Chapter 1 Administration

1.1* Scope.

This standard shall cover construction, installation, operation, and maintenance of systems for warm air heating and air conditioning, including filters, ducts, and related equipment to protect life and property from fire, smoke, and gases resulting from fire or from conditions having manifestations similar to fire.

1.2 Purpose.

This standard shall prescribe provisions based on minimum requirements for safety to life and property.

1.3 Application.

1.3.1 This standard shall apply to all systems for the movement of environmental air in structures that serve the following, except as described in 1.3.2:

(1) One- or two-family dwellings

(2) Spaces not exceeding 708 m³ (25,000 ft³) in volume in any occupancy

1.3.2 This standard shall not apply to systems for the movement of environmental air in buildings of combustible construction over three stories in height, which shall comply with NFPA 90A.

1.4 Equivalency.

Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.4.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.4.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.
2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


2.3 Other Publications.

2.3.1 ASHRAE Publications.


2.3.2 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.


2.3.3 SMACNA Publications.

Sheet Metal and Air Conditioning Contractors’ National Association, Inc., 4201 Lafayette Center Drive, Chantilly, VA 20151-1209.


2.3.4 UL Publications.
Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.
UL 1381, Outline of Investigation for Aerosol Duct Sealant, 2013.
UL 2518, Outline of Investigation for Air Dispersion System Materials, 2015.

2.3.5 Other Publications.

2.4 References for Extracts in Mandatory Sections.

Chapter 3 Definitions
3.1 General.
The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. Merriam-Webster’s Collegiate Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.
3.2.1* Approved.
Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ).
An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

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

3.2.4 Shall.
Indicates a mandatory requirement.
3.2.5 Should.
Indicates a recommendation or that which is advised but not required.

3.3 General Definitions.

3.3.1 Accessible.
Capable of being removed or exposed without damaging the building structure or finish, or not permanently closed in by the structure or finish of the building. [90A,2015 2018]

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

3.3.3 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 that is connected to a supply system and a return system.

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

3.3.3.2* Gravity System.
A central warm air heating system through which air is circulated by gravity.

3.3.4 Combustible Material.
A material capable of undergoing combustion.

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

3.3.6 Duct Lining.
A material such as adhesive, insulation, coating(s), and film used to line the inside surface of a duct, fan casing, or duct plenum.

3.3.7 Heat Pump.
A refrigeration system arranged to accomplish either heating or heating and cooling.

3.3.8 Noncombustible Material.
See Section 4.1.

3.3.9 Plenum.
A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.

3.3.10 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.
3.3.11 Rooms Large in Comparison with Size of Equipment.
Rooms having a volume equal to at least 12 times the total volume of a furnace or air-conditioning appliance and at least 16 times the total volume of a boiler. The total volume of the appliance 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 2.44 m (8 ft), the volume of a room is figured on the basis of a ceiling height of 2.44 m (8 ft).

3.3.12 Supply System.
An assembly of connected ducts, air passages, or plenums and fittings through which air is conducted to the space or spaces to be conditioned.

Chapter 4 System Components

4.1* Supply Systems.

4.1.1 Duct Materials.

4.1.1.1* Supply Ducts.
Supply ducts shall be made of either of the following materials:

1. Class 0 or Class 1 rigid or flexible air ducts tested in accordance with ANSI/UL 181
2. Sheet metal having a nominal thickness as shown in Table 4.1.1.1

Table 4.1.1.1 Nominal Thickness of Sheet Metal Ducts

<table>
<thead>
<tr>
<th>Diameter or Width</th>
<th>Nominal Thickness</th>
<th>Galvanized Sheet</th>
<th>Aluminum</th>
<th>Tin Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Minimum Thickness</td>
<td>Thickness</td>
<td>Minimum Weight per Base Box</td>
</tr>
<tr>
<td></td>
<td>mm in.</td>
<td>mm in.</td>
<td>mm in.</td>
<td>kg lb</td>
</tr>
<tr>
<td>Round Ducts and Enclosed Rectangular Ducts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>356 or less</td>
<td>14 or less</td>
<td>0.406 0.016</td>
<td>0.330 0.013</td>
<td>0.406 0.016</td>
</tr>
<tr>
<td>Over 356</td>
<td>Over 14</td>
<td>0.483 0.019</td>
<td>0.406 0.016</td>
<td>0.508 0.020</td>
</tr>
<tr>
<td>Exposed Rectangular Ducts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>356 or less</td>
<td>14 or less</td>
<td>0.483 0.019</td>
<td>0.406 0.016</td>
<td>0.508 0.020</td>
</tr>
<tr>
<td>Over 356</td>
<td>Over 14</td>
<td>0.559 0.022</td>
<td>0.483 0.019</td>
<td>0.584 0.023</td>
</tr>
</tbody>
</table>

4.1.1.1
Supply ducts that are completely encased in not less than 51 mm (2 in.) of concrete in a floor slab shall not be required to meet the requirements of 4.1.1.1.
4.1.1.1.1
The supply ducts shall meet the requirements of 4.1.1.1(1) and 4.1.1.1(2) within 0.61 m (2 ft) of the furnace supply plenum and within 0.61 m (2 ft) of a vertical connection to a riser or register.

4.1.1.1.2
Supply ducts for a separate air cooling system, not interconnected to any warm air heating system, serving a single-family dwelling shall not be required to meet the requirements of 4.1.1.1, provided that they are not closer than 0.61 m (2 ft) to any furnace or its supply plenum, boiler, or other heat-producing appliances and that they comply with 4.2.1.1, 4.2.1.3, 4.2.2, 4.2.3, and 4.2.4 as specified for return ducts.

4.1.1.1.3
Vibration isolation connectors in duct systems shall comply with 4.1.1.1.3.1 or 4.1.1.1.3.2.

4.1.1.1.3.1
The connector shall be made of approved fabric meeting the flame propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701, and shall not exceed 254 mm (10 in.) in length in the direction of airflow.

4.1.1.1.3.2
The connector shall consist of sleeve joints with packing of approved material, exhibiting either (a) a maximum flame spread index of 25 and a maximum smoke developed index of 450 when tested in accordance with ASTM E84 or with ANSI/UL 723 or (b) the criteria of 6.1.1.3.6(3) when tested in accordance with NFPA 286.

4.1.1.1.4
A Class 0 or Class 1 rigid or flexible air duct shall not be used as a vertical air duct that is more than two stories in height.

4.1.1.1.5
A Class 0 or Class 1 rigid or flexible air duct shall not be used in an air duct containing air at a temperature in excess of 121°C (250°F).

4.1.1.2
Supply ducts shall be installed in conformance with the following:

(1) The conditions of their listing
(2) SMACNA Fibrous Glass Duct Construction Standards
(3) SMACNA HVAC Duct Construction Standards — Metal and Flexible
(4) SMACNA Residential Comfort System Installation Standards Manual

4.1.2 Air Connectors.
Air connectors shall be permitted to be used as limited-use, flexible air ducts that shall not be required to conform to the provisions for air ducts where they meet the requirements in 4.1.2.1 through 4.1.2.7.
4.1.2.1
Air connectors shall conform to the requirements for Class 0 or Class 1 air connectors when tested in accordance with ANSI/UL 181.

4.1.2.2
Class 0 or Class 1 air connectors shall not be used in ducts containing air at temperatures in excess of 121°C (250°F).

4.1.2.3
Air connector runs shall not exceed 4.27 m (14 ft) in length.

4.1.2.4
Air connectors shall not pass through any wall, partition, or enclosure of a vertical shaft that is required to have a fire-resistance rating of 1 hour or more.

4.1.2.5
Air connectors shall not pass through floors.

4.1.2.6
An air connector shall not be interrupted by a short collar or any other fitting on one side and then connected to another air connector on the other side when penetrating a floor or a wall, partition, or enclosure of a vertical shaft that is required to have a fire-resistance rating of 1 hour.

