

NFPA 5000[®]

Building Construction and Safety Code[®]

2021



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NFPA 5000®

Building Construction and Safety Code

2021 Edition

This edition of *NFPA 5000®*, *Building Construction and Safety Code®*, was prepared by the Technical Committees on Building Code and released by the Correlating Committee on Building Code. It was issued by the Standards Council on June 12, 2020, with an effective date of July 2, 2020, and supersedes all previous editions.

This edition of *NFPA 5000* was approved as an American National Standard on July 2, 2020.

Origin and Development of *NFPA 5000*

The inaugural 2003 edition of *NFPA 5000®*, *Building Construction and Safety Code®*, was issued in 2002 and was (and still is) the first model building code developed using the full open consensus-based procedures accredited by the American National Standards Institute. The first edition marked the culmination of NFPA's more than 100 years of experience in developing voluntary consensus-based codes and standards related to the built environment. From the *Life Safety Code®* to the *Fire Code* to the *National Electrical Code®*, sprinkler installation, fuel gas, and myriad other occupancy-specific and installation standards, NFPA codes and standards, as well as the codes and standards of other consensus-based standards development organizations, have addressed almost every aspect of the built environment. The significant gap in the code regime for the built environment, however, had been the lack of a model building code developed using the ANSI procedures.

NFPA 5000 endeavors to be responsive to the needs of the enforcement, user, and design communities and to be consistent with the other principles of code development to which NFPA adheres. In addition, the *Code* is updated in response to, and, in some cases, in anticipation of, emerging technologies or as society looks to code developers to address new hazards. Changes to the 2015 edition are consistent with the established goals and objectives that work to deliver a safe, usable, and functional building at the end of the design process.

In addition to fire, a design hazard that always has been, and always will be, a major component of any building code, *NFPA 5000* provides requirements for other design provisions, including natural hazards, accessibility, and building interior environmental issues. Consistent with NFPA's performance-based code initiative, *NFPA 5000* establishes a clear set of goals and objectives for specifying the expected outcome for occupant safety, building use, and building performance based on the *Code* requirements. The goals and objectives also extend to the expected outcome for a building, its contents, and its mission, when applicable. The goals and objectives are critical in allowing those affected by codes to exercise the performance-based design approach. In addition, they can be used as a tool for evaluating equivalency provisions on project-specific jobs or designs.

Much of the criteria in *NFPA 5000* is derived from, and is coordinated with, numerous sources, including the American Society of Civil Engineers (ASCE), the Federal Emergency Management Agency (FEMA), and the U.S. Access Board, among others. The all-hazard design provisions for *NFPA 5000* are rounded out with the use of criteria that include elements for a range of hazard and design scenarios, design loads, and natural hazard mitigation.

Changes to the 2012 edition of *NFPA 5000* included the typical updating required for other referenced codes and standards, including those from other standard-developing organizations. Changes to defined terms in Chapter 3 were made to allow conformance with NFPA's Glossary of Terms project, whereby NFPA documents utilize consistent terminology when appropriate. Criteria dealing with elevators for occupant evacuation was relocated from Annex E to the main body of the Code in Chapter 11. Work on this concept has continued with the ASME A17/CSA B44 *Safety Code for Elevators and Escalators* Task Groups on Use of Elevators by Firefighters and Occupant Egress. These elevator provisions have matured enough to introduce this concept as a set of mainstream requirements. Related changes derived from the same ASME initiative resulted in further modifications to the Chapter 54 requirements for fire service access elevators. The 2012 Code also

recognized use of thermal pins in fire-rated doors; offered further rules and revisions applicable to locking arrangements for some egress doors; added a fundamental set of rules for installation of carbon monoxide alarms; and applied a global revision to recognize newly updated provisions of the 2010 edition of ASCE/SEI 7, *Minimum Design Loads for Buildings and Other Structures*.

The 2015 edition marked the first time that the various committees involved with *NFPA 5000* utilized the tools, enhancements, and procedures (*Regulations Governing the Development of NFPA Standards*) associated with the new code development process. The technical committees and the correlating committee benefitted from the availability of a complete draft to see the changes in context and to respond more readily to areas needing future revision or changes.

The 2015 edition incorporated many changes that have application across the board or only to certain occupancies and conditions. Numerous changes worked to align *NFPA 5000* with the accessibility definitions and scoping provisions that are contained in the Department of Justice ABA/ADA criteria (2010 edition). Related accessibility changes provided scoping for one- and two-family dwellings, as well as deferring to the technical provisions of ICC/ANSI 2009, *Standard on Accessible and Usable Buildings and Facilities*. Several provisions relating to building construction techniques and materials were updated, including the detailed requirements for plenum space construction in Chapter 7, which were removed as those provisions are now contained in NFPA 90A; recognition of new wood structural composites [cross laminated timber (CLT)], which was added to Chapter 7 as an option for heavy timber construction of walls, floors, and roof decks; new requirements were added for steel used in pile foundations; a series of changes were made to Chapter 44 to coordinate updates to ASCE/SEI 7, ASCE/SEI 19, and ACI 318; and the requirements for fire-retardant-treated wood (FRTW) were reformatted and repositioned from Chapter 3 to Chapter 45. These provisions were largely extracted from NFPA 703, *Standard for Fire-Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials*.

