

**NFPA®**

# 400

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**Hazardous Materials Code**

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**2019**



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## NFPA® 400

# Hazardous Materials Code

## 2019 Edition

This edition of NFPA 400, *Hazardous Materials Code*, was prepared by the Technical Committee on Hazardous Chemicals. It was acted on by NFPA at its June Association Technical Meeting held June 11-14, 2018, in Las Vegas, NV. It was issued by the Standards Council on August 14, 2018, with an effective date of September 3, 2018, and supersedes all previous editions.

This edition of NFPA 400 was approved as an American National Standard on September 3, 2018.

### Origin and Development of NFPA 400

For the first edition of NFPA 400, four separate documents — NFPA 430, NFPA 432, NFPA 434, and NFPA 490 — were withdrawn in 2010 and included in their entirety in NFPA 400. This edition covered hazardous material categories found in building and fire codes such as corrosives, flammable solids, pyrophoric substances, toxic and highly toxic materials, unstable materials, and water-reactive materials. NFPA 400 also included compressed gases and cryogenic fluids by extracting NFPA 55, *Compressed Gases and Cryogenic Fuels Code*, into Chapter 21.

The code established the need for additional fire protection based on quantity limits for various occupancies using the maximum allowable quantity (MAQ) concept.

In the 2013 edition, the MAQ tables in Chapter 5 were updated to be consistent with changes in fire and building codes and coordinated with requirements for industrial and medical gases based on changes to NFPA 55. The Committee updated the table establishing MAQ values for hazardous materials stored or used in outdoor control areas. The results of the Fire Protection Research Foundation (FPRF) project “Oxidizer Classification Research Project: Tests and Criteria” were used to establish an alternative method for assigning classifications to oxidizing solids. To accomplish that, the committee modified definitions for Class 1, Class 2, and Class 3 oxidizers based on the test protocol and criteria presented in the completely revised Annex G.

The oxidizer table in Annex G was updated for specific oxidizer solids based on the test results. The Committee also incorporated edits consistent with the *Manual of Style for NFPA Technical Committee Documents*.

The 2016 edition incorporated a number of significant changes to the requirements for ammonium nitrate in Chapter 11. Highlights included the addition of sprinkler requirements for existing buildings of combustible construction and content, the requirement for new buildings and storage bins to be of noncombustible construction, and emergency planning and public notification/alert systems for both new and existing facilities.

Additional changes further protected ammonium nitrate from becoming contaminated or from becoming molten and confined, conditions that can lead to an explosion during fires involving ammonium nitrate. Clear guidance for emergency responders on the conditions under which ammonium nitrate can explode, when to fight such fires, and when to evacuate were added to Annex E, which also included information on the properties and uses of ammonium nitrate. A number of oxidizers were reclassified in Annex G based on work performed under the auspices of the Fire Protection Research Foundation (FPRF). In Annex F, the tables were revised based on new test data provided by the Organic Peroxide Producers’ Safety Division (OPPSD) of the Society of the Plastics Industry (SPI). Terminology and content throughout the document have been modified to correlate with OSHA’s revised *Hazard Communication Standard*. A new annex, Annex J, Hazardous Material Definitions Comparison Table, compared the hazardous materials definitions in the new OSHA standard with those in NFPA 400. Finally, the MAQ tables in Chapter 5 were modified to reflect a change in typical container sizes from 50 lb to 55 lb (22.7 kg to 24.9 kg).

In the 2019 edition, multiple terms relating to aisles have been revised for consistent use throughout the code. A major revision has been made to the MAQ tables in Chapter 5 that deletes

most of the occupancy-specific tables in an effort to consolidate information and reduce repetition. MAQ values for assembly, educational, day care, health care, ambulatory health care, detention and correctional, certain residential, and business occupancies have been consolidated, and annex material has been added to provide clarification on amounts needed to be stored within and outside of cabinets when allowed to have increases based on the table footnotes. A new table has also been added to the code to extract common path of travel distance limits from *NFPA 5000®*, *Building Construction and Safety Code®*.

Further revisions have been made to the requirements for ammonium nitrate in Chapter 11. Text has been added to clarify which sections apply retroactively, and language has been revised to clarify that molten ammonium nitrate needs to be able to flow away from storage areas to open, unconfined areas free from incompatible materials. Revisions have been made to the fire protection system requirements so that automatic fire sprinkler systems are not required in Type I or Type II construction buildings unless they also have combustible content. Requirements for ammonium nitrate storage in railcars have been added to cover non-transportation-regulated storage.

