2[6] | 6 | 24 | 18 | 18 |
| Burning Gas Fuel . . . . . | 2[6] | 6 | 18 | 6 | 6 |
| Utilizing Electricity . . . . | 2[6] | 6 | 18 | — | — |
| B. Unlisted automatically fired, forced air or gravity system equipped with temperature limit control which cannot be set higher than 250°F (121°C). | | | | | |
| Burning Liquid Fuel . . . | 6 | 6 | 24 | 18 | 18 |
| Burning Gas Fuel . . . . . | 6 | 6 | 18 | 18[4] | 18[4] |
| Utilizing Electricity . . . . | 6 | 6 | 18 | — | — |
| C. Steam or Hot Water Heat Exchanger — Steam not over 15 psi (103 kPa) pressure and hot water not more than 250°F (121°C). | 2 | 2 | 2 | — | — |
| D. Automatically stoker fired, forced air system equipped with 250°F (121°C) temperature limit control and with a barometric draft control in accordance with Note 2. | | | | | |
| Burning Solid Fuel . . . . | 6 | 6 | 48 | 18 | 18 |
| E. Heating Boilers Used in Central Warm Air Heating Systems — Steam boilers operating at not over 15 psi (103 kPa) gage pressure and hot water boilers operating at not in excess of 250°F (121°C) of the water-wall type or having a jacket or lining of masonry or other satisfactory material. | | | | | |
| Burning Liquid Fuel . . | 6[5] | 6 | 24 | 18 | 18 |
| Burning Gas Fuel . . . . . | 6[5] | 6 | 18 | 9[3] | 9[3] |
| Burning Solid Fuel . . . . | 6[5] | 6 | 48 | 18 | 18 |
| Utilizing Electricity . . . . | 6[5] | 6 | 18 | — | — |
| F. Furnaces and Heating Boilers Used in Central Warm Air Heating Systems, other than above. | | | | | |
| Burning Liquid Fuel . . . | 18 | 18 | 48 | 18 | 18 |
| Burning Gas Fuel . . . . . | 18 | 18 | 18 | 18[4] | 18[4] |
| Burning Solid Fuel . . . . | 18 | 18 | 48 | 18 | 18 |
| G. Solar Energy Heat Exchangers operating at a temperature not in excess of 250°F (121°C). | 2[7] | 2[7] | 2[7] | — | — |

**Notes for Table 3-1.3:**

[1] Front clearance shall be sufficient for servicing the burner and furnace or boiler.

[2] Barometric draft control operated by draft intensity and permanently set to limit the draft to a maximum intensity of 0.13 in. (32.4 Pa) of water gage.

[3] This clearance may be reduced to 6 in. (152 mm) for listed gas burning furnaces and boilers.

[4] For unlisted gas appliances equipped with an approved draft hood, this clearance may be reduced to 9 in. (229 mm).

[5] This clearance is above top of boiler.

[6] This clearance may be reduced to 1 in. (25.4 mm) for a listed forced air or gravity furnace equipped with a limit control that will limit outlet air temperatures to 200°F (93°C).

[7] This clearance also applies to ducts from solar collectors to heat exchangers or thermal storage systems.

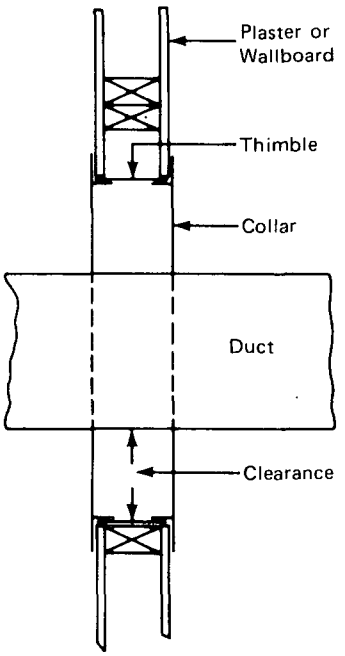



**Figure 3-1.2(b) An arrangement for passing ducts through combustible walls or partitions as specified in 3-1.2(e).**

### 3-1.3 Clearances from Vertical Ducts, Risers, Boots, and Register Boxes.

**3-1.3.1** Where a duct, riser, boot, or box on a system that does not require 18-in. (457-mm) clearance above the supply plenum or bonnet enters a floor, partition, or enclosure constructed of combustible material within the distance from the plenum specified in 3-1.2(a) and (b), the clearance from such duct, riser, or boot shall be not less than the distance required above the furnace bonnet or plenum (*see Table 3-1.3*) or the duct shall change direction equivalent to at least two 90-degree turns before entering such floor, partition, or enclosure. The above does not apply to pipeless furnaces covered in 2-3.5.

