

NFPA 88A

Parking Structures

1991 Edition



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

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

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NFPA 88A
Standard for
Parking Structures
1991 Edition

This edition of NFPA 88A, *Standard for Parking Structures*, was prepared by the Technical Committee on Garages and Parking Structures and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 19-23, 1991 in Boston, MA. It was issued by the Standards Council on July 19, 1991, with an effective date of August 16, 1991, and supersedes all previous editions.

The 1991 edition of this document has been approved by the American National Standards Institute.

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

Origin and Development of NFPA 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, the standard was adopted in 1932. Subsequently, the committee was discharged as 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, and 1985.

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.

Technical Committee on Garages and Parking Structures

Donald W. Belles, Chairman

Donald W. Belles & Assoc. Inc.

Michael D. Cato, Delray Beach Fire Dept.
Rep. Fire Marshals Assoc. of North America
Michael Crowley, Rolf Jensen & Associates
Inc.

Richard G. Gewain, Hughes Associates Inc.

James M. Hunnicutt, Hunnicutt & Associates
Rep. Institutional and Municipal Parking
Congress

Howard R. May, Desman Associates
Rep. National Parking Assoc.

Joseph J. Messersmith, Jr., Portland Cement
Assoc.

Thomas E. Murray, American Ins. Services
Group Inc.

E. Alan Reilly, Potter-Roemer Inc.

Rep. Fire Equipment Manufacturers Assoc.

W. Ted Ritter, Ritter Unlimited Inc.

Rep. Smoke Control Assoc.

Domenick A. Serrano, Jr., S & S Fire Suppres-
sion Systems

Rep. National Fire Sprinkler Assoc.

Alternates

Stephen V. Skalko, Portland Cement Assoc.
(Alternate to J. J. Messersmith, Jr.)

James Yager, Wormald Fire Systems, Inc.
Rep. National Fire Sprinkler Assoc.
(Alternate to D. A. Serrano, Jr.)

Gregory J. Cahanin, NFPA Staff Liaison

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

Information on referenced publications can be found in Chapter 6 and Appendix B.

Chapter 1 General

1-1 Scope. This standard covers the construction and protection of, as well as the control of hazards in, open, enclosed, basement, and underground parking structures. This standard does 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.

Chapter 2 Definitions

Approved.* Acceptable to the “authority having jurisdiction.”

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

Basement and Underground Parking Structures. Buildings, structures, or portions thereof, located below grade, used solely for parking purposes. Motor vehicles may be parked by an attendant or by the driver. A basement parking structure has other occupancies above; an underground parking structure has no occupancy other than parking above it.

Enclosed Parking Structures. Buildings, structures, or portions thereof used for the parking of motor vehicles and having exterior enclosure walls that have less than 25 percent of the total wall area open to atmosphere at each level using at least two sides of the structure. Parking facilities may involve the use of conventional-type elevators, attendant operated; mechanical control push-button-type elevators; or ramps. Motor vehicles may be parked by attendants, the driver, or be mechanically parked by automatic facilities where the attendant or operator may or may not be required to leave the grade or ground floor. Dispensing of motor fuels and motor vehicle servicing are occasionally provided at these parking structures.

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the “authority having jurisdiction” and concerned with product evaluation, that main-

tains 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.

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

Open Parking Structures. Buildings, structures, or portions thereof, used for parking motor vehicles and having not less than 20 percent of the total wall area open to atmosphere at each level, utilizing at least two sides of the structure. These structures may be of the ramp type in which the motor vehicles are parked by attendants or the driver; or they may have the mechanical parking facilities as described in the definition for enclosed parking structures. Dispensing of motor fuels and motor vehicle servicing are occasionally provided.

Storage Garages. Buildings, structures, or portions thereof, used solely for dead storage of motor vehicles.

Chapter 3 Construction

3-1 General Requirements.

3-1.1 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.

3-1.2 Enclosed, open, and basement and underground parking structures shall not be located within or attached to a building used for any other purpose unless separated by walls, partitions, floor, or floor-ceiling assemblies having a fire resistance rating of not less than two (2) hr. (See Section 3-5.)

Exception: No fire-rated separation is required where an open parking structure connects to an adjacent structure via an open-air balcony or bridge.

3-1.3 Those portions of an open parking structure located within or immediately below a building used for another purpose shall have the principal supporting members (see NFPA 220, *Standard on Types of Building Construction*) 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.

3-1.4* Parking structures shall be limited in height and area, depending upon the type of construction and private fire protection provided. (See Chapter 5, *Protection*, Sections 5-1 and 5-2, for provisions where automatic sprinkler protection is required.)