4.1.2.7
Multiple air connector runs shall not be spliced together in an attempt to exceed the length limitation in 4.1.2.3.

4.1.3 Furnace Plenums.

4.1.3.1
Furnace plenums shall be constructed of metal that is of the minimum thickness as shown in Table 4.1.1.1.

4.1.3.2
Furnace plenums shall be located a minimum of 914 mm (36 in.) from the heat exchanger measured along the centerline of airflow.
4.1.3.3

Other plenums shall conform to the requirements for supply ducts.
4.1.4 Use of Underfloor Space as a Supply Plenum.

Where heated air is discharged downward into an air chamber that forms a plenum of an underfloor space, the following shall apply:

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

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

(3) Accessible abandoned material shall be deemed to be storage and shall not be permitted to remain.

(4) The enclosing material of the underfloor space, including the sidewall insulation and ground cover, shall not be more flammable than 25.4 mm (1 in.) (nominal) wood boards.

(5) Ground cover not complying with the requirement in 4.1.4(4) shall be covered over with at least 51 mm (2 in.) of sand or other noncombustible material.

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

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

(8) The automatic control shall not have the capability to be set higher than 66°C (150°F).

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

(10) A noncombustible receptacle shall be placed below each floor type, opening into the air chamber.

(11) Such receptacles shall conform to the following:

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

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

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

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

(13) Exterior walls and interior stud partitions shall be fire-stopped at the floor.

(14) Each wall register shall be connected to the air chamber with a duct or boot complying with 4.1.1, 4.1.3.1, and 4.1.3.2.

(15) Supply ducts to the air chamber shall comply with the provisions of 4.1.1, 4.1.2, and 5.1.1.

(16) Supply ducts to the air chamber shall terminate approximately under the center of a room above at a distance of not less than 1.83 m (6 ft) from the plenum chamber.

(17) Furnaces, boilers, or other heat-producing appliances shall not be installed in such a supply plenum.
4.2 Return Systems.

4.2.1 Duct Materials.

4.2.1.1
Return ducts shall be permitted to be constructed of metal, of 25.4 mm (1 in.) (nominal) wood boards, or of other suitable material, provided that no material more flammable than 25.4 mm (1 in.) (nominal) wood boards shall be used.

4.2.1.2
Portions of return ducts directly above the heating surface or closer than 0.61 m (2 ft) from the outer jacket or casing of the heater shall be constructed in accordance with provisions of 4.1.1 for supply ducts.

4.2.1.3
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, the bottom of vertical ducts, or heaters having a bottom return.

4.2.2 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.

4.2.3 Continuous Ducts.

4.2.3.1
Return air shall be conducted to the appliance through continuous ducts, except as permitted in 4.2.3.2 through 4.2.3.5.

4.2.3.2*
Underfloor spaces shall be permitted to be used as plenums for return of air from rooms directly above, provided that such spaces are cleaned of all combustible material, are tightly enclosed, and are not used for storage or occupancy.

4.2.3.3
Furnaces, boilers, and other heat-producing appliances shall not be installed in a return plenum such as that described in 4.2.3.2.

4.2.3.4
Accessible abandoned materials shall be deemed to be storage and shall not be permitted to remain.

4.2.3.5
In a single-story residence, the return air shall be permitted to travel through the first-floor living space to the return air inlet on the furnace. (See 6.3.3.)

4.2.4 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.
4.2.4.1

The requirement of 4.2.4 shall not prohibit the use of a corridor as follows:

(1) A source of makeup air through normal leakage around doors for interior exhaust fans in kitchens, appliances, bathrooms, and toilet rooms

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

4.2.5 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.

4.3 Common Requirements.

4.3.1* Duct Coverings and Linings.

4.3.1.1* Duct coverings, duct linings, and tapes used in duct systems shall have a maximum flame spread index of 25 without evidence of continued progressive combustion and a maximum smoke developed index of 50 when tested in accordance with ASTM E84 or ANSI/UL 723, using the specimen preparation and mounting procedures of ASTM E2231.

4.3.1.2 The requirements of 4.3.1.1 shall not apply to duct coverings where they are located entirely outside of a building, do not penetrate a wall or roof, and do not create an exposure hazard.

4.3.1.3 Duct coverings and linings shall not flame, glow, smolder, or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. In no case shall the test temperature be below 121°C (250°F).

4.3.1.4 Duct coverings shall not extend through walls or floors required to be firestopped or required to have a fire resistance rating.

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

4.3.1.5.1 Solar energy heat exchangers incapable of creating sustained operating temperatures higher than 93°C (200°F) shall not be required to meet the provision of 4.3.1.5.

4.3.1.6 Duct coverings shall not conceal any service opening.

4.3.1.6.1 Where a label is permanently attached to the covering indicating the exact location of the opening, the requirement of 4.3.1.6 shall not be applied.
4.3.1.7
Appliances such as fan coil units, self-contained air-conditioning units, and furnaces shall be considered to meet the requirements of 4.3.1.1 if they are listed.

4.3.1.8
Unlisted solar energy air distribution system components shall be accompanied by supportive information indicating that their flame spread and smoke developed characteristics are not in excess of those of the duct system to which they are connected.

4.3.2 * Joints.

4.3.2.1
Joints and seams shall be fastened and made airtight.

4.3.2.2
Slip joints shall have a lap of at least 25.4 mm (1 in.).

4.3.2.3
Slip joints shall be fastened individually per Figure 4.3.2.3.

Figure 4.3.2.3 Types of Duct Joints.

<table>
<thead>
<tr>
<th>Button punch, rivet, or screw</th>
<th>Slip</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.4 mm (1 in.) lap</td>
<td>Standing seam</td>
</tr>
<tr>
<td>Drive cleat</td>
<td>Acme lock</td>
</tr>
<tr>
<td>&quot;S&quot; slip*</td>
<td>Pittsburgh lock</td>
</tr>
</tbody>
</table>

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

4.3.2.4
Tape shall be permitted to be used for sealing joints.

4.3.2.4.1
Tape, where exposed to the air in the system, shall have a flame spread index not to exceed 25 and a smoke developed index of not more than 50 when tested to ASTM E84 or ANSI/UL 723 using the test specimen preparation and mounting method in accordance with ASTM E2688.

4.3.2.4.2
Mastic and sealants exposed to the air in the system, shall have a flame spread index not to exceed 25 and a smoke developed index of not more than 50 when tested to ASTM E84 or ANSI/UL 723 using the test specimen preparation and mounting method in accordance with ASTM E2690.

4.3.2.5
Closure systems for use with rigid and flexible air ducts tested in accordance with ANSI/UL 181 shall have been tested and listed in accordance with ANSI/UL 181A or ANSI/UL 181B.
4.3.2.6*  
Aerosol duct sealants intended to seal minor holes and gaps in sheet metal air ducts shall have been tested and listed in accordance UL1381 and used in accordance with the conditions of their listings.

4.3.3 Duct Hangers.

4.3.3.1  
Ducts shall be supported by metal hangers, straps, lugs, or brackets.

4.3.3.2  
No nails shall be driven through the duct walls, and no unnecessary holes shall be cut therein.

4.3.4 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 5.1.3.)

4.3.5 Registers for Ducts and Plenums.

Registers shall be constructed of metal or shall conform with 4.3.5.1 through 4.3.5.4.

4.3.5.1  
Registers shall be made of a material classified as 94 V-0 when tested in accordance with ANSI/UL 94.

4.3.5.2  
Floor registers shall resist, without structural failure, a 90.7 kg (200 lb) concentrated load on a 51 mm (2 in.) diameter disc applied to the most critical area of the exposed face of the register.

