

## **NFPA® 13 Standard for the Installation of Sprinkler Systems 2019 Edition**

### Chapter 1 Administration

- 1.1 Scope.
- 1.2 Purpose.
- 1.3 Application.
- 1.4 Retroactivity.
- 1.5 Equivalency.
- 1.6 Units and Symbols.
- 1.7 New Technology.

### Chapter 2 Referenced Publications

- 2.1 General.
- 2.2 NFPA Publications.
- 2.3 Other Publications.
- 2.4 References for Extracts in Mandatory Sections.

### Chapter 3 Definitions

- 3.1 General.
- 3.2 NFPA Official Definitions.
- 3.3 General Definitions.

### Chapter 4 General Requirements

- 4.1 Level of Protection.
- 4.2 Owner's Certificate.
- 4.3 Classification of Hazard.
- 4.4 Hose Connections.
- 4.5 System Protection Area Limitations.
- 4.6 Water Supply Information.
- 4.7 Additives.
- 4.8 Air, Nitrogen, or Other Approved Gas.
- 4.9 Support of Nonsprinkler System Components.
- 4.10 Noncombustible Materials and Limited-Combustible Materials.

### Chapter 5 Water Supplies

- 5.1 General.
- 5.2 Types.

### Chapter 6 Installation Underground Piping

- 6.1 Piping.
- 6.2 Fittings.
- 6.3 Connection of Pipe, Fittings, and Appurtenances.
- 6.4 Protection of Private Fire Service Mains. [24:10.4]
- 6.5 Grounding and Bonding.
- 6.6 Restraint.
- 6.7 Steep Grades.
- 6.8 Installation Requirements.
- 6.9 Backfilling.
- 6.10 Testing and Acceptance.

## Chapter 7 Requirements for System Components and Hardware

- 7.1 General.
- 7.2 Sprinklers.
- 7.3 Aboveground Pipe and Tube.
- 7.4 Fittings.
- 7.5 Joining of Pipe and Fittings.
- 7.6 Valves.
- 7.7 Waterflow Alarm Devices.
- 7.8 Additives and Coatings.

## Chapter 8 System Types and Requirements

- 8.1 Wet Pipe Systems.
- 8.2 Dry Pipe Systems.
- 8.3 Preaction Systems and Deluge Systems.
- 8.4 Combined Dry Pipe and Preaction Systems for Piers, Terminals, and Wharves.
- 8.5 Multi-Cycle Systems.
- 8.6 Antifreeze Systems.
- 8.7 Outside Sprinklers for Protection Against Exposure Fires (Exposure Protection Sprinkler Systems).
- 8.8 Refrigerated Spaces.
- 8.9 Commercial-Type Cooking Equipment and Ventilation.
- 8.10 Pilot Line Detectors.

## Chapter 9 Sprinkler Location Requirements

- 9.1 Basic Requirements.
- 9.2 Allowable Sprinkler Omission Locations.
- 9.3 Special Situations.
- 9.4 Use of Sprinklers.
- 9.5 Position, Location, Spacing, and Use of Sprinklers.

## Chapter 10 Installation Requirements for Standard Pendent, Upright, and Sidewall Spray Sprinklers

- 10.1 General.
- 10.2 Standard Pendent and Upright Spray Sprinklers.
- 10.3 Sidewall Standard Spray Sprinklers.

## Chapter 11 Installation Requirements for Extended Coverage Upright, Pendent, Sidewall Spray Sprinkler

- 11.1 General.
- 11.2 Extended Coverage Upright and Pendent Spray Sprinklers.
- 11.3 Extended Coverage Sidewall Spray Sprinklers.

## Chapter 12 Installation Requirements for Residential Sprinklers

- 12.1 General.

## Chapter 13 Installation Requirements for CMSA Sprinklers

- 13.1 General.
- 13.2 CMSA Sprinklers.