3-2 Internal Subdivision.

3-2.1 Offices or other similar spaces of greater than 1500 sq ft (139.4 m²) in area shall be separated from parking areas by walls, partitions, floor, or floor-ceiling assemblies having a fire resistance rating of not less than two (2) hr.

3-2.2 Offices, 1500 sq ft (139.4 m²) in area or less, except for cashiers' booths, shall be separated from parking areas by walls, partitions, floor, or floor-ceiling assemblies having a fire resistance rating of not less than one (1) hr.

3-2.3 Employees' locker rooms, sanitary facilities, and storage rooms shall be separated from parking areas by walls, partitions, floor, or floor-ceiling assemblies having a fire resistance rating of not less than one (1) hr.

3-3 Floors.

3-3.1 Where of combustible construction, floors shall be surfaced with approved liquidtight noncombustible material; where concrete is used for floor surface, it shall be finished to facilitate cleaning. Floors shall be so graded and equipped with floor drains as to minimize the possibility of water or fuel standing on the floor. Nothing in the foregoing shall be construed to eliminate the use of asphalt at grade.

3-3.2 In areas of parking structures where motor fuels are dispensed, each floor drain shall be properly trapped and shall discharge through an oil separator to the sewer or to an outside vented sump.

3-4 Means of Egress. Means of egress in parking structures with respect to their required number, location, and construction shall conform with the provisions set forth in NFPA 101,[®] *Life Safety Code*.[®]

3-5 Openings in Fire Walls and Fire Partitions.

3-5.1 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 Windows*.

3-5.2 Each opening in a fire wall shall be protected with an automatic-closing or self-closing fire door or doors approved for Class A locations. No opening in a fire wall shall exceed 120 sq ft (11.1 m²) in area, with no dimension greater than 12 ft (3.7 m). The aggregate width of all openings at any level shall not exceed 25 percent of the length of the wall.

3-5.3 Where ducts must pass through fire walls or fire partitions, the openings shall be protected with approved fire doors or fire dampers installed in accordance with the requirements of NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*, or NFPA 91, *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying*.

3-6 Vertical Openings. 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 two (2) hr. For buildings less than four stories, such walls or partitions shall have a fire resistance rating of not less than one (1) hr.

Exception No. 1: Ramps in open parking structures shall not be required to be enclosed.

Exception No. 2: Ramps in enclosed parking structures, storage garages, and basement and underground parking structures shall not be required to be enclosed when the following safeguards are provided:

(a) *An approved, automatic fire extinguishing system fully protecting the parking structure, or*

(b) *An approved, automatic, supervised fire detection system installed throughout the parking structure using detectors sensing products of combustion other than heat, and*

(c) *A mechanical ventilating system capable of exhausting smoke.*

3-7 Open Parking Structures.

3-7.1 Open parking structures shall be of Type I or Type II construction as defined in NFPA 220, *Standard on Types of Building Construction*.

3-7.2 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.

Exception: Open parking structures of Type II (000) construction used only for the parking of passenger automobiles shall be permitted to be of unlimited area where (a) not more than 75 ft (22.9 m) in height, and (b) the horizontal distance on any parking level to an exterior wall opening on a street, alley, courtyard, or other similar permanent open space shall not exceed 200 ft (61 m).

3-7.3 Interior wall lines and column lines shall be at least 20 percent open with openings distributed to provide ventilation. The required open side areas of each story or parking level shall not be enclosed or restricted by any material that would limit free movement of air.

3-7.4 Openings in exterior walls shall not be required to be distributed over 40 percent of the building perimeter where the required openings are uniformly distributed over two opposing sides of the building.

Chapter 4 Hazards

4-1 Lighting and Power.

4-1.1 Electric wiring for light, power, heat, and signal or control circuits, and electrically operated tools, portable appliances, and devices shall be in accordance with the provisions of NFPA 70, *National Electrical Code*.[®] Article 511 of NFPA 70, *National Electrical Code*, shall apply to wiring and equipment within any hazardous area.

4-1.2 NFPA 30A, *Automotive and Marine Service Station Code*, shall be used to determine the extent of the hazardous area where flammable liquids are stored or handled.

4-1.3 In open parking structures electrical equipment, wiring, and appliances need not comply with Article 511 of NFPA 70, *National Electrical Code*, except where flammable liquids are stored, handled, or dispensed.

4-2 Heating — General.

4-2.1 No heater employing an open flame or glowing element shall be installed in enclosed parking areas, or sections communicating therewith, except as hereinafter specifically provided.