4.3.5.2.1  
The register shall be at a temperature not less than 74°C (165°F).

4.3.5.2.2  
The register shall be supported in accordance with the manufacturer's instructions.

4.3.5.3  
Electric or fuel-fired furnace systems shall have at least one register or grille without a closable shutter.

4.3.5.3.1  
The duct leading thereto shall be without a damper.

4.3.5.3.2  
Dampers and shutters shall be allowed where they cannot shut off more than 80 percent of the duct area.

4.3.5.4  
Fittings connecting the registers to the duct system shall be constructed of one of the following:

(1) Metal

(2) Materials that comply with the requirements of Class 0 or Class 1 ducts in ANSI/UL 181

(3) Materials that comply with the requirements of ANSI/UL 2043
4.3.6 Pipeless Furnace Registers.
Where registers are installed in the floor over the furnace, as in the case of a “pipeless” furnace, the register box shall be of double-walled construction with an air space not less than 102 mm (4 in.).

4.3.6.1
The register box shall be permitted to not meet the requirements of 4.3.6 where the warm air passage is surrounded by a cold air passage.

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

1. Such installations shall be limited to detached single-family dwellings.
2. No concealed ceiling space plenum shall serve more than one story of a detached single-family dwelling.
3. This shall not preclude separate installations on each floor of the detached single-family dwelling.
4. The concealed space plenum shall be separated from any other concealed spaces.
5. The plenum or concealed ceiling spaces shall be enclosed completely with construction not more flammable than 25.4 mm (1 in.) (nominal) wood boards.
6. Plenum or concealed ceiling spaces shall not be used for storage or occupancy.
7. Accessible abandoned materials shall be deemed to be storage and shall not be permitted to remain.
8. No ventilating system shall discharge into such plenum or concealed ceiling spaces.
9. Units supplying such plenum or concealed ceiling spaces shall be designed to limit the temperature of the air discharged into the supply plenum or chamber to 74°C (165°F).
10. Where units incorporate heating elements, heated surfaces, or combustion chambers that develop temperatures higher than 74°C (165°F), such components shall be designed to prevent direct radiation onto combustible material when the unit is installed.
11. The installation of the unit supplying such plenum or concealed ceiling spaces shall not produce negative pressure in the attic where the attic is the source of air for combustion for fuel-fired equipment.

4.3.8 Air Dispersion Systems.
Air dispersion systems shall:

1. Be installed entirely in exposed locations
2. Be utilized in systems under positive pressure
3. Not pass through or penetrate fire-resistant-rated construction
4. Be listed and labeled in compliance with UL 2518

Chapter 5 Fire Integrity of Building

5.1 Clearances to Combustible Material.

5.1.1 General.
Where ducts are adjacent to plaster on metal lath or to some other noncombustible finish attached to a combustible material, the clearance shall be measured to the combustible material.

5.1.1.1
The clearance shall be measured to the surface of the plaster or other noncombustible finish where a clearance of 51 mm (2 in.) or less is specified above a bonnet or plenum chamber or above supply ducts.

5.1.1.1.1
The requirement of 5.1.1.1 shall not be construed to prohibit the closure of openings with noncombustible material where ducts pass through walls and partitions, as provided in 5.1.2.

5.1.1.2
Where an appliance, ductwork, or a chimney or vent connection is listed for different clearances, the listed clearances shall apply.

5.1.2 Clearances from Horizontal Supply Ducts.

Minimum clearances from horizontal supply ducts to combustible materials shall be as follows in 5.1.2.1 through 5.1.2.8.
5.1.2.1
Within a distance of 0.91 m (3 ft) of the plenum of a system classified under A, C, or G of Table 5.1.2.1, the clearance shall be not less than that specified above the bonnet or plenum.

### Table 5.1.2.1 Clearances to Combustible Material for Furnaces, Boilers, Solar Energy Heating Devices, and Heat Exchangers Installed in Rooms That Are Large in Comparison with Size of Appliance

<table>
<thead>
<tr>
<th>System/Component</th>
<th>Minimum Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Above and Sides of Bonnet or Plenum</td>
</tr>
<tr>
<td></td>
<td>mm</td>
</tr>
<tr>
<td>A. Listed automatically fired, forced air or gravity system with 121°C (250°F) temperature limit control</td>
<td></td>
</tr>
<tr>
<td>Burning liquid fuel</td>
<td>51&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Burning gas fuel</td>
<td>51&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Utilizing electricity</td>
<td>51&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>B. Unlisted automatically fired, forced air or gravity system with temperature limit control that cannot be set higher than 121°C (250°F)</td>
<td></td>
</tr>
<tr>
<td>Burning liquid fuel</td>
<td>152</td>
</tr>
<tr>
<td>Burning gas fuel</td>
<td>152</td>
</tr>
<tr>
<td>Utilizing electricity</td>
<td>152</td>
</tr>
<tr>
<td>C. Steam or hot water heat exchanger — steam not over 103 kPa (15 psi) pressure and hot water not more than 121°C (250°F)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>51</td>
</tr>
<tr>
<td>D. Automatically stoker-fired, forced air system equipped with 121°C (250°F) temperature limit control with a barometric draft control&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Burning solid fuel</td>
<td>152</td>
</tr>
<tr>
<td>E. Heating boilers used in central warm air heating systems — steam boiler operating at not over 103 kPa (15 psi) gauge pressure and</td>
<td></td>
</tr>
</tbody>
</table>

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<sup>a</sup>Front includes projection of flue box or draft hood.

<sup>b</sup>States and sides.

<sup>c</sup>For unlisted systems.

<sup>d</sup>Barometric draft control not required.
<table>
<thead>
<tr>
<th>System/Component</th>
<th>Minimum Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Above and Sides of Bonnet or Plenum</td>
</tr>
<tr>
<td>hot water boilers operating at no more than 121°C (250°F) of the water wall–type or having a jacket or lining of masonry or other satisfactory material</td>
<td>mm</td>
</tr>
<tr>
<td>Burning liquid fuel</td>
<td>152&lt;sup&gt;e&lt;/sup&gt; 6&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Burning gas fuel</td>
<td>152&lt;sup&gt;e&lt;/sup&gt; 6&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Burning solid fuel</td>
<td>152&lt;sup&gt;e&lt;/sup&gt; 6&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Utilizing electricity</td>
<td>152&lt;sup&gt;e&lt;/sup&gt; 6&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>F. Furnaces and heating boilers used in central warm air heating systems, other than above</td>
<td></td>
</tr>
<tr>
<td>Burning liquid fuel</td>
<td>457 18</td>
</tr>
<tr>
<td>Burning gas fuel</td>
<td>457 18</td>
</tr>
<tr>
<td>Burning solid fuel</td>
<td>457 18</td>
</tr>
<tr>
<td>G. Solar energy heat exchangers operating at a temperature not in excess of 121°C (250°F)</td>
<td>519 29</td>
</tr>
</tbody>
</table>

<sup>a</sup>Front clearance shall be sufficient for servicing the burner and furnace or boiler.

<sup>b</sup>This clearance shall be permitted to be reduced to 25.4 mm (1 in.) for a listed forced air or gravity furnace equipped with a limit control that limits outlet air temperatures to 93°C (200°F).

<sup>c</sup>For unlisted gas appliances equipped with an approved draft hood, this clearance shall be permitted to be reduced to 229 mm (9 in.).

<sup>d</sup>The barometric draft control shall be operated by draft intensity and permanently set to limit the draft to a maximum intensity of 32.4 Pa (0.13 in.) of water gauge.

<sup>e</sup>This clearance is above top of boiler.

<sup>f</sup>This clearance shall be permitted to be reduced to 152 mm (6 in.) for listed gas burning furnaces and boilers.

<sup>g</sup>This clearance also shall apply to ducts from solar collectors to heat exchangers or thermal storage systems.
5.1.2.2
Within a distance of 1.83 m (6 ft) of the plenum of a system classified under B or D of Table 5.1.2.1, the clearance shall be not less than 152 mm (6 in.).