**3-1.3.2** Where a supply duct enters the floor of the first story above that in which the furnace is located, the space around the duct at such points shall be sealed with noncombustible material.

**3-1.3.3** Where a duct, riser, boot, or box on a system that requires 18-in. (457-mm) clearance above the supply plenum or bonnet enters a floor, partition, or enclosure constructed of combustible material within a horizontal distance of 6 ft (1.83 m) of the furnace, the duct shall be so arranged that heated air must travel at least 6 ft (1.83 m) from the closest primary heating surface and change direction equivalent to at least one 90-degree turn before entering such floor, partition, or enclosure.

**3-1.3.4** Where a duct, riser, boot, or box on a system that requires 18-in. (457-mm) clearance above the supply plenum or bonnet enters the floor of the first story above that in which the furnace is situated, the clearance shall be at least 3/16 in. (4.76 mm) from all combustible material in the floor construction, unless the duct is of double wall construction with a continuous air space of not less than 3/16 in. (4.76 mm) between the inner and outer walls.

**3-1.3.5** Where a duct or riser on a system that requires 18-in. (457-mm) clearance above the supply plenum or bonnet is enclosed in a partition, wall, or concealed space, constructed in whole or in part of combustible material:

(a) It shall be installed with an air space of not less than 3/16 in. (4.76 mm) between the duct and combustible material, unless a noncombustible insulating covering of cellular type at least 1/8 in. (3.175 mm) thick is provided (in metal lath and plaster partitions no air space is needed except from wood studs);

(b) Or, such duct shall be made double with a continuous air space of not less than 3/16 in. (4.76 mm) between the inner and outer walls.

**3-1.3.6** Where a register on a system that requires 18-in. (457-mm) clearance above the supply plenum or bonnet is placed in a floor or wall constructed of combustible material, the register box shall be installed with a clear space of not less than 3/16 in. (4.76 mm) between the top and sides of the box and any combustible material.

### 3-1.4 Clearances from Furnaces, Boilers, Heat Exchangers, Heat Pumps, and Cooling Units.

**3-1.4.1** Minimum clearances from furnaces, boilers, heat exchangers and their flue box, draft hood, or chimney or vent connectors installed in rooms which are large in comparison with the size of the appliance shall be as given in Table 3-1.3.

*Exception: As provided in 3-1.1 and 3-1.4.2.*

**3-1.4.2** Heating furnaces and boilers used in residence-type central warm air heating systems may be installed in rooms which are large in comparison with the size of the appliance with clearances reduced as designated in Table 3-1.4 where combustible material is protected in the manner specified. Such reductions shall not apply to installations in alcoves or closets.

**3-1.4.3** Furnaces and boilers used in residence-type central warm air heating systems shall not be installed in a confined space such as an alcove or closet.

*Exception: Furnaces and boilers specifically approved for such installations, when installed in compliance with the approval and with the clearances from the walls and ceiling of the alcove or closet not less than specified, regardless of the type of construction.*

**3-1.4.4** Cooling units, heat pumps, and equipment involving furnaces, boilers, or electric resistance heating shall not be installed in an attic or in any other space in the building construction used as a supply or return plenum.

*Exception: Cooling units, heat pumps, and heating equipment may be installed in such a supply or return plenum when specifically approved for such use as a result of tests and listing by an approved testing laboratory. Such units or equipment shall be installed in accordance with the conditions of such approval.*

**3-1.4.5** Furnaces, boilers, heat exchangers, heat pumps, solar energy system components, and air conditioning and cooling units shall be installed so as to provide reasonable accessibility for cleaning heating surfaces, removing and replacing burners, motors, compressors, controls, air filters, draft regulators, and other working parts and for adjusting, cleaning, and lubricating parts requiring such attention.

