

NFPA[®]

850

Recommended Practice for
Fire Protection for
Electric Generating Plants and
High Voltage Direct Current
Converter Stations

2020



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NFPA® 850

Recommended Practice for

Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations

2020 Edition

This edition of NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations*, was prepared by the Technical Committee on Electric Generating Plants. It was issued by the Standards Council on November 4, 2019, with an effective date of November 24, 2019, and supersedes all previous editions.

This edition of NFPA 850 was approved as an American National Standard on November 24, 2019.

Origin and Development of NFPA 850

The Committee on Non-Nuclear Power Generating Plants was organized in 1979 to have primary responsibility for documents on fire protection for non-nuclear electric generating plants. Begun early in 1980, the first edition of NFPA 850 was officially released in 1986 as the *Recommended Practice for Fire Protection for Fossil Fueled Steam Electric Generating Plants*.

The second edition of NFPA 850 was issued in 1990 under the revised title of *Recommended Practice for Fire Protection for Fossil Fueled Steam and Combustion Turbine Electric Generating Plants*. This second edition incorporated a new Chapter 6 on the identification and protection of hazards for combustion turbines.

In 1991 the committee changed its name to the Technical Committee on Electric Generating Plants. This simplified name was made to reflect the committee's scope to cover all types of electric generating plants except nuclear.

The 1992 edition of NFPA 850 incorporated a new Chapter 7 on alternative fuel electric generating plants. As part of these changes, the document title was revised to the *Recommended Practice for Fire Protection for Electric Generating Plants*. Various other technical and editorial changes were also made.

The 1996 edition of the standard added a new Chapter 8 on fire protection for high voltage direct current (HVDC) converter stations. In addition, the title was changed to *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations* to incorporate the new chapter.

The 2000 edition revised the application of the document to apply to existing facilities, as it is a good industry practice. Chapter 2 was reorganized to be specific to a fire risk control program. The document also clarified that a single water tank is not a reliable water supply, the spacing of hydrants, and lock-out of fire suppression systems, and additional requirements were added for water mist fire suppression systems.

The 2005 edition of NFPA 850 underwent a complete revision to comply with the *Manual of Style for NFPA Technical Committee Documents*. Chapter 2 now contains mandatory references and Chapter 3 now contains definitions, and the subsequent chapters were renumbered.

Additional changes included revised figures in Chapter 5 that are intended to further clarify existing requirements and the addition of new annex material on fire protection requirements.

The 2010 edition of NFPA 850 included a chapter containing recommendations for a fire protection design process and fire protection design basis documentation (the new Chapter 4). The chapter on fire risk control program was moved to Chapter 16. New chapters on wind turbine generating facilities, solar thermal power generation, geothermal power plants, and integrated gasification combined cycle (IGCC) generating facilities (Chapters 10–13) were added.

The use of compressed air-foam systems and fast-depressurization systems were recognized, and recommendations for the use of these systems included.

The 2015 edition underwent a significant revision with the merger of NFPA 851. The recommendations contained in NFPA 850 and 851 were aligned, and a new chapter (Chapter 14) was created to provide recommendations specific to hydroelectric generating plants. Recommendations for aerosol extinguishing systems were added. Recommendations for active carbon injection systems were added to Chapter 7, and Chapter 11 was expanded to provide recommendations for fire and life safety involving photoelectric solar power plants.

The 2020 edition of NFPA 850 has undergone a complete reorganization. Information is now grouped in a more logical layout that helps users navigate the document more quickly. New chapters on flywheel energy systems and compressed air energy storage (CAES) have been added to address technologies used in the industry.

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Committee Scope: This Committee shall have primary responsibility for documents on fire protection for electric generating plants and high voltage direct current (HVDC) converter stations, except for electric generating plants using nuclear fuel.