## Chapter 14 Installation Requirements for Early Suppression Fast-Response Sprinklers

14.1 General.

14.2 Early Suppression Fast-Response Sprinklers.

Chapter 15 Installation Requirements for Special Sprinklers

15.1 Open Sprinklers.

15.2 Special Sprinklers.

15.3 Dry Sprinklers.

15.4 Old-Style Sprinklers.

Chapter 16 Installation of Piping, Valves, and Appurtenances

16.1 Basic Requirements.

16.2 Sprinkler Installation.

16.3 Piping Installation.

16.4 Protection of Piping.

16.5 Protection of Risers Subject to Mechanical Damage.

16.6 Provision for Flushing Systems.

16.7 Air Venting.

16.8 Fitting Installation.

16.9 Valves.

16.10 Drainage.

16.11 System Attachments.

16.12 Fire Department Connections.

16.13 Gauges.

16.14 System Connections.

16.15 Hose Connections.

16.16 Electrical Bonding and Grounding.

16.17 Signs.

Chapter 17 Installation Requirements for Hanging and Support of System Piping

17.1 General.

17.2 Hanger Components.

17.3 Trapeze Hangers.

17.4 Installation of Pipe Hangers.

17.5 Pipe Stands.

Chapter 18 Installation Requirements for Seismic Protection

18.1 Protection of Piping Against Damage Where Subject to Earthquakes.

18.2 Flexible Couplings.

18.3 Seismic Separation Assembly.

18.4 Clearance.

18.5 Sway Bracing.

18.6 Restraint of Branch Lines.

18.7 Hangers and Fasteners Subject to Earthquakes.

18.8 Pipe Stands Subject to Earthquakes.

Chapter 19 Design Approaches

19.1 General.

19.2 General Design Approaches.

19.3 Occupancy Hazard Fire Control Approach for Spray Sprinklers.

19.4 Special Design Approaches.

19.5 Deluge Systems.

## Chapter 20 General Requirements for Storage

20.1 General.

20.2 Protection of Storage.

20.3 Classification of Commodities.

20.4 Commodity Classes.

20.5 Storage Arrangement.

20.6 Building Construction and Storage: Heights and Clearance.

20.7 Unsprinklered Combustible Concealed Spaces.

20.8 Room Design Method.

20.9 High-Expansion Foam Systems.

20.10 Adjacent Hazards or Design Methods.

20.11 Hose Connections.

20.12 Hose Stream Allowance and Water Supply Duration.

20.13 Discharge Considerations: General.

20.14 Protection of Idle Pallets.

20.15 Column Protection: Rack Storage and Rubber Tire Storage.

## Chapter 21 Protection of High Piled Storage Using Control Mode Density Area (CMDA) Sprinklers

21.1 General.

21.2 Control Mode Density/Area Sprinkler Protection Criteria for Palletized, Solid-Piled, Bin Box, Shelf, or Back-to-Back Shelf Storage of Class I Through Class IV Commodities.

21.3 Control Mode Density/Area Sprinkler Protection Criteria for Palletized, Solid-Piled, Bin Box, Shelf, or Back-to-Back Shelf Storage of Plastic and Rubber Commodities.

21.4 Control Mode Density/Area Sprinkler Protection Criteria for Rack Storage of Class I Through Class IV Commodities.

21.5 Control Mode Density/Area Sprinkler Protection Criteria for Single-, Double-, and Multiple-Row Racks for Group A Plastic Commodities Stored Up to and Including 25 ft (7.6 m) in Height.

21.6 Control Mode Density/Area Sprinkler Protection Criteria for Rack Storage Rubber Tires.

21.7 Control Mode Density/Area Sprinkler Protection Criteria for Roll Paper Storage.

21.8 Special Design for Rack Storage of Class I Through Class IV Commodities and Group A Plastics Stored Up to and Including 25 ft (7.6 m) in Height.