**Table 3-1.4 Reduction of Clearances with Specified Forms of Protection**

| Type of Protection Applied to and covering all surfaces of combustible material within the distance specified as the required clearance with no protection. [See Figs. 3-1.4(a), (b), and (c).] | Where the required clearance with no protection from appliance, vent connector, single wall metal pipe is: 36 inches | | 18 inches | | 12 inches | | 9 inches | | 6 inches | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Allowable Clearance with Specified Protection, inches: | | | | | | | | | |
| | Above | Sides & Rear | Above | Sides & Rear | Above | Sides & Rear | Above | Sides & Rear | Above | Sides & Rear |
| (a) 3½ in. thick masonry wall without ventilated air space | — | 24 | — | 12 | — | 9 | — | 6 | — | 5 |
| (b) ½ in. insulation board over 1 in. glass fiber or mineral wool batts | 24 | 18 | 12 | 9 | 9 | 6 | 6 | 5 | 4 | 3 |
| (c) 0.024 in. (24 gage) sheet metal over 1 in. glass fiber or mineral wool batts reinforced with wire on rear face, with ventilated air space | 18 | 12 | 9 | 6 | 6 | 4 | 5 | 3 | 3 | 3 |
| (d) 3½ in. thick masonry wall with ventilated air space | — | 12 | — | 6 | — | 6 | — | 6 | — | 6 |
| (e) 0.024 in. (24 gage) sheet metal with ventilated air space | 18 | 12 | 9 | 6 | 6 | 4 | 5 | 3 | 3 | 2 |
| (f) ½ in. thick insulation board with ventilated air space | 18 | 12 | 9 | 6 | 6 | 4 | 5 | 3 | 3 | 3 |
| (g) 0.024 in. (24 gage) sheet metal with ventilated air space over 0.024 in. (24 gage) sheet metal with ventilated air space | 18 | 12 | 9 | 6 | 6 | 4 | 5 | 3 | 3 | 3 |
| (h) 1 in. glass fiber or mineral wool batts sandwiched between two sheets 0.024 in. (24 gage) sheet metal with ventilated air space. | 18 | 12 | 9 | 6 | 6 | 4 | 5 | 3 | 3 | 3 |

**Notes for Table 3-1.4:**

NOTE 1: Reduction of clearances from combustible materials shall not interfere with combustion air, draft hood clearance and relief, and accessibility of servicing.

NOTE 2: All clearances shall be measured from the outer surface of the combustible material to the nearest point on the surface of the appliance, disregarding any intervening protection applied to the combustible material.

NOTE 3: Spacers and ties shall be of noncombustible material. No spacer or tie shall be used directly opposite an appliance or connector.

NOTE 4: With all clearance reduction systems using a ventilated air space, adequate provision for air circulation shall be provided as described. [See Figures 3-1.4(b) and (c).]

NOTE 5: There shall be at least 1 in. (25 mm) clearance between the reduction system and combustible walls and ceilings for reduction systems using ventilated air space.

NOTE 6: If a wall protector is mounted on a single flat wall away from corners, adequate air circulation may be provided by leaving only the bottom and top edges, or only the side and top edges open, with at least 1 in. (25 mm) air gap.

NOTE 7: Mineral wool batts (blanket or board) shall have a minimum density of 8 lb/ft³ (128 kg/m³) and a minimum melting point of 1500°F (816°C).

NOTE 8: Insulation material used as part of clearance reduction system shall have a thermal conductivity of 1.0 (BTU-in.)/(sq ft-hr-°F) or less.

NOTE 9: There shall be at least 1 in. (25 mm) between the appliance and the protector. In no case shall the clearance between the appliance and the combustible surface be reduced below that allowed in the table.

NOTE 10: All clearances and thicknesses are minimum; larger clearances and thicknesses are acceptable.