5.1.2.3
From ducts of furnaces classified under D of Table 5.1.2.1, the clearance shall be not less than 25.4 mm (1 in.) beyond 1.83 m (6 ft) from the plenum to a point where there is a change in direction of 90 degrees or more.

5.1.2.4
From ducts of furnaces classified under F of Table 5.1.2.1, the following requirements shall apply:

(1) The clearance shall be not less than 457 mm (18 in.) up to 0.91 m (3 ft) from the bonnet or plenum.

(2) The clearance shall be not less than 152 mm (6 in.) for 0.91 m (3 ft) to 1.83 m (6 ft) from the bonnet or plenum.

(3) The clearance shall be not less than 25.4 mm (1 in.) beyond 1.83 m (6 ft) from the bonnet or plenum.

5.1.2.5
No clearance shall be required beyond the distances from the plenum or change in direction specified in 5.1.2.1 and 5.1.2.2.

5.1.2.6
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 5.1.2.1, 5.1.2.2, and 5.1.2.3, the clearance shall be not less than that specified in those paragraphs.
5.1.2.7

The ends of the space providing this clearance shall be permitted to be closed with a thimble and collar, or the wall surfaces shall be extended to the duct with noncombustible building material such as plaster on metal lath. [See Figure 5.1.2.7(a) and Figure 5.1.2.7(b).]

Figure 5.1.2.7(a) An Arrangement for Closing Ends of Clearance Space Around a Supply Duct. A similar arrangement can be used where a duct continues through the partition.

Figure 5.1.2.7(b) An Arrangement for Passing Ducts Through Combustible Walls or Partitions as Specified in 5.1.2.5.

5.1.2.8

Separate air-cooling system ducts that are made of materials other than noncombustible material shall be installed with clearances to warm air ducts as required in 5.1.2.1, 5.1.2.2, and 5.1.2.3.

5.1.3 Clearances from Vertical Ducts, Risers, Boots, and Register Boxes.
5.1.3.1
Where a duct, riser, boot, or box on a system that does not require 457 mm (18 in.)
clearance above the supply plenum or bonnet enters a floor, partition, or enclosure
constructed of combustible material within the distances from the plenum specified in
5.1.2.1 and 5.1.2.2, the clearance from such a duct, riser, boot, or box shall be not less
than the distance required above the furnace bonnet or plenum per Table 5.1.2.1.

5.1.3.1.1
Alternatively, the duct shall change in a direction equivalent to at least two 90-degree
turns before entering such floor, partition, or enclosure.

5.1.3.1.2
These requirements shall not apply to pipeless furnaces as specified in 4.3.6.

5.1.3.2
Where a supply duct enters the floor of the first story above that story on which the
furnace is located, the space around the duct at such points shall be sealed with
noncombustible material.

5.1.3.3
Where a duct, riser, boot, or box on a system that requires 457 mm (18 in.) of clearance
above the supply plenum or bonnet enters a floor, partition, or enclosure constructed of
combustible material within a horizontal distance of 1.83 m (6 ft) of the furnace, the duct
shall be arranged so that heated air travels at least 1.83 m (6 ft) from the closest primary
heating surface and changes direction equivalent to at least one 90-degree turn before
entering such a floor, partition, or enclosure.

5.1.3.4
Where a duct, riser, boot, or box on a system that requires 457 mm (18 in.) of clearance
above the supply plenum or bonnet enters the floor of the first story above that story on
which the furnace is situated, the clearance shall be at least 4.76 mm (3/16 in.) from all
combustible material in the floor construction.

5.1.3.4.1
Where the duct is of double-wall construction with a continuous air space of not less than
4.76 mm (3/16 in.) between the inner and outer walls, 5.1.3.4 shall not apply.

5.1.3.5
Where a duct or riser on a system that requires 457 mm (18 in.) of 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, 5.1.3.5.1, 5.1.3.5.2, or 5.1.3.5.3 shall apply.

5.1.3.5.1
The duct shall be installed with an air space of not less than 4.76 mm (3/16 in.) between
the duct and combustible material.

5.1.3.5.2
Where a noncombustible insulating covering of the cellular type that is at least 3.18 mm
(¼ in.) thick is provided using metal lath and plaster partitions, no air space shall be
required except from wood studs.

5.1.3.5.3
The duct shall be double-walled with a continuous air space of not less than 4.76 mm
(3/16 in.) between the inner and outer walls.
5.1.3.6
Where a register on a system that requires 457 mm (18 in.) of 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 4.76 mm (√16 in.) between the top and sides of the box and any combustible material.

5.1.4 Clearances from Furnaces, Boilers, Heat Exchangers, Heat Pumps, and Cooling Units.

5.1.4.1
Minimum clearances from furnaces, boilers, heat exchangers and their flue boxes, draft hoods, or chimney or vent connectors that are installed in rooms that are large in comparison with the size of the appliance shall be as specified in 5.1.3.1, unless otherwise provided in 5.1.1 and 5.1.4.2.

5.1.4.2
Heating furnaces and boilers used in residence-type central warm air heating systems shall be permitted to be installed in rooms that are large in comparison with the size of the appliance with clearances reduced as designated in Table 5.1.4.2 where combustible material is protected in the manner specified per Figure 5.1.4.2(a), Figure 5.1.4.2(b), and Figure 5.1.4.2(c).

Table 5.1.4.2 Reduction of Clearances with Specified Forms of Protection

<table>
<thead>
<tr>
<th>Type of Protection*</th>
<th>Required Clearance with No Protection from Appliance and Vent Con Single-Wall Metal Pipe</th>
<th>Allowable Clearance with Specified Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>914 mm (36 in.)</td>
<td>457 mm (18 in.)</td>
</tr>
<tr>
<td>Above</td>
<td>Sides and Rear</td>
<td>Above</td>
</tr>
<tr>
<td>mm</td>
<td>in.</td>
<td>mm</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>89 mm (3½ in.) thick masonry wall without ventilated air space</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>12.7 mm (½ in.) insulation board over 25.4 mm (1 in.) glass fiber or mineral wool batts</td>
<td>610 24</td>
<td>457 18</td>
</tr>
<tr>
<td>0.6 mm (0.024 in.) (24-gauge) sheet metal over 25.4 mm (1 in.) glass fiber or mineral wool batts reinforced with wire on rear face with ventilated air space</td>
<td>457 18</td>
<td>305 12</td>
</tr>
<tr>
<td>89 mm (3½ in.) thick masonry wall with ventilated air space</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note: The table continues with additional rows and columns, but they are not fully visible in the image provided.
<table>
<thead>
<tr>
<th>Type of Protection*</th>
<th>Required Clearance with No Protection from Appliance and Vent Con</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>914 mm (36 in.)</td>
</tr>
<tr>
<td><strong>Allowable Clearance with Specified Protection</strong></td>
<td>Above</td>
</tr>
<tr>
<td></td>
<td>mm in.</td>
</tr>
<tr>
<td>0.6 mm (0.024 in.) (24-gauge) sheet metal with ventilated air space</td>
<td>457 18</td>
</tr>
<tr>
<td>12.7 mm (½ in.) insulation board with ventilated air space</td>
<td>457 18</td>
</tr>
<tr>
<td>0.6 mm (0.024 in.) (24-gauge) sheet metal with ventilated air space over 0.6 mm (0.024 in.) (24-gauge) sheet metal with ventilated air space</td>
<td>457 18</td>
</tr>
<tr>
<td>25.4 mm (1 in.) glass fiber or mineral wool batts sandwiched between two sheets</td>
<td>457 18</td>
</tr>
</tbody>
</table>
*Applied to and covering all surfaces of combustible material within the distance specified as the required clearance with no protection.

Notes:

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

(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.

