

NFPA® 400

Hazardous Materials Code

2022 Edition



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An International Codes and Standards Organization

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NFPA® 400

Hazardous Materials Code

2022 Edition

This edition of NFPA 400, *Hazardous Materials Code*, was prepared by the Technical Committee on Hazardous Chemicals. It was issued by the Standards Council on March 18, 2021, with an effective date of April 8, 2021, and supersedes all previous editions.

This edition of NFPA 400 was approved as an American National Standard on April 8, 2021.

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For the first edition of NFPA 400, four separate documents — NFPA 430, NFPA 432, NFPA 434, and NFPA 490 — were withdrawn in 2010 and included in their entirety in NFPA 400.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 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 were revised for consistent use throughout the code. A major revision was made to the MAQ tables in Chapter 5 that deleted 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 were consolidated, and annex material was 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 was also added to the code to extract common path of travel distance limits from NFPA 5000[®], *Building Construction and Safety Code*[®].

Further revisions were made to the requirements for ammonium nitrate in Chapter 11. Text was added to clarify which sections applied retroactively, and language was 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 were 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 were added to cover non-transportation-regulated storage.

Class II organic peroxides were divided into Class IIA and Class IIB based on small-scale burn rate data and alignment with international classifications. Definitions were added, MAQ tables were updated to include these two classes, and some of the assignments of organic peroxide formulation classifications in Annex F were changed accordingly. Changes were 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 was added to show an example of a storage layout in a typical sprinklered warehouse storing Class 1 oxidizers.

For the 2022 edition, Chapter 14, Organic Peroxide Formulations, was heavily revised to reflect current industry practices, definitions for the organic peroxide classifications were updated, and definitions for dosing vessel and protected storage room were added to supplement the revisions. Calcium ammonium nitrate complying with specific manufacturing specifications has been exempted from complying with the ammonium nitrate chapter, and a definition for calcium ammonium nitrate was added to aid in application of this exemption. The MAQ values for Class 3 oxidizers in mercantile, storage, and industrial occupancies were increased, and terminology for ignitable (flammable or combustible) liquids was updated throughout the code to align with NFPA 30.

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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.

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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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. 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 and extracted 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) Ignitable (flammable or 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.

1.3.1.2 Where a conflict between a general requirement of this code and a specific requirement of this code exists, the specific requirement shall apply.

1.3.2 Multiple Occupancies. Where two or more classes of occupancy occur in the same building or structure and are so intermingled that separate safeguards are impracticable, means of egress facilities, construction, protection, and other safeguards shall comply with the most restrictive fire safety requirements of the occupancies involved.

1.3.3 Vehicles and Marine Vessels. Vehicles, marine vessels, or other similar conveyances, where in fixed locations and occupied as buildings, as described by Section 11.6 of NFPA 101 shall be treated as buildings and comply with this code.

1.3.4 Buildings.

1.3.4.1 Buildings permitted for construction after the adoption of this code shall comply with the provisions stated herein for new buildings.

1.3.4.2 Repairs, renovations, alterations, reconstruction, change of occupancy, and additions to buildings shall conform with NFPA 101 and the building code.

1.3.4.3 Newly introduced equipment, materials, and operations regulated by this code shall comply with the requirements for new construction or processes.

1.3.5 Severability. If any provision of this code or the application thereof to any person or circumstance is held invalid, the remainder of the code and the application of such provision to other persons or circumstances shall not be affected thereby.

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

1.4.1 Unless otherwise specified, the provisions of this code 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 code. Where specified, the provisions of this code shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction (AHJ) determines that the existing condition presents an unacceptable degree of risk, the AHJ shall be permitted to apply retroactively any portions of this code deemed appropriate.

1.4.3 The retroactive requirements of this code shall be permitted to be modified if their application would be impractical in the judgment of the AHJ, and only where it is evident that a reasonable degree of safety is provided.

1.5 Equivalency. Nothing in this code 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 code.

1.5.1 Technical documentation shall be submitted to the AHJ to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the AHJ.

1.5.3 Alternatives. The specific requirements of this code shall be permitted to be altered by the AHJ to permit alternative methods that will secure equivalent fire safety, but in no case shall the alternative afford less fire safety than, in the judgment of the AHJ, that which would be provided by compliance with the provisions contained in this code.

1.5.4 Modifications. The AHJ shall be authorized to modify any of the provisions of this code upon application in writing by the owner, a lessee, or a duly authorized representative where there are practical difficulties in carrying out the provisions of the code, provided that the intent of the code is met, public safety is secured, and substantial justice is done.

1.5.5 Buildings with equivalency, alternatives, or modifications approved by the AHJ shall be considered as conforming with this code.

1.5.6 Each application for an alternative fire protection feature shall be filed with the AHJ and shall be accompanied by such evidence, letters, statements, results of tests, or other supporting information as required to justify the request.

1.5.7 The AHJ shall keep a record of the actions on the applications specified in 1.5.6, and a signed copy of the AHJ's decision shall be provided for the applicant.

1.5.8 Approval. The AHJ shall approve alternative construction systems, materials, or methods of design when it is substantiated that the proposed alternative provides an equivalent level of protection of this code.

1.5.9 Tests.

1.5.9.1 Where there is insufficient evidence of compliance with the requirements of this code, or where there is evidence that any material or method of construction does not conform to the requirements of this code, or where there is insufficient evidence to substantiate claims for alternative construction systems, materials, or methods of construction, the AHJ shall be permitted to require tests for proof of compliance at the expense of the owner or the owner's agent.