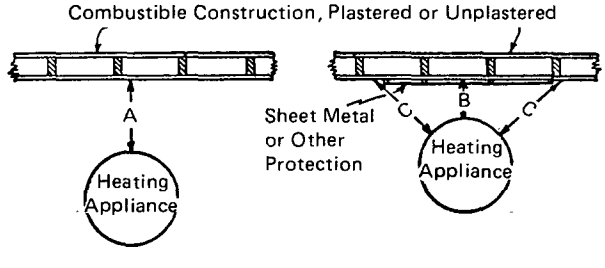
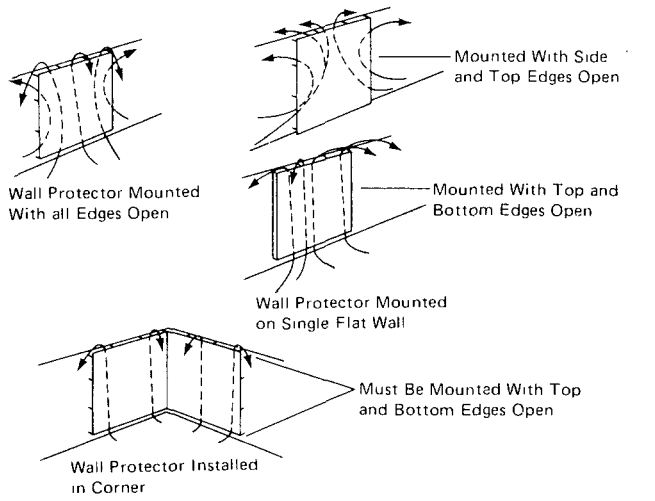



**Figure 3-1.4(a) Sheet metal or other protection to reduce required clearance from heating appliance.**

*A* equals the required clearance with no protection specified in Table 3-1.3.

*B* equals the reduced clearance permitted in accordance with Table 3-1.4. The protection applied to construction using combustible material is required to extend far enough in each direction to make "C" equal to "A."



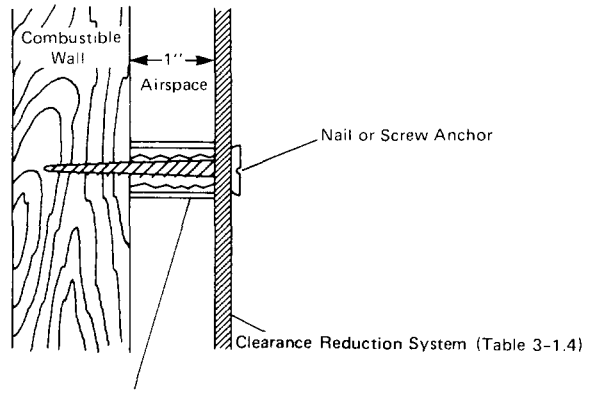




**Figure 3-1.4(b) Wall protector clearance reduction system.**

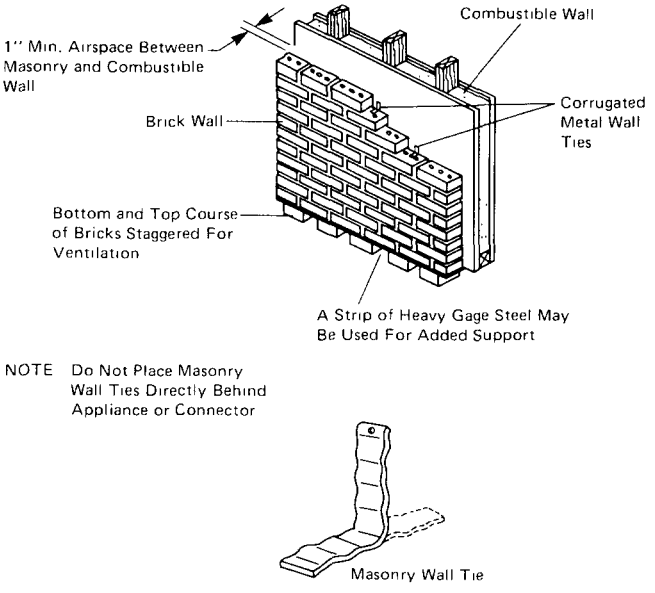



**Figure 3-1.4(c) Masonry clearance reduction system.**

### 3-2 Firestopping.

**3-2.1** Where the installation of ducts in walls, floors, or partitions requires the removal of any firestopping, the spaces around the duct at such points where firestopping was removed shall be sealed with noncombustible insulating material.

**3-2.2** Where spaces between studs in walls or partitions are used as return ducts, the portions of such spaces so used shall be cut off from all remaining unused portions by tight-fitting stops of sheet metal or of wood not less than 2 in. (51 mm) (nominal) thickness. Such spaces shall not be used as a supply duct.