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

(4) With all clearance reduction systems using a ventilated air space, means for air circulation shall be provided as described. [See Figure 5.1.4.2(b) and Figure 5.1.4.2(c).]

(5) There shall be at least 25.4 mm (1 in.) of clearance between the reduction system and combustible walls and ceilings for reduction systems using ventilated air space.

(6) If a wall protector is mounted on a single flat wall away from corners, adequate 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 25.4 mm (1 in.) air gap.

(7) Mineral wool batts (blanket or board) shall have a minimum density of 128 kg/m$^3$ (8 lb/ft$^3$) and a minimum melting point of 816°C (1500°F).

(8) Insulation material used as part of the clearance reduction system shall have a thermal conductivity of 1.0 (Btu-in.)/(ft-hr.-°F) (SI = 1 W/m$^2$ · K) or less.

(9) There shall be at least 25.4 mm (1 in.) between the appliance and the protector. In no case shall the clearance between the appliance and the combustible surface be reduced below that permitted by the table.

(10) All clearances and thicknesses are minimum; larger clearances and thicknesses shall be permitted.

**Figure 5.1.4.2(a) Sheet Metal or Other Protection to Reduce Required Clearance from Heating Appliance.**

**Figure 5.1.4.2(b) Wall Protector Clearance Reduction System.**
5.1.4.2.1
The reductions specified in Table 5.1.4.2 shall not apply to installations in alcoves or closets.

5.1.4.3
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.

5.1.4.3.1
Furnaces and boilers specifically approved for such installations, where installed in compliance with their listing and with the clearances from the walls and ceiling of the alcove or closet not less than specified, regardless of the type of construction, shall not be required to meet the provision of 5.1.4.3.
5.1.4.4
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 that is used as a supply or return plenum.

5.1.4.4.1
Cooling units, heat pumps, and heating equipment shall be permitted to be installed in such a supply or return plenum where specifically approved for such use as a result of tests and listing by an approved testing laboratory.

5.1.4.4.2
Cooling units, heat pumps, or heating equipment shall be installed in accordance with the conditions of such approval.

5.1.4.5
Furnaces, boilers, heat exchangers, heat pumps, solar energy system components, and air-conditioning and cooling units shall be installed to provide accessibility for the following:

(1) Cleaning heating surfaces
(2) Removing and replacing burners, motors, compressors, controls, air filters, draft regulators, and other working parts
(3) Adjusting, cleaning, and lubricating parts requiring such attention

5.2 Firestopping.

5.2.1
Where the installation of ducts in walls, floors, or partitions necessitates the removal of any firestopping, the spaces around the duct at such points where firestopping was removed shall be sealed with noncombustible insulating material.

5.2.2
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 made of sheet metal or wood that is not less than 51 mm (2 in.) (nominal) thickness. Such spaces shall not be used as a supply duct.

Chapter 6 Equipment, Wiring, and Controls

6.1 Equipment.

6.1.1 Heating Panels.

6.1.1.1
Air chambers that have one or more external surface designed for use as heating panels shall be used only with the following:

(1) Automatically fired gas-burning or oil-burning forced warm air systems equipped with temperature limit controls that limit furnace outlet air temperature to 93°C (200°F)
(2) Forced warm air systems equipped with heat exchangers utilizing steam that cannot exceed 103 kPa (15 psi) gauge pressure or hot water that cannot exceed a temperature of 121°C (250°F)

6.1.1.2 Connection.

Heating panels shall be connected to supply and return air ducts that conform to this standard.
6.1.1.3 Construction.

6.1.1.3.1 Heating panels shall be enclosed on all sides.

6.1.1.3.2 The enclosure material shall be attached to the building structure.

6.1.1.3.3 Joints and seams shall be airtight.

6.1.1.3.4 Where the warm air supply is from a warm air furnace, braces and hangers inside the chamber shall be noncombustible and the enclosure material shall be constructed of one of the materials in 6.1.1.3.6.

6.1.1.3.5 Where the warm air supply is from a steam or hot water exchanger, no single vertical heating panel shall serve more than one story and the enclosure material shall be constructed of one of the materials in 6.1.1.3.6.

6.1.1.3.6 Materials of construction of the enclosure shall be one of the following:

1. Material that is wholly noncombustible
2. Material that exhibits a flame spread index not exceeding 25 when tested in accordance with ASTME84 or ANSI/UL 723
3. Material that complies with the following when tested in accordance with NFPA 286:
   a. During the 40 kW exposure, flames shall not spread to the ceiling.
   b. The flame shall not spread to the outer extremity of the sample on any wall or ceiling.
   c. Flashover, as defined in NFPA 286, shall not occur.
   d. The peak heat release rate throughout the test shall not exceed 800 kW.
   e. The total smoke released throughout the test shall not exceed 1000 m² (10,760 ft²).

6.1.2 Downflow Systems.

6.1.2.1 Downflow heating equipment shall be designed or equipped so that the outlet air temperature shall not exceed 93°C (200°F).

6.1.2.1.1 For systems installed under the provisions of 4.3.7, the outlet air temperature shall be limited to 74°C (165°F).

6.1.2.2 Equipment shall be designed to prevent unsafe temperature in the event of reverse flow or fan failure.

6.1.3 Air Filters.
6.1.3.1
Air filters shall comply with ANSI/UL 900.

6.1.3.2
An evaporative cooler containing a combustible filter and water evaporation medium, such as excelsior, shall not be used.

6.1.3.3
Liquid adhesive coatings used on filters shall have a flash point not less than 163°C (325°F) in accordance with ASTM D93.

6.1.4 Air-Cooling Equipment.

6.1.4.1
Mechanical refrigeration used with air duct systems shall be installed in accordance with ASHRAE 15E packaged with ASHRAE 34.

6.1.4.2
Evaporative coolers containing a combustible evaporating medium, such as excelsior, shall not be used.

6.1.4.2.1
The use of evaporation media in accordance with the requirements of 6.1.3.1 shall be permitted.

6.1.5 Furnaces Used with Cooling Units.

6.1.5.1
Furnaces that are combination units in which a refrigeration coil is provided shall have the refrigeration coil located downstream from or parallel to the heating furnace.

6.1.5.1.1
The requirements in 6.1.5.1 shall not apply where the heating furnace is specifically approved for installation downstream from the coil.

6.1.5.2
Where the heating furnace is located upstream from the coil, the coil shall be designed or equipped to prevent the development of excessive temperatures or pressures.

6.1.5.2.1
In those cases where the coil is located parallel to the heating furnace, dampers or other means to control the flow of air shall be provided to prevent chilled air from entering the furnace section.

6.1.5.2.2
Means shall be provided for the disposal of condensate and to prevent dripping of condensate on the heating element.

6.1.5.2.3
Manually operated dampers shall not be required to be provided with means to prevent operation of either unit, provided the damper is in the full heat or cool position.
6.1.5.3 Furnaces, including duct furnaces, shall be permitted to be installed downstream from evaporative coolers or air washers under the following conditions:

(1) The condensate cannot fall into any portion of burners, pilots, or burner carryover arms.

(2) 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.

6.1.5.4 Air washers operating with chilled water that delivers air below the dew point of the ambient air at the appliance shall be considered as refrigeration systems.

6.1.5.5 The blower shall be of capacity as 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.

6.1.6 Boilers Used with Cooling Units.

6.1.6.1 Where 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.

6.1.6.2 Where hot water heating boilers are connected to heating coils located in air-handling units and where they are 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.

6.1.7 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 provisions of 4.3.7 and 5.1.4.

6.1.8 Solar Systems.

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

6.1.8.2 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.

6.2 Electric Wiring and Equipment.

6.2.1 Electric wiring and equipment shall be installed for safe operation.

6.2.2 Electric wiring and equipment shall be installed in accordance with NFPA 70.
6.2.3
A disconnecting means shall be installed within sight and reach in the ungrounded leads of each power circuit to electrically operated components that are in unprotected locations and in other locations not accessible for service.

