

NFPA® 90B

Standard for the Installation of Warm Air Heating and Air-Conditioning Systems

2012 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

Order
Redline PDF



Become a
Member

Subscribe
to the



Register for
Seminars, Webinars, and
Online Courses

Visit the
NFPA Catalog



Documents

Document Sharing Hub

IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA® DOCUMENTS
NOTICE AND DISCLAIMER OF LIABILITY CONCERNING THE USE OF NFPA DOCUMENTS

NFPA® codes, standards, recommended practices, and guides (“NFPA Documents”), of which the document contained herein is one, are developed through a consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing varied viewpoints and interests to achieve consensus on fire and other safety issues. While the NFPA administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in NFPA Documents.

The NFPA disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on NFPA Documents. The NFPA also makes no guaranty or warranty as to the accuracy or completeness of any information published herein.

In issuing and making NFPA Documents available, the NFPA is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is the NFPA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

The NFPA has no power, nor does it undertake, to police or enforce compliance with the contents of NFPA Documents. Nor does the NFPA list, certify, test, or inspect products, designs, or installations for compliance with this document. Any certification or other statement of compliance with the requirements of this document shall not be attributable to the NFPA and is solely the responsibility of the certifier or maker of the statement.

ISBN: 978-145590101-2 (Print)
ISBN: 978-145590143-2 (PDF)

IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA DOCUMENTS

ADDITIONAL NOTICES AND DISCLAIMERS

Updating of NFPA Documents

Users of NFPA codes, standards, recommended practices, and guides (“NFPA Documents”) should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of Tentative Interim Amendments. An official NFPA Document at any point in time consists of the current edition of the document together with any Tentative Interim Amendments and any Errata then in effect. In order to determine whether a given document is the current edition and whether it has been amended through the issuance of Tentative Interim Amendments or corrected through the issuance of Errata, consult appropriate NFPA publications such as the National Fire Codes® Subscription Service, visit the NFPA website at www.nfpa.org, or contact the NFPA at the address listed below.

Interpretations of NFPA Documents

A statement, written or oral, that is not processed in accordance with Section 6 of the Regulations Governing Committee Projects shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Patents

The NFPA does not take any position with respect to the validity of any patent rights referenced in, related to, or asserted in connection with an NFPA Document. The users of NFPA Documents bear the sole responsibility for determining the validity of any such patent rights, as well as the risk of infringement of such rights, and the NFPA disclaims liability for the infringement of any patent resulting from the use of or reliance on NFPA Documents.

NFPA adheres to the policy of the American National Standards Institute (ANSI) regarding the inclusion of patents in American National Standards (“the ANSI Patent Policy”), and hereby gives the following notice pursuant to that policy:

NOTICE: The user’s attention is called to the possibility that compliance with an NFPA Document may require use of an invention covered by patent rights. NFPA takes no position as to the validity of any such patent rights or as to whether such patent rights constitute or include essential patent claims under the ANSI Patent Policy. If, in connection with the ANSI Patent Policy, a patent holder has filed a statement of willingness to grant licenses under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, copies of such filed statements can be obtained, on request, from NFPA. For further information, contact the NFPA at the address listed below.

Law and Regulations

Users of NFPA Documents should consult applicable federal, state, and local laws and regulations. NFPA does not, by the publication of its codes, standards, recommended practices, and guides, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

NFPA Documents are copyrighted by the NFPA. They are made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of safe practices and methods. By making these documents available for use and adoption by public authorities and private users, the NFPA does not waive any rights in copyright to these documents.

Use of NFPA Documents for regulatory purposes should be accomplished through adoption by reference. The term “adoption by reference” means the citing of title, edition, and publishing information only. Any deletions, additions, and changes desired by the adopting authority should be noted separately in the adopting instrument. In order to assist NFPA in following the uses made of its documents, adopting authorities are requested to notify the NFPA (Attention: Secretary, Standards Council) in writing of such use. For technical assistance and questions concerning adoption of NFPA Documents, contact NFPA at the address below.

For Further Information

All questions or other communications relating to NFPA Documents and all requests for information on NFPA procedures governing its codes and standards development process, including information on the procedures for requesting Formal Interpretations, for proposing Tentative Interim Amendments, and for proposing revisions to NFPA documents during regular revision cycles, should be sent to NFPA headquarters, addressed to the attention of the Secretary, Standards Council, NFPA, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02169-7471; email: stds_admin@nfpa.org

For more information about NFPA, visit the NFPA website at www.nfpa.org.