## Chapter 4 Equipment, Wiring, and Controls

### 4-1 Equipment.

#### 4-1.1 Heating Panels.

**4-1.1.1** Air chambers having one or more external surface designed for use as heating panels shall be used only with:

(a) Automatically fired gas or oil burning forced warm air systems equipped with temperature limit controls that will limit furnace outlet air temperature to 200 °F (93 °C), or,

(b) Forced warm air systems equipped with heat exchangers utilizing steam which cannot exceed 15 lb (103 kPa) gage pressure or hot water which cannot exceed a temperature of 250 °F (121 °C).

**4-1.1.2 Connection.** Heating panels shall be connected to supply and return air ducts conforming to this standard.

**4-1.1.3 Construction.**

(a) Where warm air supply is from a warm air furnace, heating panels shall be enclosed on all sides with material which is wholly noncombustible or which possesses a flame spread classification of not over 25 as determined in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. This enclosing material shall be securely attached to the building structure; joints and seams shall be substantially airtight. Braces and hangers inside the chamber shall be noncombustible.

(b) Where warm air supply is from a steam or hot water heat exchanger, heating panels shall either comply with 4-1.1.3(a) or shall be enclosed on all sides with material not more flammable than 1-in. (25.4-mm) (nominal) wood boards. This enclosing material shall be securely attached to the building structure; joints and seams shall be substantially airtight. No single vertical heating panel shall serve more than one story.

#### 4-1.2 Down-Flow Systems.

**4-1.2.1 General.** Down-flow heating equipment shall be designed or equipped so that the outlet air temperature will not exceed 200 °F (93 °C).

*Exception: For systems installed under the provisions of 2-3.7, the outlet air temperature shall be limited to 165 °F (74 °C).*

**4-1.2.2** Equipment shall be designed to prevent unsafe temperature in event of reverse flow or fan failure.

**4-1.3 Air Filters.**

**4-1.3.1** Air filters shall have either a Class 1 or Class 2 rating in accordance with UL 900, *Standard for Test Performance of Air Filter Units.*

**4-1.3.2** An evaporative cooler containing a combustible filter and water evaporation medium, such as excelsior, shall not be used.

**4-1.3.3** Liquid adhesive coatings used on filters shall have a flash point not less than 325 °F (163 °C), per ASTM D93, *Test for Flashpoint by Pensky-Martens Closed Tester.*

**4-1.4 Air Cooling Equipment.** Mechanical refrigeration used with air duct systems shall be installed in accordance with ANSI/ASHRAE 15, *Safety Code for Mechanical Refrigeration.*

**4-1.4.1** Evaporative coolers containing a combustible evaporating medium, such as excelsior, shall not be used. This does not preclude the use of evaporation media meeting the requirements of 4-1.3.1.

**4-1.5 Furnaces Used with Cooling Units.**

**4-1.5.1** Combination units in which a refrigeration coil is provided shall have the refrigeration coil located downstream from the heating furnace, or the coil shall be located parallel to the heating furnace.

*Exception: Where the heating furnace is specifically approved for installation downstream from the coil.*

**4-1.5.1.1** When the heating furnace is located upstream from the coil, the coil shall be designed or equipped so as not to develop excessive temperatures or pressures. In those cases where the coil is located parallel to the heating furnace, dampers or other means used to control flow of air shall be adequate to prevent chilled air from entering the furnace section. If the dampers are manually operated, means shall be provided to prevent operation of either unit unless the damper is in the full heat or cool position. Adequate means shall be provided for disposal of condensate and to prevent dripping of condensate on the heating element.

**4-1.5.2** Furnaces (including duct furnaces) may be installed downstream from evaporative coolers or air washers provided that condensate will not fall into any portion of burners, pilots, or burner carry-over arms and provided that the heating element is made of corrosion-resistant material, such as stainless steel, ceramic-coated steel, or an aluminum-coated steel in which the bond between the steel and the aluminum is an iron-aluminum alloy. Air washers operating with chilled water which delivers air below the dew point of the ambient air at the appliance are considered as refrigeration systems.

**4-1.5.3** The capacity of the blower shall be adequate to overcome the external static resistance imposed by the combined heating and cooling units at the air throughput required for heating or cooling, whichever is greater.