Contents

Chapter 1 Administration	850- 6	8.8 Manual Fire-Fighting Equipment.	850- 26
1.1 Scope.	850- 6	Chapter 9 Fuels, Common Equipment, and Protection	850- 27
1.2 Purpose.	850- 6	9.1 General.	850- 27
1.3 Application.	850- 6	9.2 Flammable Gases.	850- 27
1.4 Equivalency.	850- 6	9.3 Combustible Liquids.	850- 27
1.5 Units.	850- 7	9.4 Flammable Liquids.	850- 28
Chapter 2 Referenced Publications	850- 7	9.5 Solid Fuels.	850- 28
2.1 General.	850- 7	9.6 Hydraulic Control System.	850- 31
2.2 NFPA Publications.	850- 7	9.7 Electrical Equipment.	850- 32
2.3 Other Publications.	850- 8	9.8 Storage Rooms, Offices, and Shops.	850- 33
2.4 References for Extracts in Recommendations Sections.	850- 9	9.9 Oil Storage Areas.	850- 33
Chapter 3 Definitions	850- 9	9.10 Warehouses.	850- 33
3.1 General.	850- 9	9.11 Fire Pumps.	850- 33
3.2 NFPA Official Definitions.	850- 9	9.12 Cooling Towers.	850- 33
3.3 General Definitions.	850- 9	9.13 Auxiliary Boilers.	850- 33
Chapter 4 Fire Protection Design Process	850- 11	9.14 Vehicle Repair Facilities.	850- 33
4.1 General.	850- 11	9.15 Air Compressors.	850- 33
4.2 Stakeholders.	850- 11	Chapter 10 Turbines, Generators, and Internal Combustion Engines	850- 33
4.3 Inputs to the Design Process.	850- 11	10.1 General.	850- 33
4.4 Fire Protection Design Basis Process.	850- 11	10.2 Application of Chapters 4 Through 9.	850- 33
4.5 Fire Protection Design Basis Document (Deliverables).	850- 12	10.3 Turbine and Internal Combustion Engine Generators.	850- 34
Chapter 5 Fire Risk Control Program	850- 12	10.4 Combined Cycle Units.	850- 36
5.1 General.	850- 12	Chapter 11 Alternative Fuels	850- 36
5.2 Management Policy and Direction.	850- 12	11.1 General.	850- 36
5.3 Fire Risk Control Program.	850- 12	11.2 Application of Chapters 4 Through 10.	850- 37
5.4 Fire Protection Program.	850- 13	11.3 Design and Equipment Arrangement.	850- 37
5.5 Identification of Fire Hazards of Materials.	850- 15	11.4 Risk Considerations for MSW.	850- 37
Chapter 6 General Plant Design	850- 15	11.5 Risk Considerations for RDF.	850- 37
6.1 Plant Arrangement.	850- 15	11.6 Risk Considerations for Biomass Fuels.	850- 39
6.2 Life Safety.	850- 18	11.7 Risk Considerations for Tire Derived Fuels.	850- 39
6.3 Building Construction Materials.	850- 18	11.8 Other Alternative Fuels and Processes.	850- 40
6.4 Smoke and Heat Venting, Heating, Ventilating, and Air Conditioning.	850- 18	Chapter 12 Power Boilers	850- 40
6.5 Containment and Drainage.	850- 19	12.1 General.	850- 40
6.6 Emergency Lighting.	850- 20	12.2 Application of Chapters 4 Through 11.	850- 40
6.7 Lightning Protection.	850- 20	12.3 Design and Equipment Arrangement.	850- 40
Chapter 7 General Fire Protection Systems and Equipment	850- 20	Chapter 13 Wind Turbines	850- 43
7.1 General.	850- 20	13.1 General.	850- 43
7.2 Water Supply.	850- 20	13.2 Application of Chapters 4 Through 10.	850- 44
7.3 Valve Supervision.	850- 21	13.3 Design and Equipment Arrangement.	850- 44
7.4 Supply Mains, Yard Mains, Hydrants, and Building Standpipes.	850- 21	13.4 Risk Consideration.	850- 44
7.5 Portable Fire Extinguishers.	850- 22	13.5 Hazard Protection.	850- 44
7.6 Fire Suppression Systems and Equipment — General Requirements.	850- 22	Chapter 14 Solar Generation	850- 45
7.7 Fire-Signaling Systems.	850- 23	14.1 General.	850- 45
7.8 Commissioning and Maintenance.	850- 24	14.2 Application of Chapters 4 Through 10.	850- 45
Chapter 8 Fire Protection for the Construction Site	850- 24	14.3 Design and Equipment Arrangement.	850- 45
8.1 Introduction.	850- 24	14.4 Risk Considerations.	850- 46
8.2 Administration.	850- 24	14.5 Hazard Protection.	850- 46
8.3 Site Clearing, Excavation, Tunneling, and Construction Equipment.	850- 24	Chapter 15 Geothermal Generation	850- 47
8.4 Construction Warehouses, Shops, and Offices.	850- 25	15.1 General.	850- 47
8.5 Construction Site Lay-Down Areas.	850- 26	15.2 Application of Chapters 4 Through 10.	850- 47
8.6 Temporary Construction Materials.	850- 26	15.3 Design and Equipment Arrangement.	850- 47
8.7 Underground Mains, Hydrants, and Water Supplies.	850- 26	15.4 Risk Considerations.	850- 47
		15.5 Hazard Protection.	850- 47
		Chapter 16 Integrated Gasification Combined-Cycle (IGCC)	850- 47
		16.1 General.	850- 47