6.3 Controls.

6.3.1 Temperature Limit Controls.

6.3.1.1 Temperature limit controls shall be of a listed type.

6.3.1.2 Temperature limit controls shall be such that they cannot be set higher than a specified temperature setting.

6.3.1.3 Temperature limit controls shall be located no more than 0.61 m (2 ft) downstream from the heat exchanger.

6.3.2 Fan Control for Stoker-Fired Furnaces.

Where a warm air furnace equipped with a fan to circulate the air is stoker-fired, it also shall be equipped with an automatic overrun control to start the fan when the air in the furnace bonnet or the air at the beginning of the main supply duct at a point not affected by radiated heat reaches a temperature not higher than 93°C (200°F) after the stoker and fan (in its normal operation) have been shut down as a result of a satisfied thermostat.

6.3.2.1 If a manual disconnect is installed in the air-circulating fan electrical circuit, it shall be installed to de-energize both the fan and the stoker simultaneously.

6.3.3* Air for Combustion and Ventilation.

Heating appliances shall be installed in a location in which the facilities for ventilation provide for combustion and ventilation under normal conditions of operation and use.

6.3.4 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 the following:

1. A fail-safe 121°C (250°F) limit control installed not more than 254 mm (10 in.) above the top surface of the heat exchanger in a supply plenum that extends at least 305 mm (12 in.) above the top surface of the heat exchanger

2. A barometric draft control operated by draft intensity and permanently set to limit the draft to a maximum intensity of 32.4 Pa (0.13 in.)

6.3.5 Air-Circulating Fan Controls.

Where 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 6.3.2.

6.3.6 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.
6.3.6.1
This requirement shall not preclude the attachment to a plenum or duct of small devices, such as humidifiers, specifically listed for such use.

6.3.6.2
Motors and electrical wiring and equipment shall comply with Section 6.2.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1
For other types of 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.

A.3.2.1 Approved.

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, 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 that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ).

The phrase “authority having jurisdiction,” or its acronym AHJ, 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, or 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 or her 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.

A.3.2.3 Listed.

The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations 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.

A.3.3.2.2 Gravity System.

An integral fan or blower that is used only to overcome the internal furnace resistance to airflow is permitted.

A.4.1
The provisions of Section 4.1 do not require inherently noncombustible materials to be tested in order to be classified as noncombustible materials. [101:A.4.6.13]
A.4.1.1.1
Air duct materials are classified in ANSI/UL 181 as follows:
(1) Class 0 — Air duct materials having a fire hazard classification of zero (flame spread and smoke developed)
(2) Class 1 — Air duct materials having a flame spread index of not over 25 without evidence of continued progressive combustion and a smoke developed index of not over 50

A.4.1.1.2
See NAIMA *Fibrous Glass Duct Construction Standard* for additional information.

A.4.1.4(17)
Additional information can be found in NFPA 31 and NFPA 54.

A.4.2.3.2
Additional information can be found in NFPA 31 and NFPA 54.

A.4.3.1
See NAIMA *Fibrous Glass Duct Liner Standard* for additional information.

A.4.3.1.1
ASTM E2231 is a practice that describes, in mandatory language, standard methods for specimen preparation and mounting of pipe and duct insulation systems using the Steiner tunnel test method (contained in ASTM E84). It requires that the entire system that is used in the field be tested, including the insulation itself, any adhesive, and/or any jacket used. The practice recognizes that pipe or duct insulation systems can be composed of a single product or of a combination of products, and that these have a variety of physical characteristics, including that they may or may not be self-supporting.

A.4.3.2
Additional information can be found in the category “Fabrics” in the UL *Building Materials Directory*.

A.4.3.2.6
Aerosol duct sealants evaluated to UL 1381 are limited to application in sheet-metal ducts with individual openings no greater than 127 mm (5/8 in.) in diameter, and seam/joint openings no greater than 127 mm (5/8 in.) across. These sealants are not intended for use as a substitute for or to supplement mechanical attachment in the sheet-metal duct systems. These sealants are not intended for use with rigid fiberglass ducts, flexible-wire helix ducts, or spirally wound metal ducts not complying with SMACNA Standards. Consideration should be given to the use of aerosol duct sealants in systems with fire dampers, volume boxes, and other inline accessories. Aerosol sealants used with these components have not been evaluated as a part of UL 1381.

A.6.3.3
Additional information can be found in NFPA 31 and NFPA 54.

A.6.3.4(1)
A fail-safe limit control is a limit control that automatically checks the furnace in the event of power failure or shutoff or that automatically checks the furnace when a temperature of 121°C (250°F) is reached, whether or not power is available.
B.1 Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.


B.1.2 Other Publications.

B.1.2.1 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.


B.1.2.2 NAIMA Publications.


B.1.2.3 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.


UL 1381, Outline of Investigation for Aerosol Duct Sealant, 2013.


B.2 Informational References. (Reserved)

B.3 References for Extracts in Informational Sections.

Public Comment No. 16-NFPA 90B-2016 [Section No. 2.3.2]

2.3.2 ASTM Publications.
ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.


Statement of Problem and Substantiation for Public Comment

date updates

Related Item
Public Input No. 5-NFPA 90B-2015 [Section No. 2.3.2]

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 04 17:33:21 EDT 2016

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-1-NFPA 90B-2016
Statement: date updates
**Public Comment No. 15-NFPA 90B-2016 [ New Section after 4.1.1.1 ]**

**TITLE OF NEW CONTENT**
Airstream surfaces shall be resistant to mold growth. tested by the UL 81.3 ASTM C 1338,4 or comparable test methods.

*Exception: Sheet metal surfaces and metal fasteners.*

All duct surfaces shall be resistant to erosion. Airstream surface materials shall pass UL 1813

*Exception: Sheet metal surfaces and metal fasteners.*

**Additional Proposed Changes**

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASHRAE_62.1_for_mold_and_duct_erosion_NFPA_90.docx</td>
<td>ASHRAE standard for HVAC duct material</td>
<td></td>
</tr>
</tbody>
</table>

**Statement of Problem and Substantiation for Public Comment**

Controlling the HVAC duct material is a critical part to control fire and smoke spread from a fire event.

**Related Item**
First Revision No. 2-NFPA 90B-2015 [Section No. 4.3.5.4]

**Submitter Information Verification**

**Submitter Full Name:** John Hamilton  
**Organization:** National Energy Management Ins  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Thu Mar 10 15:10:52 EST 2016

**Committee Statement**

**Committee Action:** Rejected but held  
**Resolution:** This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
Supply ducts shall be made of either of the following materials:

1. Class 0 or Class 1 rigid or flexible air ducts tested in accordance with ANSI/UL 181
2. Sheet metal having a nominal thickness as shown in Table 4.1.1.1
3. Gypsum sheet rock ducts shall be 5/8" minimum thickness and temps not exceed 125 degrees
4. All poures surfaced ducts shall have an anti microbial surface
5. Airstream surface materials shall be evaluated in accordance with the “Erosion Test” in UL 1813

Table 4.1.1.1 Nominal Thickness of Sheet Metal Ducts

<table>
<thead>
<tr>
<th>Diameter or Width</th>
<th>Nominal Thickness</th>
<th>Galvanized Sheet</th>
<th>Aluminum</th>
<th>Tin Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm/in.</td>
<td>mm/in.</td>
<td>mm/in.</td>
<td>kg/lb</td>
</tr>
<tr>
<td>Round Ducts and Enclosed Rectangular Ducts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>356 or less Over 356</td>
<td>0.406 0.16</td>
<td>0.330 0.013</td>
<td>0.406 0.016</td>
<td>— —</td>
</tr>
<tr>
<td>14 or less Over 14</td>
<td>0.483 0.019</td>
<td>0.406 0.016</td>
<td>0.508 0.020</td>
<td>— —</td>
</tr>
</tbody>
</table>