**4-1.6 Boilers Used with Cooling Units.**

**4-1.6.1** When the same coil is used for both heating and cooling, valves shall be provided to prevent chilling of the boiler during the operation of the cooling system.

**4-1.6.2** When hot water heating boilers are connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, such boiler piping systems shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

**4-1.7 Heat Pump Systems.** Heat pump systems involving units or equipment installed in attics or in a space in the building construction used as a supply or return plenum shall conform to the appropriate provisions of 2-3.7 and 3-1.4.

**4-1.8 Solar Systems.**

**4-1.8.1** Solar systems or solar assisted systems shall be designed, constructed, and controlled so that the air temperature in the supply system shall not exceed 250 °F (121 °C).

**4-1.8.2** A flammable or combustible heat transfer fluid from a solar energy system shall not be used in a heat exchanger located in a duct system.

**4-2 Electric Wiring and Equipment.** Electric wiring and equipment shall be adequate for safe operation and shall be installed in accordance with NFPA 70, *National Electrical Code®.* In addition, a disconnecting means shall be installed within sight and easy reach in the ungrounded leads of each power circuit to electrically operated components which are in unprotected locations and in other locations not readily accessible for service.

**4-3 Controls.**

**4-3.1 Temperature Limit Controls.** Temperature limit controls shall be of a listed type and shall be such that they cannot be set higher than the specified temperature setting and shall be located no more than 2 ft (0.61 m) downstream from the heat exchanger.

**4-3.2 Fan Control for Stoker-Fired Furnaces.** When a warm air furnace equipped with a fan to circulate the air is stoker-fired it shall also be equipped with an automatic over-run control to start the fan when the air in the furnace bonnet or at the beginning of the main supply duct at a point not affected by radiated heat reaches a temperature not higher than 200 °F (93 °C) after the stoker and fan (in its normal operation) have been shut down as a result of a satisfied thermostat. If a manual disconnect is installed in the air circulating fan electrical circuit, it shall be so installed as to deenergize simultaneously both the fan and the stoker.

**4-3.3 Air for Combustion and Ventilation.** Heating appliances shall be installed in a location in which the facilities for ventilation permit satisfactory combustion and proper ventilation under normal conditions of operation and use. (*See NFPA 31, Standard for the Installation of Oil Burning Equipment, and NFPA 54, National Fuel Gas Code.)*

**4-3.4 Thermostatically Controlled Hand-Fired Solid Fuel Burning Furnaces.** Hand-fired solid fuel burning furnaces on which the furnace draft is controlled by a thermostat shall be equipped with (1) a fail-safe 250 °F (121 °C) limit control installed not more than 10 in. (254 mm) above the top surface of the heat exchanger in a supply plenum that extends at least 12 in. (305 mm) above the top surface of the heat exchanger, and (2) a barometric draft control operated by draft intensity and permanently set to limit the draft to a maximum intensity of 0.13 in. (32.4 Pa) of water gage. By a fail safe limit control is meant one which will automatically check the furnace in the event of power failure or shut off, or which will automatically check the furnace when 250 °F (121 °C) temperature is reached whether or not power is then available.

**4-3.5 Air Circulating Fan Controls.** When a hand-fired solid fuel burning furnace is equipped with a fan to circulate the air, it shall be equipped with fan controls as required for stoker-fired furnaces by 4-3.2.

**4-3.6 Accessory Equipment.** Material used in the construction of accessory equipment attached to or installed in a supply or return system shall comply with the requirements for the materials of that portion of the system to which it is attached. This shall not preclude the attachment to a plenum or duct of small devices, such as humidifiers, specifically listed for such use. Motors and electrical wiring and equipment shall comply with Section 4-2.