A series of changes that have a broad impact on the various occupancy rules of the *Code* were accepted. These included the allowance to use an atrium wall to serve as part of the separation for creating separated occupancies where permitted by an occupancy chapter, a change that is permitted for use by almost all occupancy chapters; the addition of explicit rules for security access turnstiles; the revision of occupant load factors for business use and ambulatory health care use, based on a review of how these spaces are actually utilized; the increase of options for the protection of vertical openings involving escalators; the addition of provisions for expanded use and placement of alcohol-based hand-rub (ABHR) dispensers in various occupancies; the addition of provisions to address smoke alarm and smoke detector installation in the vicinity of cooking equipment; the mandated installation of carbon monoxide detectors and alarms found in the educational and day care chapters; and the expansion of the Life Safety Evaluation provisions (including further changes that were accepted with a TIA that was issued concurrently with the *Code*) to address facility management duties.

The day care and residential board and care occupancies provisions were revised to permit additional floor levels to be considered part of the level of exit discharge, and the board and care occupancy provisions were revised to permit door locking for the clinical needs of the residents. The health care occupancy provisions were further revised, as was begun in 2012, to permit the health care setting to be made more homelike; nursing home minimum corridor width was reduced within small smoke compartments under certain conditions; provisions were added to permit exit doors to be disguised with murals for certain settings like memory care units; additional termination point options were added for the travel distance measurement in suites; options were added for increasing the size of non-sleeping suites; and the allowable size for smoke compartments in hospitals was increased. The ambulatory health care chapters were reformatted into stand-alone chapters so as not to require the use of the business occupancy chapters.

Finally, numerous revisions were made in Chapter 34 to start to ensure that *NFPA 5000* is aligned with and extracts the appropriate information from NFPA 400, *Hazardous Materials Code*. An interrelated change (made by way of a TIA) impacting Chapter 34 (and other portions of the Code) involved removal of all information that relates to consumer fireworks and NFPA 1124, *Code for the Manufacture, Transportation, and Storage of Fireworks and Pyrotechnic Articles*.

The 2018 edition expanded on certain types of hazards and emerging subjects that must be addressed in this current era. These topics included integration of new provisions dealing with building and occupant security as well as provisions dealing with normal building use that address minimizing trips and falls in a building.

Initiatives at NFPA included a need to address the overlap between building security and traditional fire code, life safety code, and building code provisions. The addition of a goal in Chapter 4 of the 2018 edition required an assurance that any imposed security features would not interfere with the other compliance requirements. A series of related prescriptive changes included new terms used for certain types of door locking arrangements that rely on an electrical power component to release under different circumstances. A further allowance was added to several of the occupancy chapters that expanded on the type of door locking configurations that are permitted. In each of these cases, the code specifies certain criteria, such as the door doesn't have to be open to engage the lock, the allowable height of the release mechanism for the lock, and the ability to unlock the door from the opposite side are among the limitations imposed. A related security issue dealt with the need to conduct a risk assessment to determine whether a mass notification system (MNS) is necessary for certain occupancies. If it is determined that a system is needed, the risk assessment will also be used to determine the type of MNS.

The addition of requirements for grab bars in showers and bath tubs was included for certain occupancies with the base provisions being contained in Chapter 22. This was an example of where building code provisions must address normal use of the building or structure. A measurable number of injuries are potentially prevented by adding this type of requirement.

Other significant changes included the following: A reference was added to require compliance with NFPA 4, *Standard for Integrated Fire Protection and Life Safety System Testing*, to address the ever complex arrangements between different types of fire protection systems; the maximum size of the smoke compartment in a hospital and ambulatory health care occupancy was increased from 22,500 ft² to 40,000 ft²; additional provisions were added for attic protection in the chapters dealing with apartments and hotels that use NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*; mandates for carbon monoxide detection in assembly occupancies and residential board and care occupancies were added; and, finally, a series of newly introduced terms and definitions were included for mall buildings. The requirements dealing with flame propagation on exterior non-load-bearing walls in buildings were expanded to address composite designs that included water-resistant barriers; a new section was added to the chapter on roof assemblies that addressed both the fire and structural design parameters that must be included for roof-mounted PV panels.

Two new annex sections were added to address structural hardening of the exterior wall of a building exit, and a provision recommending basic design criteria for storm shelters was included. Text extracted from NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls*, was updated in Chapter 8, as were extracts from NFPA 30, *Flammable and Combustible Liquids Code*, and NFPA 400, *Hazardous Materials Code*, in Chapter 34.

The 2021 edition includes updates based on new trends and safety concerns, including security, new building materials, and exterior wall testing.