21.9 Sprinkler Design Criteria for Storage and Display of Class I Through Class IV Commodities, Cartoned Nonexpanded Group A Plastics and Nonexpanded Exposed Group A Plastics in Retail Stores.

21.10 Control Mode Density/Area Sprinkler Protection Criteria for Baled Cotton Storage.

21.11 Control Mode Density/Area Sprinkler Protection Criteria for Carton Records Storage with Catwalk Access.

21.12 Control Mode Density/Area Sprinkler Protection Criteria for Compact Storage of Commodities Consisting of Paper Files, Magazines, Books, and Similar Documents in Folders and Miscellaneous Supplies with No More Than 5 Percent Plastics Up to 8 ft (2.4 m) High.

## Chapter 22 CMSA Requirements for Storage Applications

22.1 General.

- 22.2 Palletized and Solid-Piled Storage of Class I Through Class IV Commodities.
- 22.3 Palletized and Solid-Piled Storage of Nonexpanded and Expanded Group A Plastic Commodities.
- 22.4 Single-, Double-, and Multiple-Row Rack Storage for Class I Through Class IV Commodities.
- 22.5 Single-, Double-, and Multiple-Row Racks of Group A Plastic Commodities.
- 22.6 Rubber Tires.
- 22.7 Roll Paper Storage.

## Chapter 23 ESFR Requirements for Storage Applications

23.1 General.

- 23.2 ESFR Design Criteria.
- 23.3 Early Suppression Fast-Response (ESFR) Sprinklers for Palletized or Solid-Piled Storage of Class I Through Class IV Commodities.
- 23.4 Early Suppression Fast-Response (ESFR) Sprinklers for Palletized or Solid-Piled Storage of Group A Plastic Commodities.
- 23.5 Early Suppression Fast-Response (ESFR) Sprinklers for Rack Storage of Class I Through Class IV Commodities.
- 23.6 Early Suppression Fast-Response (ESFR) Sprinklers for Rack Storage of Group A Plastic Commodities.
- 23.7 Protection of Exposed Expanded Group A Plastics.
- 23.8 ESFR Protection of Rack Storage of Rubber Tires.
- 23.9 Early Suppression Fast-Response (ESFR) Sprinklers for Protection of Roll Paper Storage.
- 23.10 Plastic Motor Vehicle Components.
- 23.11 Sprinkler Design Criteria for Storage and Display of Class I Through Class IV Commodities, Cartoned Nonexpanded Group A Plastics and Nonexpanded Exposed Group A Plastics in Retail Stores.
- 23.12 Protection of High Bay Records Storage.
- 23.13 Slatted Shelves.

## Chapter 24 Alternative Sprinkler System Designs for Chapters 20 Through 25

24.1 General.

- 24.2 Sprinkler Design Criteria for Palletized and Solid-Piled, Storage of Class I Through Class IV and Plastic Commodities.
- 24.3 Sprinkler Protection Criteria for Open-Frame Rack Storage of Class I Through Class IV and Plastic Commodities.
- 24.4 Hose Stream Allowance and Water Supply Duration.
- 24.5 Minimum Obstruction Criteria.

## Chapter 25 Protection of Rack Storage Using In-Rack Sprinklers

25.1 General Requirements of In-Rack Sprinklers.

- 25.2 Ceiling-Level Sprinkler Design Criteria in Combination with In-Rack Sprinklers.
- 25.3 In-Rack Sprinkler Characteristics.
- 25.4 Vertical Spacing and Location of In-Rack Sprinklers.
- 25.5 Horizontal Location and Spacing of In-Rack Sprinklers.
- 25.6 Protection of Racks with Solid Shelves.
- 25.7 Horizontal Barriers in Combination with In-Rack Sprinklers.
- 25.8 Alternative In-Rack Sprinkler Protection Options That Are Independent of the Ceiling Sprinkler Design.
- 25.9 In-Rack Sprinkler Arrangements in Combination with CMDA Sprinklers at

Ceiling Level.