1.5.9.2 Test methods shall be as specified by this code for the material in question.

1.5.9.3 If no appropriate test methods are specified in this code, the AHJ shall be authorized to accept an applicable test procedure from another recognized source.

1.5.9.4 Copies of the results of all tests specified in 1.5.9.2 and 1.5.9.3 shall be retained in accordance with local AHJ guidance.

1.6 Units and Formulas.

1.6.1 The units of measure in this code are presented first in U.S. customary units (inch-pound units), followed by International System (SI) of Units in parentheses.

1.6.2 Either system of units shall be acceptable for satisfying the requirements in the code.

1.6.3 Users of this code shall apply one system of units consistently and shall not alternate between units.

1.6.4 The values presented for measurements in this code are expressed with a degree of precision appropriate for practical application and enforcement. It is not intended that the application or enforcement of these values be more precise than the precision expressed.

1.6.5 Where extracted text contains values expressed in only one system of units, the values in the extracted text have been retained without conversion to preserve the values established by the responsible technical committee in the source document.

1.7 Enforcement. This code shall be administered and enforced by the AHJ designated by the governing authority. See Annex K for sample wording for enabling legislation.

1.8* Permits. Permits and the permit process shall comply with the requirements of NFPA 1.

1.8.1 Plans and Specifications.

1.8.1.1 The AHJ shall have the authority to require plans and specifications to ensure compliance with applicable codes and standards.

1.8.1.2 Information that is identified by the owner as confidential shall not be made part of the public record.

1.8.2 Stop Work or Evacuation.

1.8.2.1 The AHJ shall have the authority to order an operation or use stopped and the immediate evacuation of any occupied building or area when such building or area has hazardous conditions that present imminent danger.

1.8.2.2 Whenever any work is being done contrary to provisions of this code, the AHJ is hereby authorized to order such work stopped.

1.8.2.3 The work specified in 1.8.2.2 shall immediately stop until authorized by the AHJ to proceed.

1.9 Facility Closure.

1.9.1 Where required by the AHJ, no facility storing hazardous materials listed in 1.1.1 shall close or abandon an entire storage facility without notifying the AHJ at least 30 days prior to the scheduled closing.

1.9.2 The AHJ shall be permitted to reduce the 30-day period specified in 1.9.1 when there are special circumstances requiring such reduction.

1.9.3 Facilities Out of Service.

1.9.3.1 Facilities Temporarily Out of Service. Facilities that are temporarily out of service shall continue to maintain a permit and be monitored and inspected.

1.9.3.2 Facilities Permanently Out of Service. Facilities for which a permit is not kept current or that are not monitored and inspected on a regular basis shall be deemed to be permanently out of service and shall be closed in accordance with 1.9.4.1 through 1.9.4.2.

1.9.4 Closure Plan.

1.9.4.1 Where required by the AHJ, the permit holder or applicant shall submit a closure plan to the fire department to terminate storage, dispensing, handling, or use of hazardous materials at least 30 days prior to facility closure.

1.9.4.2 The plan shall demonstrate that hazardous materials that were stored, dispensed, handled, or used in the facility have been transported, disposed of, or reused in a manner that eliminates the need for further maintenance and any threat to public health and safety.

1.10 Emergency Planning.

1.10.1 Emergency Action Plan. An emergency action plan, consistent with the available equipment and personnel, shall be established to respond to fire and other emergencies in accordance with requirements set forth in NFPA 1.

1.10.2 Activation. The facility responsible for an unauthorized release shall activate the emergency action element of the Hazardous Materials Management Plan.

1.11 Hazardous Materials Management Plan (HMMP).

1.11.1* When required by the AHJ, new or existing facilities that store, use, or handle hazardous materials covered by this code in amounts above the MAQ specified in 5.2.1.2 through 5.2.1.5 and 5.4.1.2 shall submit a hazardous materials management plan (HMMP) to the AHJ.

1.11.2 The HMMP shall be reviewed and updated as follows:

- (1) Annually
- (2) When the facility is modified
- (3) When hazardous materials representing a new hazard category not previously addressed are stored, used, or handled in the facility

1.11.3 The HMMP shall comply with the requirements of Chapter 6.

1.12* Hazardous Materials Inventory Statement (HMIS).

1.12.1 When required by the AHJ, a hazardous materials inventory statement (HMIS) shall be completed and submitted to the AHJ.

1.12.2 The HMIS shall comply with the requirements in NFPA 1.

1.13 Plan Review.

1.13.1 Where required by the AHJ for new construction, modification, or rehabilitation, construction documents and shop drawings shall be submitted, reviewed, and approved prior to the start of such work as provided in Section 1.13.

1.13.2 The applicant shall be responsible for ensuring that the following conditions are met:

- (1) The construction documents include all of the fire protection requirements.
- (2) The shop drawings are correct and in compliance with the applicable codes and standards.
- (3) The contractor maintains an approved set of construction documents on-site.

1.13.3 It shall be the responsibility of the AHJ to promulgate rules that cover the following:

- (1) Criteria to meet the requirements of Section 1.13
- (2) Review of documents and construction documents within established time frames for the purpose of acceptance or providing reasons for nonacceptance

1.13.4 Review and approval by the AHJ shall not relieve the applicant of the responsibility of compliance with this code.

1.13.5 When required by the AHJ, revised construction documents or shop drawings shall be prepared and submitted for review and approval to illustrate corrections or modifications necessitated by field conditions or other revisions to approved plans.

1.14 Technical Assistance.

1.14.1 The AHJ shall be permitted, upon prior written notification to the applicant, building owner, or owner's agent, to require a review by an independent third party with expertise in the matter to be reviewed at the submitter's expense.