Copyright © 2011 National Fire Protection Association®. All Rights Reserved.

NFPA® 90B

Standard for the

Installation of Warm Air Heating and Air-Conditioning Systems

2012 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. It was issued by the Standards Council on May 31, 2011, with an effective date of June 20, 2011, and supersedes all previous editions.

This edition of NFPA 90B was approved as an American National Standard on June 20, 2011.

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. The 1993 and 1996 editions were reconfirmations of the 1989 edition. The 1999 edition contained changes that were mainly editorial in nature.

The 2002 edition incorporated format changes to comply with the *Manual of Style for NFPA Technical Committee Documents* and new provisions for the removal of accessible abandoned materials in concealed spaces and plenums.

The only changes to the 2006 edition were to update “flame spread rating” to “flame spread index.”

The major change in the 2009 edition was to replace the references to NFPA 255 with ANSI/UL 723 and ASTM E 84, since NFPA 255 had been withdrawn. All three test standards are quite similar.

The changes in the 2012 edition are for the purposes of updating the editions of the referenced standards.



Documents

Document Sharing Hub

Technical Committee on Air Conditioning

David P. Demers, *Chair*
Demers Associates Inc., MA [SE]

Charles E. Altizer, Virginia State Fire Marshal's Office, VA [E]
Rep. International Fire Marshals Association
Ramzi A. Amawi, Intertek Testing Services, OH [RT]
Jesse J. Beitel, Hughes Associates, Inc., MD [SE]
James S. Buckley, Jacobs, TX [IM]
Rep. American Society for Heating, Refrigeration & Air Conditioning Engineers Inc.
Merton W. Bunker, Jr., U.S. Department of State, VA [U]
Laurence W. Caraway, Jr., Kitchen Klean Inc., NH [IM]
Rep. National Air Duct Cleaners Association
Michael Earl Dillon, Dillon Consulting Engineers, Inc., CA [SE]
James T. Dollard, Jr., IBEW Local Union 98, PA [L]
Rep. International Brotherhood of Electrical Workers
Douglas S. Erickson, American Society for Healthcare Engineering, VI [U]
Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc., GA [M]
J. C. Harrington, FM Global, MA [I]
Thomas L. Hedges, Hedges Electric & Construction, Inc., CA [IM]
Rep. National Electrical Contractors Association
Marcelo M. Hirschler, GBH International, CA [M]
Rep. American Fire Safety Council/Plenum Cable Assn.
Charles C. Holt, National Energy Management Institute, PA [L]
Rep. Sheet Metal Workers' International Association

Eli P. Howard, III, Sheet Metal & Air Conditioning Contractors Natl. Assn., VA [IM]
Michael J. Jontry, Illinois Department of Public Health, IL [E]
Marvin A. Koerber, ATCO Rubber Products Inc., SC [M]
Rep. Air Diffusion Council
William E. Koffel, Koffel Associates, Inc., MD [M]
Rep. Society of the Plastics Industry, Inc.
Richard E. Loyd, R & N Associates, AZ [M]
Rep. American Iron and Steel Institute
Timothy J. Orris, AMCA International, Inc., IL [M]
Rep. Air Movement & Control Association
Richard P. Owen, Oakdale, MN [E]
Rep. National Electrical Code Correlating Committee
Brian J. Papagni, The RJA Group, Inc., GA [SE]
Thomas E. Ponder, CertainTeed Corporation, PA [M]
Rep. North American Insulation Manufacturers Association
Michael J. Rzeznik, Aon/Schirmer Engineering Corporation, NY [I]
Suresh K. Shah, U.S. Department of Health & Human Services, TX [U]
Dwayne E. Sloan, Underwriters Laboratories Inc., NC [RT]
George A. Straniero, Tyco/AFC Cable Systems, Inc., NJ [M]
Rep. National Electrical Manufacturers Association
Robert A. Wessel, Gypsum Association, MD [M]

Alternates

Diane B. Copeland, Dillon Consulting Engineers, Inc., CA [SE]
(Alt. to M. E. Dillon)
Charles C. Cottrell, North American Insulation Manufacturers Assn., VA [M]
(Alt. to T. E. Ponder)
Thomas M. Dusza, The RJA Group, CA [SE]
(Alt. to B. J. Papagni)
David L. Hall, Air Products and Controls Inc., MI [M]
(Alt. to T. P. Hammerberg)
Ralph A. Koerber, ATCO Rubber Products, Inc., TX [M]
(Alt. to M. A. Koerber)
Vijay Kotian, Albermarle Corporation, LA [M]
(Alt. to M. M. Hirschler)