25.10 In-Rack Sprinkler Arrangements in Combination with CMSA Sprinklers at Ceiling Level.

25.11 In-Rack Sprinkler Arrangements in Combination with ESFR Sprinklers at Ceiling Level.

25.12 Design Criteria for In-Rack Sprinklers in Combination with Ceiling-Level Sprinklers.

## Chapter 26 Special Occupancy Requirements

26.1 General.

26.2 Flammable and Combustible Liquids.

26.3 Aerosol Products.

26.4 Spray Application Using Flammable or Combustible Materials.

26.5 Solvent Extraction Plants. [NFPA 36]

26.6 Installation and Use of Stationary Combustion Engines and Gas Turbines.

26.7 Nitrate Film.

26.8 Laboratories Using Chemicals.

26.9 Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes.

26.10 Acetylene Cylinder Charging Plants.

26.11 Compressed Gases and Cryogenic Fluids Code.

26.12 Utility LP-Gas Plants.

26.13 Production, Storage, and Handling of Liquefied Natural Gas (LNG).

26.14 Protection of Information Technology Equipment.

26.15 Standard on Incinerators, and Waste and Linen Handling Systems and Equipment.

26.16 Standard for Ovens and Furnaces.

26.17 Health Care Facilities Code, Class A Hyperbaric Chambers.

26.18 Fixed Guideway Transit and Passenger Rail Systems.

26.19 Motion Picture and Television Production Studio Soundstages, Approved Production Facilities, and Production Locations.

26.20 Animal Housing Facilities.

26.21 Water Cooling Towers.

26.22 Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves.

26.23 Semiconductor Fabrication Facilities.

26.24 Aircraft Hangars.

26.25 Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways.

26.26 Aircraft Engine Test Facilities.

26.27 Advanced Light Water Reactor Electric Generating Plants.

26.28 Light Water Nuclear Power Plants.

26.29 Code for the Protection of Cultural Resource Properties — Museums, Libraries, and Places of Worship. [NFPA 909]

26.30 National Electrical Code.

26.31 Fire Protection of Telecommunication Facilities.

26.32 Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids.

26.33 Hypobaric Facilities.

26.34 Coal Mines.

26.35 Metal/Nonmetal Mining and Metal Mineral Processing Facilities.

26.36 Hazardous Materials Code.

## Chapter 27 Plans and Calculations

27.1 Working Plans.

27.2 Hydraulic Calculation Procedures.

27.3 Hose Allowance.

27.4 Hydraulic Calculation Forms.

27.5 Pipe Schedules.

## Chapter 28 Systems Acceptance

28.1 Approval of Sprinkler Systems and Private Fire Service Mains.

28.2 Acceptance Requirements.

28.3 Automated Inspection and Testing Devices and Equipment.

28.4 Instructions.

28.5 Hydraulic Design Information Sign (Hydraulic Data Nameplate).

28.6 General Information Sign.

## Chapter 29 Existing System Modifications

29.1 General.

29.2 Components.

29.3 Sprinklers.

29.4 Revamping of Pipe Schedule Systems.

29.5 Revamping of Hydraulic Design Systems.

29.6 System Design.

29.7 Testing.

## Chapter 30 Marine Systems

30.1 General.

30.2 System Components, Hardware, and Use.

30.3 System Requirements.

30.4 Installation Requirements.

30.5 Design Approaches.

30.6 Plans and Calculations.

30.7 Water Supplies.

30.8 System Acceptance.

30.9 System Instructions and Maintenance.

## Chapter 31 System Inspection, Testing, and Maintenance

31.1 General.

Annex A Explanatory Material

Annex B Miscellaneous Topics

Annex C Explanation of Test Data and Procedures for Rack Storage

Annex D Sprinkler System Information from the 2018 Edition of the Life Safety Code

Annex E Development of the Design Approach to Conform with ASCE/SEI 7 and Suggested Conversion Factor Adjustments for Locations Outside the United States

Annex F Informational References