NFPA 88A

Standard for Parking Structures

2002 Edition

NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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This edition of NFPA 88A, *Standard for Parking Structures*, was prepared by the Technical Committee on Garages and Parking Structures, and acted on by NFPA at its May Association Technical Meeting held May 19–23, 2002, in Minneapolis, MN. It was issued by the Standards Council on July 19, 2002, with an effective date of August 8, 2002, and supersedes all previous editions.

This edition of NFPA 88A was approved as an American National Standard on July 19, 2002.

Origin and Development of NFPA 88A

Work on fire protection safeguards for garages was initiated by the NFPA in 1927 with the appointment of a committee. After extensive deliberations and the publication of successive drafts, a standard was adopted in 1932. Subsequently, the committee was discharged when it appeared that no further activity was needed in this field. In 1952, the present committee was created. This committee prepared a number of redrafts of the 1932 text, and in 1957 a revised NFPA 88, *Standard for Garages*, was adopted. Revisions were made in 1962, 1968, 1979, 1985, 1995, and 1998.

Prior to 1973, the subject of this standard was included in NFPA 88, *Standard for Garages*. In order to treat separately the occupancies of repair garages and parking structures, this standard and NFPA 88B, *Standard for Repair Garages*, were published separately in 1973.

In 1991, partial revisions were made, and the 1995 edition contained editorial changes. The 1998 edition contained definitions clarifying the various configurations of parking structures. It contained changes increasing the area of office space related to the parking structure and further clarified the requirements for vertical opening protection and automatic sprinkler installation. That edition also included new requirements for natural gas powered vehicles.

The 2002 edition contains primarily editorial revisions for compliance with the NFPA *Manual of Style* and it lists metric units of measurement as the primary units.

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Committee Scope: This Committee shall have primary responsibility for documents on construction, control of fire hazards, ventilation, and fire protection in parking structures.

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

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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, Annex B lists the complete title and edition of the source documents for both mandatory and nonmandatory extracts. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the appropriate technical committee.

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

Chapter 1 Administration

1.1 Scope. This standard shall cover the construction and protection of, as well as the control of hazards in, open, and enclosed parking structures. This standard shall not apply to one- and two-family dwellings.

1.2 Purpose. The purpose of this standard is to provide minimum fire protection standards for parking structures.

1.3 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.3.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.3.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.3.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction and only where it is clearly evident that a reasonable degree of safety is provided.

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, provided technical documentation is submitted to the authority having jurisdiction to demonstrate equivalency and the system, method, or device is approved for the intended purpose.

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, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2002 edition.

NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems,* 2000 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2002 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2000 edition.

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages,* 2000 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment,* 2001 edition.

NFPA 52, *Compressed Natural Gas (CNG) Vehicular Fuel Systems Code,* 2002 edition.

NFPA 54, *National Fuel Gas Code,* 2002 edition.

NFPA 57, *Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code,* 2002 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2001 edition.

NFPA 70, *National Electrical Code®,* 2002 edition.

NFPA 72®, National Fire Alarm Code®, 2002 edition.

NFPA 80, *Standard for Fire Doors and Fire Windows,* 1999 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems,* 2002 edition.

NFPA *101®, Life Safety Code®,* 2000 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances,* 2000 edition.

NFPA 220, *Standard on Types of Building Construction,* 1999 edition.

2.3 Other Publication.

2.3.1 ASTM Publication. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C,* 2001.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter apply to the terms used in this standard. Where terms are not included, common usage of the terms applies.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). The organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* 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.

3.3 General Definitions.

3.3.1 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, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, shall be considered noncombustible materials. [**220:**2.1]

3.3.2* Parking Structure. A building, structure, or portion thereof used for the parking, storage, or both, of motor vehicles.

3.3.2.1 ***Enclosed Parking Structure.*** Any parking structure that is not an open parking structure.