## Chapter 5 Referenced Publications

**5-1** The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

**5-1.1 NFPA Publications.** National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 31-1987, *Standard for the Installation of Oil Burning Equipment*

NFPA 54-1988, *National Fuel Gas Code*

NFPA 70-1990, *National Electrical Code*

NFPA 255-1984, *Standard Method of Test of Surface Burning Characteristics of Building Materials*

NFPA 701-1989, *Standard Methods of Fire Tests for Flame-Resistant Textiles and Films.*

**5-1.2 Other Publications.**

**5-1.2.1 ANSI/ASHRAE Publication.** American National Standards Institute, 1430 Broadway, New York, NY 10018.

ANSI/ASHRAE 15-1978, *Safety Code for Mechanical Refrigeration.*

**5-1.2.2 ASTM Publications.** American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM C411-1982, *Test for Hot-Surface Performance of High-Temperature Thermal Insulation*

ASTM D93-1985, *Test for Flashpoint by Pensky-Martens Closed Tester*

ASTM E136-1982, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C.*

**5-1.2.3 SMACNA Publications.** Sheet Metal and Air Conditioning Contractors National Association, Inc., 8224 Old Courthouse Road, Vienna, VA 22180.

*Fibrous Glass Duct Construction Standards*, Fifth Edition, 1979

*HVAC Duct Construction Standards*, First Edition, 1988

*Installation Standards for Residential Heating and Air Conditioning Systems*, Sixth Edition, 1988.

**5-1.2.4 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

UL 94-1980, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 181-1981, *Standard for Factory-Made Air Ducts and Connectors*

UL 900-1987, *Standard for Test Performance of Air Filter Units.*

## Appendix A Referenced Publications

**A-1** The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

**A-1.1 NFPA Publications.** National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 90A-1989, *Standard for the Installation of Air Conditioning and Ventilating Systems*

NFPA 91-1983, *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying*

NFPA 96-1987, *Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.*

**A-1.2 Other Publication.**

*Building Materials Directory*, Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

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# SUBMITTING PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

**Contact NFPA Standards Administration for final date for receipt of proposals on a specific document.**

## INSTRUCTIONS

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1. For each document on which you are proposing amendment indicate:
   (a) The number and title of the document
   (b) The specific section or paragraph.

2. Check the box indicating whether or not this proposal recommends new text, revised text, or to delete text.

3. In the space identified as "Proposal" include the wording you propose as new or revised text, or indicate if you wish to delete text.

4. In the space titled "Statement of Problem and Substantiation for Proposal" state the problem which will be resolved by your recommendation and give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If a statement is more than 200 words in length, the technical committee is authorized to abstract it for the Technical Committee Report.

5. Check the box indicating whether or not this proposal is original material, and if it is not, indicate source.

6. If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

NOTE: The NFPA Regulations Governing Committee Projects in Paragraph 10-10 state: Each proposal shall be submitted to the Council Secretary and shall include:

(a) identification of the submitter and his affiliation (Committee, organization, company) where appropriate, and

(b) identification of the document, paragraph of the document to which the proposal is directed, and

(c) a statement of the problem and substantiation for the proposal, and

(d) proposed text of proposal, including the wording to be added, revised (and how revised), or deleted.

## FORM FOR PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

**Mail to:** Secretary, Standards Council
National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269

**Date** 5/18/85 **Name** John B. Smith **Tel. No.** 617-555-1212

**Address** 9 Seattle St., Seattle, WA 02255

**Representing (Please indicate organization, company or self)** Fire Marshals Assn. of North America

1. a) **Document Title:** Protective Signaling Systems **NFPA No. & Year** NFPA 72D

   b) **Section/Paragraph:** 2-7.1 (Exception)

2. **Proposal recommends: (Check one)** ☐ new text
   ☐ revised text
   ☒ deleted text.

3. **Proposal (include proposed new or revised wording, or identification of wording to be deleted):**

   Delete exception.

4. **Statement of Problem and Substantiation for Proposal:**

   A properly installed and maintained system should be free of ground faults. The occurrence of one or more ground faults should be required to cause a "trouble" signal because it indicates a condition that could contribute to future malfunction of the system. Ground fault protection has been widely available on these systems for years and its cost is negligible. Requiring it on all systems will promote better installations, maintenance and reliability.



5. ☒ **This Proposal is original material.**
   ☐ **This Proposal is not original material; its source (if known) is as follows:** _____

(Note: Original material is considered to be the submitter's own idea based on or as a result of his own experience, thought, or research and, to the best of his knowledge, is not copied from another source.)

**I agree to give NFPA all and full rights, including rights of copyright, in this Proposal and I understand that I acquire no rights in any publication of NFPA in which this Proposal in this or another similar or analogous form is used.**

John B. Smith
**Signature**

**PLEASE USE SEPARATE FORM FOR EACH PROPOSAL**