A new Chapter 56 on security systems and features outlines security requirements for the built environment. It contains references to NFPA 730, NFPA 731, and NFPA 914. The chapters on educational occupancies and day care occupancies require the use of new Chapter 56.

The revisions based on ASCE 7-16 for wind loads and design loads have been reaffirmed as well as the section on vegetative roof systems.

Many updates have been made to the building height/area restrictions and testing requirements for specific materials. New options, height increases, and area increases have been added for mass timber construction. Revisions to testing requirements and height limitations have been made to the sections on light-transmitting plastic wall panels and metal composite materials (MCM). Updates also have been made to the requirements for fire-retardant-treated wood.

Other updates include revisions to align with updates in referenced concrete standards and seismic standards; a new reference to NFPA 855 in Chapter 55 for energy storage systems; new provisions for mass notification risk assessments; Chapter 18 requirements that all day care occupancies be sprinklered; and new requirements for low-frequency alarm signals in sleeping rooms of hotels, dormitories, and apartment buildings per *NFPA 72*[®].

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Committee Scope: This committee shall have primary responsibility for documents or portions of documents on the design and construction of every building or structure, including structural design methods and techniques, as well as the design of integrated building systems for health, safety, comfort, and convenience.

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Committee Scope: This Committee shall have primary responsibility for documents on protection of human life and property from fire and other circumstances capable of producing similar consequences, and on the emergency movement of people in residential board and care facilities.

Technical Committee on Building Construction (BLD-BLC)

Richard L. Day, *Chair*

Michigan State Fire Marshal's Office, MI [E]

Nasser Ahmed Al Zeyara, Qatar Civil Defense, Qatar [E]

Farid Alfawakhiri, American Iron and Steel Institute, IL [M]

David G. Bueche, Hoover Treated Wood Products, CO [M]

Mark Chrisman, Henderson Engineers, KS [SE]

David S. Collins, The Preview Group, Inc., OH [SE]
Rep. American Institute of Architects

Richard J. Davis, FM Global, MA [I]

Alan J. Dopart, Willis of New Jersey, NJ [I]

David W. Frable, US General Services Administration, IL [U]

Michael A. Gardner, M Gardner Services, LLC, MD [L]

Rep. Wall and Ceiling Alliance

James W. Gaut, Marriott Vacations Worldwide, FL [U]

Kurtis Grant, US Department of Health & Human Services, GA [E]

William J. Hall, Portland Cement Association, VA [M]

Robert E. Hanson, Savannah River Nuclear Solutions, GA [U]

Khaled Heiza, Monofia University, Egypt [SE]

Jeffrey M. Hugo, National Fire Sprinkler Association, Inc., MI [M]

Aaron Johnson, Rural/Metro Corporation, FL [E]

James Tyler Johnson, Justice Institute of British Columbia, Canada [U]

Edward R. LaPine, JENSEN HUGHES, NY [SE]

Kenneth Lowery, Verisk Analytics/Insurance Services Office, Inc., GA [I]

Dennis A. Richardson, American Wood Council, CA [M]

Brad Schiffer, Brad Schiffer/Taxis, Inc., FL [SE]

Michael Schmeida, Gypsum Association, OH [M]

Stephen Schneider, Marx|Okubo Associates, CA [SE]

Joseph H. Versteeg, Versteeg Associates, CT [E]

Rep. International Fire Marshals Association

Peter J. Willse, AXA XL/Global Asset Protection Services, LLC, CT [I]

Luke C. Woods, UL LLC, MA [RT]

Felix I. Zemel, Town of Dover, MA [SE]

Alternates

James M. Dalton, Chicago Fire Department, IL [L]
(Voting Alt.)

Timothy Earl, GBH International, MI [M]
(Alt. to Michael Schmeida)

Joseph T. Holland, Hoover Treated Wood Products, FL [M]
(Alt. to David G. Bueche)

Jonathan Humble, American Iron and Steel Institute, CT [M]
(Alt. to Farid Alfawakhiri)

William Jeffrey Ivans, Verisk/Insurance Services Office, NJ [I]
(Alt. to Kenneth Lowery)

Valerie Zivavras, NFPA Staff Liaison

William E. Koffel, Koffel Associates, Inc., MD [U]
(Voting Alt.)

Raymond C. O'Brocki, American Wood Council, MD [M]
(Alt. to Dennis A. Richardson)

Joseph Radford Sellers, U.S. Department of Energy, TN [U]
(Alt. to Robert E. Hanson)

Richard N. Walke, UL LLC, IL [RT]
(Alt. to Luke C. Woods)

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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 the selection and design of types of building construction, exterior walls, building height and area, firewalls, and fire barrier walls, as they relate to the protection of life and property from fire. For the processing of NFPA 5000, Chapter 7, and Sections 8.3 and 8.4, this committee reports directly to the NFPA 5000 Correlating Committee; whereas, for the processing of NFPA 220 and NFPA 221, this committee does not report to the NFPA 5000 Correlating Committee.