3.3.2.2 ***Open Parking Structure.*** A parking structure that, at each parking level, has wall openings open to the atmosphere, for an area of not less than 0.4 m^2 for each linear meter (1.4 ft^2 for each linear foot) of its exterior perimeter. Such openings are distributed over 40 percent of the building perimeter or uniformly over two opposing sides. Interior wall lines and column lines are at least 20 percent open, with openings distributed to provide ventilation.

Chapter 4 Construction

4.1 General Requirements.

4.1.1* Parking structures shall be built using one of the types of construction defined in NFPA 220, *Standard on Types of Building Construction*, except as otherwise amended in this standard.

4.1.2 Those parts of parking structures located within, immediately below, attached to, or less than 3000 mm (120 in.) from a building used for any other purpose shall be separated by walls, partitions, floors, or floor–ceiling assemblies having fire resistance ratings of not less than 2 hours, unless otherwise permitted by 4.1.3.

4.1.3 No fire-rated separation shall be required when parts of a parking structure and a building used for any other purpose are separated by 3000 mm (120 in.) or more, and are attached only via open pedestrian balconies or bridges or open vehicle bridges.

4.1.4* Those portions of an open parking structure located within or immediately below a building used for another purpose shall have the principal supporting members and bearing walls in all levels of the parking structure protected to provide a fire-resistive rating equivalent to that required for the other occupancy.

4.2 Internal Subdivision. Offices or other similar spaces that are related to the operation of the parking structure and are less than 300 m^2 (3000 ft^2) in area, other than cashier or attendant booths, shall be separated from parking areas by walls or partitions that resist the passage of smoke.

4.3 Floors.

4.3.1 Floor surfaces shall be of noncombustible material.

4.3.1.1 Where combustible construction is permitted, floor surfaces shall be noncombustible and liquid tight.

4.3.1.2* Asphalt shall be permitted on grade.

4.3.2 Floors shall be graded and equipped with drains.

4.3.3 Floors in areas of parking structures where motor fuels are dispensed shall be designed in accordance with NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages.*

4.4 Means of Egress.

4.4.1 Means of egress shall comply with NFPA *101®*, *Life Safety Code®*, as modified by 4.4.2.

4.4.2 The ramp requirement of NFPA *101*, 7.2.5, shall not apply to those parts of sloped floors utilized for both parking and vehicle circulation.

4.4.3* Open stairs shall be permitted in open parking structures.

4.5 Openings in Fire Walls and Fire Partitions.

4.5.1 Doorways and other openings in fire walls and fire partitions shall be protected with approved fire doors installed in accordance with NFPA 80, *Standard for Fire Doors and Fire Windows.*

4.5.2 Where ducts pass through fire walls or fire partitions, the openings shall be protected in accordance with NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems.*

4.6 Vertical Openings in Enclosed Parking Structures.

4.6.1 Unless otherwise provided in 4.6.3 or 4.6.4, vertical openings through floors in buildings four stories or more in height shall be enclosed with walls or partitions having a fire resistance rating of not less than 2 hours.

4.6.2 Unless otherwise provided in 4.6.3 or 4.6.4, vertical openings through floors in buildings less than four stories in height shall be enclosed with walls or partitions having a fire resistance rating of not less than 1 hour.

4.6.3 Ramps in enclosed parking structures shall not be required to be enclosed where the parking structure is protected throughout by an approved, automatic sprinkler system.

4.6.4 Ramps in enclosed parking structures shall not be required to be enclosed where the parking structure is protected throughout by an approved, supervised, automatic fire detection system, and a mechanical ventilation system in accordance with 5.3.2.

4.7 Open Parking Structures.

4.7.1 Open parking structures shall be of Type I or Type II construction as defined in NFPA 220, *Standard on Types of Building Construction.*

4.7.2 Heights and floor areas of open parking structures of Type I, Type II (222), or Type II (111) construction shall be permitted to be unlimited.