Class II organic peroxides have been divided into Class IIA and Class IIB based on small-scale burn rate data and alignment with international classifications. Definitions have been added, MAQ tables have been updated to include these two classes, and some of the assignments of organic peroxide formulation classifications in Annex F have been changed accordingly. Changes have been made to the requirements for fire protection systems, and to remove MAQs for segregated storage and cutoff storage, since these are addressed through the protection level and control area concepts.

Finally, new annex material has been added to show an example of a storage layout in a typical sprinklered warehouse storing Class 1 oxidizers.

The 2019 edition of NFPA 400 is dedicated to the memory of Nancy Pearce, who served as Staff Liaison to the Technical Committee on Hazardous Chemicals since the 2013 edition of the code. Nancy passed away on September 5, 2017, after a long and courageous battle with breast cancer — although that did not stop her from sharing her joy and passion with all who had the pleasure of working with her. Nancy worked at NFPA for 6 years, and spent the previous 23 years as an Industrial Hygienist for the Massachusetts Department of Labor Standards, Occupational Safety and Health Program. Often with a smile, she could pull teams of people together with a common mission, never minimizing their important work for making the world a safer place to work and live. Nancy will be remembered and missed for her professionalism, incredible work ethic, and kindness.

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**Committee Scope:** This Committee shall have primary responsibility for documents on, and maintain current codes for, classes of hazardous chemicals and codes for specific chemicals where these are warranted by virtue of widespread distribution or special hazards.



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## NFPA 400

## Hazardous Materials Code

2019 Edition

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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.

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 L. 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 L.

## Chapter 1 Administration

## 1.1 Scope.

**1.1.1\* Applicability.** This code shall apply to the storage, use, and handling of the following hazardous materials in all occupancies and facilities:

- (1) Ammonium nitrate solids and liquids
- (2) Corrosive solids and liquids
- (3) Flammable solids
- (4) Organic peroxide formulations
- (5) Oxidizer — solids and liquids
- (6) Pyrophoric solids and liquids
- (7) Toxic and highly toxic solids and liquids
- (8) Unstable (reactive) solids and liquids
- (9) Water-reactive solids and liquids
- (10)\* Compressed gases and cryogenic fluids as included within the context of NFPA 55

**1.1.1.1 Occupancies.** Unless otherwise specified in this code, all occupancy definitions and classifications shall be in accordance with the building code.

**1.1.1.2 Multiple Hazards.** Hazardous materials that are classified in more than one hazard category, as set forth in Section 4.1, shall conform to the code requirements for each hazard category.

**1.1.2 Exemptions.**

**1.1.2.1** The quantity and arrangement limits in this code shall not apply to facilities that use ammonium perchlorate in the commercial manufacture of large-scale rocket motors.

**1.1.2.2** This code shall not apply to the following:

- (1) Storage or use of hazardous materials for individual use on the premises of one- and two-family dwellings
- (2) Explosives or blasting agents, which are regulated by NFPA 495, and fireworks
- (3) Refrigerants and refrigerant oil contained within closed-cycle refrigeration systems complying with the fire code and the mechanical code adopted by the jurisdiction
- (4) High-hazard contents stored or used in farm buildings or similar occupancies and in remote locations for on-premises agricultural use
- (5) Corrosive materials in stationary batteries utilized for facility emergency power or uninterrupted power supply, or similar purposes, in accordance with NFPA 1
- (6) Aerosols complying with NFPA 30B
- (7) Corrosive materials displayed in original packaging in mercantile occupancies and intended for personal or household use or as building materials
- (8) Flammable and combustible liquids having no other physical or health hazard properties covered by this code
- (9) Organic peroxide formulations that are capable of detonation as manufactured or when unpackaged or in authorized shipping containers under conditions of fire exposure, when stored, manufactured, or used in accordance with NFPA 495
- (10) Combustible metals, as defined in NFPA 484
- (11) LP-Gas complying with NFPA 58 or NFPA 59
- (12) Where approved, materials that have been satisfactorily demonstrated not to present a potential danger to public health, safety, or welfare, based upon the quantity or condition of storage
- (13) The off-site transportation of hazardous materials when in accordance with Department of Transportation (DOT) regulations
- (14) Cellulose nitrate film complying with NFPA 40

**1.2\* Purpose.** The purpose of this code shall be to provide fundamental safeguards for the storage, use, and handling of hazardous materials as listed in 1.1.1.

**1.3 Application.** Administrative, operational, and maintenance provisions of this code shall apply to the following:

- (1) Conditions and operations arising after the adoption of the code
- (2) Existing conditions and operations

**1.3.1 Conflicts.**

**1.3.1.1** Where requirements between this code and a referenced NFPA document differ, the requirements of this code shall apply.