Exposed Rectangular Ducts

<table>
<thead>
<tr>
<th>Diameter or Width</th>
<th>Nominal Thickness</th>
<th>Galvanized Sheet</th>
<th>Aluminum</th>
<th>Tin Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm/in.</td>
<td>mm/in.</td>
<td>mm/in.</td>
<td>kg/lb</td>
</tr>
<tr>
<td>356 or less Over 356</td>
<td>0.483 0.019</td>
<td>0.406 0.016</td>
<td>0.508 0.020</td>
<td>— —</td>
</tr>
<tr>
<td>14 or less Over 14</td>
<td>0.559 0.022</td>
<td>0.483 0.019</td>
<td>0.584 0.023</td>
<td>— —</td>
</tr>
</tbody>
</table>

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASHRAE_62.1_for_mold_and_duct_erosion_NFPA_90B.docx</td>
<td>This is from ASHRAE Standard 62.1</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Comment

ASHRAE and UL both have standards for HVAC air ducts and they should be followed by NFPA

Related Item

First Revision No. 8-NFPA 90B-2015 [Global Input]
**Submitter Full Name:** John Hamilton  
**Organization:** National Energy Management Ins  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Wed Mar 09 11:06:34 EST 2016

### Committee Statement

<table>
<thead>
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<th>Committee Action:</th>
<th>Rejected but held</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution:</td>
<td>This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.</td>
</tr>
</tbody>
</table>
Supply. Steel supply ducts that are completely encased in not less than 51 mm (2 in.) of concrete in a floor slab shall not be required to meet the requirements of 4.1.1.1.
Ducts enclosed in concrete shall be sloped to allow for drainage to an access point
Ducts enclosed in concrete shall be sealed prior to the pouring of concrete
Combustible material shall not be used for underground duct systems

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underground_duct_work.docx</td>
<td>Current codes on underground duct work</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Comment

The current NFPA language allows for wood and other combustibles to be used as HVAC supply duct work if it encased in concrete. This creates a plethora of fire and smoke related issues. Including this language would eliminate those concerns.

Related Item

First Revision No. 8-NFPA 90B-2015 [Global Input]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 10 09:44:09 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
Public Comment No. 3-NFPA 90B-2016 [Section No. 4.1.1.2]

4.1.1.2*
Supply ducts shall be installed in conformance with the following:

1. The conditions of their listing
2. SMACNA Fibrous Glass Duct Construction Standards
3. SMACNA HVAC Duct Construction Standards — Metal and Flexible
4. SMACNA Residential Comfort System Installation Standards Manual
5. _Flexible air ducts shall pass all 16 UL 181 test for classification as a air duct

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
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<tbody>
<tr>
<td>UL_181_16_test_for_classification_as_a_air_duct.docx</td>
<td>These are the 16 test UL preforms when test to ducts to classify them as a air duct.</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Comment

Clear up confusion the use of air connectors as air ducts which changes the integrity of fire and smoke control of a building.

Related Item
First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address:  
City: 
State: 
Zip: 
Submittal Date: Thu Mar 10 11:33:10 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
Public Comment No. 4-NFPA 90B-2016 [Section No. 4.1.2 [Excluding any Sub-Sections]]

Air connectors shall be permitted to be used as limited-use, flexible air ducts that shall not be required to conform to the provisions for air ducts where they meet the requirements in 4.1.2.1 through 4.1.2.7.

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air_Connector_connecting_furnace_return_and_path_to_first_floor.pdf</td>
<td>Example of how the use of a air connector can allow for smoke and fire to penetrate the floors of a building.</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Comment

The use of air connectors that do not pass the UL flame penetration test for classification as an air duct leads to the spread of smoke and fire from floor to floor and into wall cavities.

Related Item

First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 10 11:42:19 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
4.1.2.1
Air connectors shall conform to the requirements for Class 0 or Class 1 air connectors when tested in accordance with 13 of the 16 tests for air ducts from ANSI/UL 181.

Statement of Problem and Substantiation for Public Comment

This will give AHJ's information that air connectors have not passed all the UL test for classification as a HVAC air duct.

Related Item
First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Mar 10 11:46:44 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
4.1.2.2
Class 0 or Class 1 air connectors shall not be used in ducts containing air at temperatures in excess of 121°C (250°F).

Statement of Problem and Substantiation for Public Comment

I believe this is a typo

Related Item
First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Mar 10 11:49:13 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
Public Comment No. 7-NFPA 90B-2016 [Section No. 4.1.2.3]

<table>
<thead>
<tr>
<th>4.1.2.3</th>
</tr>
</thead>
</table>
| Air connector runs shall not exceed 4.27 m (14 ft) in total length for any individual duct run.

Statement of Problem and Substantiation for Public Comment

Currently NFPA language has allowed installs of 14 feet of connector attached to small splice pieces and fittings leading to 95% of a 100 foot duct run being air connectors.

**Related Item**
First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

<table>
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<th>Submitter Full Name: John Hamilton</th>
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<tbody>
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<td>Organization: National Energy Management Ins</td>
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<tr>
<td>Street Address:</td>
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Committee Statement

<table>
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<th>Committee Action: Rejected but held</th>
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<tbody>
<tr>
<td>Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.</td>
</tr>
</tbody>
</table>
4.1.2.3
Air connector runs shall not exceed 4 m (14 ft 7.8 inch) in length.

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
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<tbody>
<tr>
<td>HVAC-DUCT-_Connector-Ad-LOWRES-JULY_20_air_connector.pdf</td>
<td>This is a product the industry calls a air connector. This is not what NFPA has classified as a air connector</td>
<td></td>
</tr>
<tr>
<td>FlexConnCatalog2013_LR_air_connector.pdf</td>
<td>This is a product the industry calls a air connector. This is not what NFPA has classified as a air connector</td>
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<tr>
<td>HVAC-3202_Silicone_HI-T_TDS_7-27-12_air_connector.pdf</td>
<td>This is a product the industry calls a air connector. This is not what NFPA has classified as a air connector</td>
<td></td>
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<tr>
<td>HVAC-3202_Neoprene_TDS-LOW-RES_air_connector.pdf</td>
<td>This is a product the industry calls a air connector. This is not what NFPA has classified as a air connector</td>
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<tr>
<td>HVAC-3202_VinylFlex_TDS-LOWRES_air_connector.pdf</td>
<td>This is a product the industry calls a air connector. This is not what NFPA has classified as a air connector</td>
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<tr>
<td>HVAC-3202_Residential_Quality_2-3-2_28G_TDS-US_Version_01-10-13_air_connector.pdf</td>
<td>This is a product the industry calls a air connector. This is not what NFPA has classified as a air connector</td>
<td></td>
</tr>
<tr>
<td>Carlisle_connector_plus.png</td>
<td>This is a product the industry calls a air connector. This is not what NFPA has classified as a air connector</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Comment

Clarification of what an air connector is, a small piece of flexible material used to eliminate vibration in a HVAC system. Not 14 feet.
**Related Item**

First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

**Submitter Information Verification**

<table>
<thead>
<tr>
<th><strong>Submitter Full Name:</strong></th>
<th>John Hamilton</th>
</tr>
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<tbody>
<tr>
<td><strong>Organization:</strong></td>
<td>National Energy Management Ins</td>
</tr>
<tr>
<td><strong>Street Address:</strong></td>
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<tr>
<td><strong>City:</strong></td>
<td></td>
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<td><strong>Submittal Date:</strong></td>
<td>Thu Mar 10 11:54:26 EST 2016</td>
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**Committee Statement**

<table>
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<tr>
<th><strong>Committee Action:</strong></th>
<th>Rejected but held</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolution:</strong></td>
<td>This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.</td>
</tr>
</tbody>
</table>
4.1.2.4
Air connectors shall not pass through within 15 feet of any wall, partition, or enclosure of a vertical shaft that is required to have a fire-resistance rating of 1 hour or more.