4.7.3 Open parking structures of Type II (000) construction shall be permitted to be of unlimited area where both of the following conditions are met:

(1) The height does not exceed 25 m (75 ft).
(2) The horizontal distance from any point on any parking level to an exterior wall opening on a street, an alley, a courtyard, or other similar permanent open space does not exceed 60 m (200 ft).

4.7.4 Unprotected vertical openings through floors in open parking structures shall be permitted.

Chapter 5 Hazards

5.1 Lighting and Power.

5.1.1 Electric wiring for light, power, heat, and signal or control circuits and for electrically operated tools, portable appliances, and devices shall be in accordance with the provisions of NFPA 70, *National Electrical Code®*.

5.1.2 Areas where flammable liquids are stored, handled, or dispensed shall be delineated and classified for the installation of electrical equipment in accordance with NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*.

5.2 Heating.

5.2.1 Heating equipment shall conform to NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*; NFPA 31, *Standard for the Installation of Oil-Burning Equipment;* NFPA 54, *National Fuel Gas Code;* and NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, as applicable.

5.2.2 Unless otherwise permitted by 5.2.3, all flames associated with heating equipment shall be located a minimum of 500 mm (18 in.) below the floor–ceiling assembly or 500 mm (18 in.) above the floor.

5.2.3 Heating equipment located so as to be protected by a partition not less than 500 mm (18 in.) above the floor shall not be required to meet 5.2.2.

5.2.4 The use of improvised furnaces, salamanders, and space heaters shall be prohibited.

5.3 Ventilation.

5.3.1 A mechanical ventilation system shall not be required in an open parking structure.

5.3.2* All enclosed parking structures shall be ventilated by a mechanical system capable of providing a minimum of 300 L/min per m^2 of floor area (1 ft^3/min per ft^2 of floor area) during hours of normal operation.

5.3.3 Mechanical ventilating systems shall be installed in accordance with NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*. Ductwork shall be constructed of noncombustible material.

5.4 Storage and Handling of Flammable Liquids and Liquefied Petroleum Gas and Natural Gas.

5.4.1 The storage and handling of flammable liquids shall conform to NFPA 30, *Flammable and Combustible Liquids Code*. The storage and handling of liquefied petroleum gas shall conform to NFPA 58, *Liquefied Petroleum Gas Code*. The storage and handling of natural gas fuels shall conform to NFPA 52, *Compressed Natural Gas (CNG) Vehicular Fuel Systems Code,* or NFPA 57, *Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code*.

5.4.2 Dispensing Equipment. The design and installation of equipment and storage tanks used for the dispensing of flammable liquids shall conform to the requirements for service stations in NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*. The equipment and storage tanks used for the dispensing of natural gas fuels shall conform to NFPA 52, *Compressed Natural Gas (CNG) Vehicular Fuel Systems Code,* or NFPA 57, *Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code*. The equipment and storage tanks used for the dispensing of liquefied petroleum gas shall conform to NFPA 58, *Liquefied Petroleum Gas Code*.

5.5 Housekeeping.

5.5.1 Daily inspections of the parking structure shall be made for the removal or repair of any hazardous condition. Equipment and safety devices shall be maintained, and hazardous accumulations of combustible material shall be removed from the structure.

5.5.2 Clear aisle space shall be maintained to permit ready access to, and the use of, fire-fighting equipment.

5.5.3 Metal lockers shall be provided for employees' clothes.

5.5.4 Approved metal receptacles with self-closing covers shall be provided for the storage or disposal of oil-soaked waste or cloths.

5.5.5 Containers having a capacity of greater than 208 L (55 gal) used for combustible trash shall be of metal construction and shall be covered.

5.5.6 Floors shall be kept clean and free of oil and grease.

Chapter 6 Protection

6.1 Automatic Sprinkler Systems, Fire Alarm Systems, and Signaling Systems.

6.1.1 Automatic sprinkler systems, where required, shall conform to NFPA 13, *Standard for the Installation of Sprinkler Systems*.