Randall K. Laymon, Underwriters Laboratories Inc., IL [RT]
(Alt. to D. E. Sloan)
Harold C. Ohde, IBEW-NECA Technical Institute, IL [L]
(Alt. to J. T. Dollard, Jr.)
Isaac I. Papier, Honeywell, Inc., IL [M]
(Alt. to G. A. Straniero)
Mark Terzigni, Sheet Metal & Air Conditioning Contractors Natl. Assn., VA [IM]
(Alt. to E. P. Howard, III)
Robert Van Becelaere, Ruskin Manufacturing, MO [M]
(Alt. to T. J. Orris)
Robert J. Wills, American Iron and Steel Institute, AL [M]
(Alt. to R. E. Loyd)

Allan Fraser, NFPA Staff Liaison

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the construction, installation, operation, and maintenance of systems for air conditioning, warm air heating, and ventilating 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.



Contents

Chapter 1 Administration	90B- 4	Chapter 4 System Components	90B- 5
1.1 Scope	90B- 4	4.1 Supply Systems	90B- 5
1.2 Purpose	90B- 4	4.2 Return Systems	90B- 7
1.3 Application	90B- 4	4.3 Common Requirements	90B- 7
1.4 Equivalency	90B- 4	Chapter 5 Fire Integrity of Building Construction	90B- 9
Chapter 2 Referenced Publications	90B- 4	5.1 Clearances to Combustible Material	90B- 9
2.1 General	90B- 4	5.2 Firestopping	90B-11
2.2 NFPA Publications	90B- 4	Chapter 6 Equipment, Wiring, and Controls	90B-13
2.3 Other Publications	90B- 4	6.1 Equipment	90B-13
2.4 References for Extracts in Mandatory Sections	90B- 5	6.2 Electric Wiring and Equipment	90B-14
Chapter 3 Definitions	90B- 5	6.3 Controls	90B-14
3.1 General	90B- 5	Annex A Explanatory Material	90B-15
3.2 NFPA Official Definitions	90B- 5	Annex B Informational References	90B-16
3.3 General Definitions	90B- 5	Index	90B-17

NFPA 90B

**Standard for the
Installation of Warm Air Heating and
Air-Conditioning Systems**

2012 Edition

IMPORTANT NOTE: This NFPA document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading "Important Notices and Disclaimers Concerning NFPA Documents." They can also be obtained on request from NFPA or viewed at www.nfpa.org/disclaimers.

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex B. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex B.

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. This standard shall apply to all systems for the movement of environmental air in structures that serve the following:

- (1) One- or two-family dwellings
- (2) Spaces not exceeding 708 m³ (25,000 ft³) in volume in any occupancy
- (3) Buildings of combustible construction over three stories in height shall be in accordance 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.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

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

NFPA 70®, *National Electrical Code*®, 2011 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2012 edition.

NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, 2011 edition.

NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, 2010 edition.

2.3 Other Publications.

2.3.1 ANSI/ASHRAE Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th floor, New York, NY 10036.

ANSI/ASHRAE 15, *Safety Code for Mechanical Refrigeration*, 2004.

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

ASTM C 411, *Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation*, 2005.

ASTM D 93, *Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester*, 2010.

ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2010b.

ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, 2006.

ASTM E 2231, *Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics*, 2009.

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

Fibrous Glass Duct Construction Standards, 7th edition, 2003.

HVAC Duct Construction Standards — Metal and Flexible, 3rd edition, 2005.

Residential Comfort System Installation Standards Manual, 7th edition, 1998.

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

ANSI/UL 94, *Standard for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances*, 1996, revised 2010.



ANSI/UL 181, *Standard for Safety Factory-Made Air Ducts and Air Connectors*, 2005, revised 2008.

ANSI/UL 181A, *Standard for Safety Closure Systems for Use with Rigid Air Ducts*, 2005, revised 2008.

ANSI/UL 181B, *Standard for Safety Closure Systems for Use with Flexible Air Ducts and Air Connectors*, 2005, revised 2008.

ANSI/UL 723, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2008, revised 2010.

ANSI/UL 900, *Standard for Air Filter Units*, 2004, revised 2009.

2.3.5 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2012 edition.

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, 2012]

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. A material that, 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. Materials that are reported as passing ASTM E 136 are considered noncombustible materials.

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

4.1.1.1.1 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.