4-2.2 All heating equipment in enclosed parking areas shall be of an approved type with all flames associated therewith being located 18 in. (457.2 mm) above the floor or protected by a partition not less than 18 in. (457.2 mm) high. Improvised furnaces, salamanders, or space heaters shall not be permitted.

4-2.3 Heating equipment shall be installed to conform with the standards of the National Fire Protection Association: 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*; NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances*; and NFPA 82, *Standard on Incinerators, Waste, and Linen Handling Systems and Equipment*, as applicable, except as hereinafter specifically provided.

4-3* Ventilation.

4-3.1 Wherever mechanical ventilating systems are employed in parking structures, they shall be installed in accordance with NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*. When blower and exhaust systems are installed for vapor removal, the systems shall be installed in accordance with NFPA 91, *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying*.

4-3.2 All enclosed, basement, and underground parking structures shall be ventilated by a mechanical system capable of providing a minimum of six air changes per hour during hours of normal operation.

4-4 Storage and Handling of Flammable Liquids and Liquefied Petroleum Gases.

4-4.1 The storage and handling of flammable liquids shall be in accordance with NFPA 30, *Flammable and Combustible Liquids Code*, except as amended by this standard. The storage and handling of liquefied petroleum gas shall be in compliance with NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*.

4-4.2 Dispensing Equipment. The design and installation of equipment used for the dispensing of flammable liquids shall be in accordance with the requirements for service stations as set forth in NFPA 30A, *Automotive and Marine Service Station Code*, except as amended by this standard.

4-5 Housekeeping.

4-5.1 An authorized employee, an officer of the firm, or the owner shall make daily inspections of the parking facility and shall be responsible for the prompt removal or repair of any hazardous condition, including proper maintenance of equipment and safety devices and the immediate removal of accumulations of combustible materials.

4-5.2 Clear aisle space shall be maintained to permit ready access to, and the use of, fire fighting equipment.

4-5.3 Metal lockers shall be provided for employees' clothes.

4-5.4 Approved metal receptacles with self-closing covers shall be provided for the storage or disposal of oil-soaked waste or cloths.

4-5.5 Combustible rubbish shall be placed in covered metal receptacles until removed to a safe place for disposal. Contents of such containers shall be removed daily.

4-5.6 Floors shall be kept clean and free of oil and grease. Only approved water solutions or detergents, floor sweeping compounds, and grease absorbents shall be used for cleaning floors.

Chapter 5 Protection

5-1 Automatic Sprinkler Systems. Approved automatic sprinkler equipment installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be provided in parking structures under the following conditions:

(a) Basement and underground parking structures, the ceilings of which are less than 2 ft (1.7 m) above grade.

(b) Storage garages or enclosed parking structures of Type III or IV construction over 50 ft (15.2 m) in height.

5-2 Automatic Sprinkler Systems or Fire Detection and Smoke Removal. Storage garages and enclosed parking structures located within or immediately below a building used for another purpose shall be provided with the following safeguards:

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

(b) An approved, automatic, supervised fire detection system installed throughout the parking areas using detectors sensing products of combustion other than heat, and

(c) A mechanical ventilating system capable of exhausting smoke.

5-3 Maintenance and Supervision of Fire Detection and Fire Extinguishing Systems.

5-3.1 Where an automatic fire alarm or automatic fire extinguishing system is installed as a requirement of this standard, the system shall be adequately supervised to assure reliable operation as follows:

(a) The extinguishing or alarm system shall be electrically connected, either directly or through a central station facility or by another approved method, to the fire department legally committed to serve the area in which the building is located. System actuation shall initiate the alarm sequence.

(b) Where a system may become inoperable due to closing of valves, interruption of power, or other reasons, adequate supervision shall be provided to sound at least a local trouble alarm when the system is disabled.

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

(d) Signaling system details, with respect to design, shall conform to the requirements set forth in the various NFPA standards as follows: NFPA 71, *Standard for the Installation, Maintenance, and Use of Signaling Systems for Central Station Service*; NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*; and NFPA 1221, *Standard for the Installation, Maintenance, and Use of Public Fire Service Communication Systems*.

5-3.2 Every automatic fire alarm or fire extinguishing system required by this standard shall be continuously maintained in reliable operating condition at all times, and such periodic inspections and tests shall be made as are necessary to assure the system will perform as expected in a fire emergency.

5-4 Portable Fire Extinguishers. Approved extinguishers, installed and maintained in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*, shall be provided in all parking structures.

Exception: Where approved by the authority having jurisdiction, alternative first aid fire equipment shall be permitted to be used.