16.2	Application of Chapters 4 Through 10.	850– 47	19.3	Design and Equipment Arrangement.	850– 51
16.3	Design and Equipment Arrangement.	850– 47	19.4	Risk Consideration.	850– 51
16.4	Risk Considerations.	850– 48	19.5	Hazard Protection.	850– 52
16.5	Hazard Protection.	850– 49	Chapter 20	Compressed Air Energy Storage (CAES) ...	850– 53
Chapter 17	Hydroelectric Generation	850– 49	20.1	General.	850– 53
17.1	General.	850– 49	20.2	Application of Chapters 4 Through 10.	850– 53
17.2	Application of Chapters 4 Through 10.	850– 49	20.3	Design and Equipment Arrangement.	850– 53
17.3	Design and Equipment Arrangement.	850– 49	20.4	Risk Consideration.	850– 53
17.4	Risk Considerations. (Reserved)	850– 50	20.5	Hazard Protection.	850– 53
17.5	Hazard Protection.	850– 50	Annex A	Explanatory Material	850– 53
Chapter 18	High-Voltage Direct Current (HVDC)		Annex B	Sample Fire Report	850– 70
	Converter Stations	850– 50	Annex C	Fire Tests	850– 72
18.1	General.	850– 50	Annex D	Loss Experience	850– 75
18.2	Application of Chapters 4 Through 9.	850– 50	Annex E	Fire Protection Design Basis Document	850– 79
18.3	Design and Equipment Arrangement.	850– 50	Annex F	Informational References	850– 80
18.4	Risk Considerations.	850– 51	Index		850– 82
18.5	Hazard Protection.	850– 51			
Chapter 19	Flywheel Energy Systems	850– 51			
19.1	General.	850– 51			
19.2	Application of Chapters 4 Through 10.	850– 51			

NFPA 850

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Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations

2020 Edition

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

Chapter 1 Administration

1.1 Scope. This document provides recommendations for fire prevention and fire protection for electric generating plants and high voltage direct current converter stations, except as follows: Advanced light water reactor electric generating plants are addressed in NFPA 804; nuclear power plants are addressed in NFPA 805; and fuel cells are addressed in NFPA 853.

1.2 Purpose.

1.2.1 This document is prepared for the guidance of those charged with the design, construction, operation, and protection of electric generating plants and high voltage direct current converter stations that are covered by the scope of this document.

1.2.2 This document provides fire hazard control recommendations for the safety of construction and operating personnel, the physical integrity of plant components, and the continuity

of plant operations. Specific concerns are generalized and categorized as shown in 1.2.2.1 through 1.2.2.4.

1.2.2.1 Protection of Plant Personnel. Risk of injury and loss of life, in the event of fire, should be controlled. Specific criteria should be established for means of egress. When for plant safety and emergency response reasons personnel are not able to evacuate immediately, specific criteria for ensuring their safety until they can evacuate and safe passage to egress routes should be established.

1.2.2.2 Assets Protection. The large capital costs of the structures, systems, and components for the facilities addressed in this recommended practice create financial risks for the owners, investors, and financiers. Specific criteria should be established for the mitigation of the risks from fires exposing these assets.

1.2.2.3 Business Interruption. The ability of these facilities to generate and transmit electricity is important not only to the owners of the facilities but also to the consumers of that energy, including the public. Specific criteria for managing the effects of fire on the ability to generate and transmit power should be developed, based on economic and societal considerations.

1.2.2.4 Environmental Protection. Fires in these facilities have the potential of creating environmental impact, by damaging pollution control systems and components and by creating unwanted releases to the environment from the fire and fire-fighting activities. Specific criteria should be established to control the impact of fire and fire-fighting activities on the environment.

1.3 Application.

1.3.1 This document is intended for use by persons knowledgeable in the application of fire protection for electric generating plants and high voltage direct current converter stations.