Additional Proposed Changes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pictures_of_air_connector_used_on_the_other_side_of_a_1_hour_fire_rated_ceiling.pdf</td>
<td>Shows air connector next to a 1 hour fire rated ceiling</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Comment

Air connectors do not pass the UL flame penetration test. Allowing them to be attached to a short (no limit on length requirement) piece of metal next to or going through the fire assemble allows for a flame to breach right into the fire rated assembly. 15 feet may give enough length of duct with UL listed Duct flame penetration test duct or metal duct to stop the spread of smoke and flame through the floor.

Related Item
First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Mar 10 12:03:39 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
**Public Comment No. 10-NFPA 90B-2016 [Section No. 4.1.2.5]**

4.1.2.5

Air connectors shall not pass through floors **within 15 feet of the floor opening**.

**Additional Proposed Changes**

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector_attached_at_floor.pdf</td>
<td>Shows small metal connection to floor and air connector right next to the floor.</td>
<td></td>
</tr>
</tbody>
</table>

**Statement of Problem and Substantiation for Public Comment**

When air connectors are attached to floor boot registers, there is only about 2 inches of metal below the floor. With air connectors not passing the UL 181 flame penetration test, this allows for smoke and fire to jump through a floor or into a wall cavity with relative ease. Easier than the smoke drafting material around the outside of the duct. Why have smoke drafting material around the outside of the duct when air connectors allow for the fire and smoke to go through the duct.

**Related Item**

First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

**Submitter Information Verification**

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Mar 10 12:07:24 EST 2016

**Committee Statement**

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
4.1.2.6
An air connector shall not be interrupted by a short collar or any other fitting on one side and then connected to another air connector on the other side when penetrating a be at least 15 feet away from a floor or a wall, partition, or enclosure of a vertical shaft that is required to have a fire-resistance rating of 1 hour.

Additional Proposed Changes

<table>
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<th>File Name</th>
<th>Description</th>
<th>Approved</th>
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<tbody>
<tr>
<td>Connector_attached_at_floor.pdf</td>
<td>Connector attached at floor</td>
<td></td>
</tr>
</tbody>
</table>

Statement of Problem and Substantiation for Public Comment

When using the term “short” what does that mean? If the air connector is used only on one side of the floor or wall can it be used on one side of the fire assembly? With this language it could be. Weather the penetration is connected on the other side of the fitting to another duct or is open it should not matter. Allowing this to penetrate a floor or wall into the occupants space would allow smoke to enter the space quicker. This language will allow for unlimited numbers or air connectors used on a duct run if connected with “long” collars. How long is a long collar? 1 foot? 15 may be long enough if NFPA feels it is safe to allow the use of air connectors in the first place.

Related Item
First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address: 
City: 
State: 
Zip: 
Submittal Date: Thu Mar 10 12:11:11 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
Public Comment No. 12-NFPA 90B-2016 [Section No. 4.1.2.7]

4.1.2.7
Multiple air connector runs shall not be spliced together in an attempt to exceed the 14 foot total duct run length limitation in 4.1.2.3.

Statement of Problem and Substantiation for Public Comment

Some duct runs in homes has up to 4 pieces of air connectors per duct run. Air connector in the basement to a fitting in the floor wall cavity, air connector in the first floor wall cavity up to a fitting in the second floor, air connector in the second floor wall cavity up to a fitting into the attic space, air connector in the attic space to the terminal device, 4 piece of air connectors in one duct run.

Related Item
First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 10 12:14:57 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
Public Comment No. 13-NFPA 90B-2016 [Section No. 4.1.3.1]

4.1.3.1 Furnace plenums shall be constructed of metal that is of the minimum thickness as shown in Table 4.1.1.1. except for the vibration eliminator (connector).

Statement of Problem and Substantiation for Public Comment

Typical installation of a furnace plenum includes a flex connector for vibration elimination.

Related Item

First Revision No. 5-NFPA 90B-2015 [Section No. 4.1.2]

Submitter Information Verification

Submitter Full Name: John Hamilton
Organization: National Energy Management Ins
Street Address:
City:
State:
Zip:
Submittal Date: Thu Mar 10 14:50:47 EST 2016

Committee Statement

Committee Action: Rejected but held
Resolution: This public comment introduces a concept that has not had public review by being included in a related Input or First Revision as shown in the First Draft.
Public Comment No. 17-NFPA 90B-2016 [Section No. B.1.2.1]

B.1.2.1 ASTM Publications.
ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

Statement of Problem and Substantiation for Public Comment

date update

Related Item
Public Input No. 6-NFPA 90B-2015 [Section No. B.1.2.1]

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 04 17:34:55 EDT 2016

Committee Statement

Committee Action: Accepted
Resolution: SR-2-NFPA 90B-2016
Statement: date update
MEMORANDUM

TO: Technical Committee on Air Conditioning (AIC-AAA)

FROM: Diane Matthews, Administrator, Technical Projects

DATE: December 9, 2016

SUBJECT: NFPA 90B Second Draft Technical Committee Revised FINAL Ballot Results (A2017)

According to the final ballot results, all ballot items received the necessary affirmative votes to pass ballot.

24 Members Eligible to Vote
6 Members Not Returned (Amawi, Caraway, Jr., Cottrell, Dillon, Hisole and Hurst)
17 Members Voted Affirmative on All Revisions
1 Member Voted Affirmative with Comment on one or more Revisions (Hirschler)
0 Members Voted Negative on one or more Revisions
0 Members Abstained on one or more Revisions

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote for each revision.

To pass ballot, each revision requires: (1) a simple majority of those eligible to vote and (2) an affirmative vote of $\frac{2}{3}$ of ballots returned. See Sections 3.3.4.3.(c) and 4.4.10.1 of the Regulations Governing the Development of NFPA Standards.
2.3.2 ASTM Publications.
ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

Submitter Information Verification

Submitter Full Name: Allan Fraser
Organization: National Fire Protection Assoc
Street Address:
City: 
State: 
Zip: 
Submittal Date: Tue Sep 27 15:03:09 EDT 2016

Committee Statement

Committee Statement: date updates
Response Message:

Ballot Results

☑ This item has passed ballot

24 Eligible Voters
6 Not Returned
17 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Amawi, Ramzi A.
Caraway, Jr., Laurence W.
Cottrell, Charles C.
Dillon, Michael Earl
Hisole, Amando Lyndyll
Hurst, Anthony

Affirmative All
Andre, Joseph F.
Biller, Justin B.
Dollard, Jr., James T.
Flannery, Jonathan
Gerdes, Ralph D.
Hammerberg, Thomas P.
Harrington, John C.
Hartsell, Jonathan
Howard, III, Eli P.
Koerber, Ralph A.
Koffel, William E.
Orris, Timothy J.
Prasad, Ajay V.
Schmeida, Michael
Sloan, Dwayne E.
Straniero, George A.
Webb, William A.

Affirmative with Comment
Hirschler, Marcelo M.
The dates for ASTM E136 and ASTM E2652 should have been changed to 2016 as was done in the public comment and in the revision to the informational references annex.
Second Revision No. 2-NFPA 90B-2016 [Section No. B.1.2.1]

B.1.2.1 ASTM Publications.
ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

Submitter Information Verification

Submitter Full Name: Allan Fraser
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Street Address:
City:
State:
Zip:
Submittal Date: Tue Sep 27 15:05:30 EDT 2016

Committee Statement

Committee Statement: date update
Response Message:

Public Comment No. 17-NFPA 90B-2016 [Section No. B.1.2.1]

Ballot Results

✔ This item has passed ballot

24 Eligible Voters
6 Not Returned
18 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Amawi, Ramzi A.
Caraway, Jr., Laurence W.
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