5-5 Standpipes. Structures exceeding a height of 50 ft (15.2 m), or having parking levels below grade, shall be provided with one or more standpipes conforming to the provisions of NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*.

Exception: Standpipe systems for open parking structures shall be permitted to be of the dry type without a permanent water supply.

5-6* 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 facilities.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1991 edition

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 1990 edition

NFPA 30, *Flammable and Combustible Liquids Code*, 1990 edition

NFPA 30A, *Automotive and Marine Service Station Code*, 1990 edition

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

NFPA 54, *National Fuel Gas Code*, 1988 edition

NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*, 1989 edition

NFPA 70, *National Electrical Code*, 1990 edition

NFPA 71, *Standard for the Installation, Maintenance, and Use of Signaling Systems for Central Station Service*, 1989 edition

NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*, 1990 edition

NFPA 80, *Standard for Fire Doors and Windows*, 1990 edition

NFPA 82, *Standard on Incinerators, Waste, and Linen Handling Systems and Equipment*, 1990 edition

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

NFPA 91, *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying*, 1990 edition

NFPA 101, *Life Safety Code*, 1991 edition

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances*, 1988 edition

NFPA 220, *Standard on Types of Building Construction*, 1985 edition

NFPA 1221, *Standard for the Installation, Maintenance, and Use of Public Fire Service Communication Systems*, 1991 edition.

Chapter 6 Referenced Publications

6-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

6-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 10, *Standard for Portable Fire Extinguishers*, 1990 edition

Appendix A

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-2 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 or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use.

The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

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

Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

A-3-1.4 Building codes generally contain provisions limiting the heights and areas of parking structures of various types of construction. Excessive heights and large undivided floor areas are undesirable inasmuch as moderate

areas are essential to the effective use of hose streams where reliance is placed on manual fire fighting tactics.

A-4-3 It is recognized that the ventilation requirements contained within Section 4-3 do not consider exhaust emissions from motor vehicle engines. Authorities having jurisdiction should be consulted to determine precautions necessary to protect against this health hazard.

A-5-6 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, *Recommendations for Organization, Training and Equipment of Private Fire Brigades*.

Appendix B Referenced Publications

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

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

NFPA 600, *Recommendations for Organization, Training and Equipment of Private Fire Brigades*, 1986 edition

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SUBMITTING PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

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

Note: All proposals must be received by 5:00 p.m. E.S.T./E.D.S.T. on the published proposal closing date.

INSTRUCTIONS

Use a separate proposal form for submitting each proposed amendment.

1. Type or print legibly in black ink.
2. Indicate the number, edition year, and title of the document. Also indicate the specific section or paragraph that the proposed amendment applies to.
3. Check the appropriate box to indicate whether this proposal recommends adding new text, revising existing text, or deleting text.
4. In the space identified as "Proposal" indicate the exact wording you propose as new or revised text, or the text you propose be deleted.
5. In the space titled "Statement of Problem and Substantiation for Proposal" state the problem which will be resolved by your recommendation and give the specific reason for your proposal. Include copies of test results, research papers, fire experience, or other materials that substantiate your recommendation.
6. Check the appropriate box to indicate whether or not this proposal is original material, and if it is not, indicate the source of the material.
7. Sign the proposal.

If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee. The technical committee is authorized to abstract the "Statement of Problem and Substantiation for Proposal" if it exceeds 200 words for publication in the Technical Committee Reports.

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

- (a) identification of the submitter and his affiliation (Committee, organization, company) where appropriate, and
- (b) identification of the document, paragraph of the document to which the proposal is directed, and
- (c) a statement of the problem and substantiation for the proposal, and
- (d) proposed text of proposal, including the wording to be added, revised (and how revised), or deleted.

FORM FOR PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Mail to: Secretary, Standards Council
National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02269-9101
Fax No.: 617-770-3500

Note: All proposals must be received by 5:00 p.m. E.S.T./E.D.S.T. on the published proposal closing date.

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

Address 9 Seattle St., Seattle, WA 02255

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

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

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

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

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

Delete exception.

FOR OFFICE USE ONLY

Log #: _____

Date Rec'd: _____

Proposal #: _____

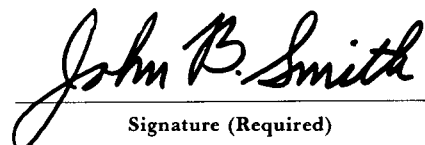
4. Statement of Problem and Substantiation for Proposal:

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

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

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

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Signature (Required)

PLEASE USE SEPARATE FORM FOR EACH PROPOSAL