1.3.2 The recommendations contained in this document are intended for new installations, as the application to existing installations might not be practicable. However, the recommendations contained in this document represent good industry practice and should be considered for existing installations.

1.3.3 It should be recognized that rigid uniformity of generating station design and operating procedures does not exist and that each facility will have its own special conditions that impact on the nature of the installation. Many of the specific recommendations herein might require modification after due consideration of all applicable factors involved. This modification should be made only after following the methodology described in Chapter 4 and documented in the Fire Protection Design Basis document.

Δ 1.4 Equivalency.

N 1.4.1 Nothing in this recommended practice 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 recommended practice.

1.4.2 Equivalency should be demonstrated following the methodology described in Chapter 4 and documented in the Fire Protection Design Basis document.

1.5 Units. Metric units in this document are in accordance with the International System of Units, which is officially abbreviated SI in all languages. For a full explanation, see ASTM **SI10**, *American National Standard for Use of the International System of Units (SI): The Modern Metric System*.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this recommended practice and should be considered part of the recommendations of this document.

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

- NFPA 1, *Fire Code*, 2018 edition.
- NFPA 2, *Hydrogen Technologies Code*, 2020 edition.
- NFPA 10, *Standard for Portable Fire Extinguishers*, 2018 edition.
- NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 edition.
- NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, 2018 edition.
- NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, 2018 edition.
- NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2019 edition.
- NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2019 edition.
- NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2017 edition.
- NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 2019 edition.
- NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2017 edition.
- NFPA 18A, *Standard on Water Additives for Fire Control and Vapor Mitigation*, 2017 edition.
- NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2019 edition.
- NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2018 edition.
- NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2019 edition.
- NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2020 edition.
- NFPA 30, *Flammable and Combustible Liquids Code*, 2018 edition.
- NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, 2018 edition.
- NFPA 31, *Standard for the Installation of Oil-Burning Equipment*, 2020 edition.
- NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*, 2018 edition.
- NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2019 edition.
- NFPA 54, *National Fuel Gas Code*, 2018 edition.
- NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, 2020 edition.
- NFPA 56, *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems*, 2020 edition.
- NFPA 58, *Liquefied Petroleum Gas Code*, 2020 edition.
- NFPA 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)*, 2019 edition.
- NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2018 edition.
- NFPA 69, *Standard on Explosion Prevention Systems*, 2019 edition.
- NFPA 70®, *National Electrical Code®*, 2020 edition.
- NFPA 72®, *National Fire Alarm and Signaling Code®*, 2019 edition.
- NFPA 75, *Standard for the Fire Protection of Information Technology Equipment*, 2020 edition.
- NFPA 77, *Recommended Practice on Static Electricity*, 2019 edition.
- NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2019 edition.
- NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, 2017 edition.
- NFPA 85, *Boiler and Combustion Systems Hazards Code*, 2019 edition.
- NFPA 86, *Standard for Ovens and Furnaces*, 2019 edition.
- NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2018 edition.
- NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*, 2018 edition.
- NFPA 92, *Standard for Smoke Control Systems*, 2018 edition.
- NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2017 edition.
- NFPA 101®, *Life Safety Code®*, 2018 edition.
- NFPA 110, *Standard for Emergency and Standby Power Systems*, 2019 edition.
- NFPA 120, *Standard for Fire Prevention and Control in Coal Mines*, 2020 edition.
- NFPA 204, *Standard for Smoke and Heat Venting*, 2018 edition.
- NFPA 214, *Standard on Water-Cooling Towers*, 2016 edition.
- NFPA 220, *Standard on Types of Building Construction*, 2018 edition.
- NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, 2019 edition.
- NFPA 252, *Standard Methods of Fire Tests of Door Assemblies*, 2017 edition.
- NFPA 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*, 2019 edition.
- NFPA 257, *Standard on Fire Test for Window and Glass Block Assemblies*, 2017 edition.
- NFPA 259, *Standard Test Method for Potential Heat of Building Materials*, 2018 edition.
- NFPA 497, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, 2017 edition.
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- NFPA 501A, *Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities*, 2017 edition.
- NFPA 600, *Standard on Facility Fire Brigades*, 2020 edition.
- NFPA 601, *Standard for Security Services in Fire Loss Prevention*, 2020 edition.
- NFPA 652, *Standard on the Fundamentals of Combustible Dust*, 2019 edition.