6.1.2 Fire alarm systems, where required, shall conform to *NFPA 72®, National Fire Alarm Code®*.

6.1.3 Automatic sprinklers and fire alarm systems shall not be required in open parking structures.

6.1.4 Automatic sprinkler systems shall be installed in portions of enclosed parking structures, the ceilings of which are less than 600 mm (24 in.) above grade, regardless of type of construction, and in enclosed parking structures of Type III or Type IV construction over 15 m (50 ft) in height.

6.2 Automatic Sprinkler Systems or Fire Detection and Smoke Removal. Enclosed parking structures located at or above grade, within or immediately below a building used for another occupancy, shall have one of the following systems:

(1) An approved, automatic sprinkler system fully protecting the parking area

(2) An approved, supervised, automatic fire detection system installed throughout the parking area and a mechanical ventilation system in accordance with 5.3.2

6.3 Maintenance and Supervision of Automatic Sprinkler and Fire Alarm Systems.

6.3.1 Where an automatic sprinkler system is installed as a requirement of this standard, the system shall be supervised in accordance with NFPA *101, Life Safety Code*, 9.7.2.

6.3.2 Where a fire alarm system is installed as a requirement of this standard, the system shall be supervised in accordance with *NFPA 72, National Fire Alarm Code*.

6.3.3 Where building fire alarm facilities are provided, actuation of the fire detection or fire extinguishing system shall cause the building alarm to sound.

6.3.4 Every automatic fire alarm or fire extinguishing system required by this standard shall be continuously maintained in reliable operating condition at all times.

6.3.5 Automatic fire sprinkler systems and standpipe systems shall be inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

6.4 Standpipes.

6.4.1 In other than open parking structures as described in 6.4.2, structures exceeding a height of 15 m (50 ft) or having parking levels below grade shall be provided with a Class I standpipe system in accordance with NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems*.

6.4.2 In open parking structures of any height, Class I standpipe systems of the manual dry type shall be permitted.

6.5* Employee Instruction. Employees of all parking structures shall be instructed with respect to the importance of transmitting fire alarms promptly and shall be trained in the use of available private fire-fighting equipment.

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.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.3.2.4 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 Parking Structure. A parking structure is permitted to be enclosed or open, use ramps, and use mechanical control push-button-type elevators to transfer vehicles from one floor to another. Motor vehicles are permitted to be parked by the driver or an attendant or are permitted to be parked mechanically by automatic facilities. Where automatic parking is provided, the operator of those facilities is permitted either to remain at the entry level or to travel to another level. Motor fuel is permitted to be dispensed, and motor vehicles are permitted to be serviced in a parking structure in accordance with NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*.

A.4.1.1 Building codes generally contain provisions limiting the heights and areas of parking structures of various types of construction.

A.4.1.4 See NFPA 220, *Standard on Types of Building Construction*.

A.4.3.1.2 Asphalt pavement applied over earth substrates is an acceptable method of surfacing.

A.4.4.3 Exit travel distance is measured in accordance with NFPA *101, Life Safety Code*, and includes the distance measured along the plane of the tread nosings in open stairs.

A.5.3.2 This ventilation requirement is also intended to address vehicles that use natural gas [compressed natural gas (CNG) or liquefied natural gas (LNG)]. A natural gas leak should pose no greater risk than leaks of conventional motor fuels.

A.6.5 Parking structures that are not within the protection area of an organized public fire department should have a fire brigade that is organized, equipped, and drilled in accordance with NFPA 600, *Standard on Industrial Fire Brigades*.

Annex B Informational References

B.1 Referenced Publications. The following documents or portions thereof are referenced within this standard for informational purposes only and are thus not part of the requirements of this document unless also listed in Chapter 2.

B.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, 2000 edition.

NFPA *101®*, *Life Safety Code®*, 2000 edition.