



# TechNotes

Editor - Roland Asp, CET

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## Best of Model Codes

The majority of NFSA's Expert of the Day (EOD) program focuses on NFPA 13, NFPA 13R, NFPA 20, NFPA 25 and other fire protection standards. It also handles dozens of questions annually on model codes, such as those published by the International Code Council (ICC) and the National Fire Protection Association (NFPA) listed below. Contractors and designers new to model codes and their relevance to sprinkler work may benefit from the more detailed summary of this topic found in the [May/June 2021 issue of NFSM, titled Codes for Layout Techs, by Jeffrey M. Hugo.](#)

- International Building Code (IBC)
- International Fire Code (IFC)
- International Existing Building Code (IEBC)
- International Residential Code (IRC)
- NFPA 1, Fire Code
- NFPA 101, Life Safety Code
- NFPA 5000, Building Construction and Safety Code

## EOD Questions on Codes

NFSA concentrates on water-based fire protection and as such, questions from NFSA members for the NFSA subject matter experts (SME) on model or adopted codes are fire sprinkler related. Often the questions are interrelated with the referenced standard, such as the 2018 NFPA 1, *Fire Code* references the 2016 edition of NFPA 13. Questions may come from the local code officials or authorities having jurisdiction (AHJ) regarding a contractor's interpretation of a code. Questions also come from contractors when an AHJ cites a violation of a code or standard. Regardless of the author of the question, the top topics that land on the EOD process for model codes are:

- Aircraft hangars
- Occupancy, use, group, hazard, and classification
- Existing buildings

- High rise
- IBC sprinkler thresholds
- Parking garages
- Stairwells
- Standpipes (see [August 23, 2022 #494 edition](#))
- Water supplies

## Aircraft Hangars

Questions about aircraft hangars are typically regarding the fire sprinkler and foam system differences between the IBC and NFPA 409. Beginning with the 1991 *Southern Building Code* and continuing to the current edition of the IBC, Section 412.3.6 refers to NFPA 409 for the fire protection system. However, the IBC exempts the NFPA 409 foam requirement for Group II hangars when the fixed based operator (FBO) has separate facilities on site. Group II hangars in NFPA 409 are protected with a combination of fire sprinklers and foam systems. The current exception in the IBC allows the foam system to be removed without an alternative protection path from NFPA 409 to do so. Based upon this exemption, IBC users miss Section 7.2.5 from the 2016 edition of NFPA 409 to permit a fire sprinkler system density of 0.17 gpm over 5,000 sf; however, this density is applied with a foam system. The IBC has no guidance on what the design density should be and NFPA 409 still requires foam for Class II hangars regardless of the presence of a FBO repair facility.

NFSA action to change this item was proposed to the IBC General committee for the 2024 IBC. The change included language to apply a minimum sprinkler density to compensate for the lack of foam protection. The IBC committee did not approve the change but instead recommended NFPA 409 provide protection criteria.

## Occupancy, Use, Group, Hazard, and Commodity Classification

Model codes classify buildings by their occupancy, use, and group, whereas NFPA 13 classifies the space as a hazard and the storage as a commodity. The change of occupancy, use, and group in model codes can be a complicated subject. New and existing building rules are clarified and easier to determine in NFPA 1 and NFPA 101 with the new and existing occupancy chapters, but the majority of the US uses the IBC, which references the IEBC and IFC for applying new systems in existing buildings. For more on this subject see the article in the [March/April 2021 issue of NFSM titled \*Change of Use—What does it mean?\* By Jeffrey M. Hugo](#). EOD questions vary broadly on this topic, but when an EOD lands on a model code and these topics, it often is seeking to clarify the code requirements on the following:

- The application of construction documents and permit requirements for new and existing sprinkler systems in new and existing buildings.
- To classify specific buildings and their sprinkler requirements.
- The application of the codes in mixed use buildings with mixed standards.
- The correlation of IFC and NFPA 1 storage protection with NFPA 13.
- The change of occupancy, use, group within an existing building that triggers sprinklers.

NFSA makes it a priority to actively pursue these items in each model code cycle. Some of the dozens of changes the NFSA has championed in the model codes recently are:

- 2015 edition of the IBC, the NFSA lowered the sprinkler threshold on education buildings from 20,000 sf to 12,000 sf.
- 2018 edition of the IFC correlated the high-piled storage requirements in Chapter 32 to NFPA 13.
- 2021 edition of the IEBC lowered the threshold for retrofitting sprinklers in existing buildings.

## Existing Buildings

Model codes that deal with existing buildings are the IEBC, IFC, NFPA 1, and NFPA 101. EOD questions on this subject often deal with changes to an existing building or process, as described above. However, a significant number of questions deal with retrofitting existing buildings. In the 2006 NFPA 1 and NFPA 101, nightclubs were required to be retrofitted with fire sprinklers following the Station nightclub fire. It took until the 2018 IFC to require bars, restaurants, and nightclubs to be retrofitted with sprinklers. EOD questions often deal with the discrepancies and interpretation between the NFPA nightclub and IFC A-2 designations.

Retrofitting high-rise buildings, have long been required by NFPA 1 and NFPA 101, whereas it was not until the 2021 that the IFC caught up with similar requirements to retrofit all high-rises over 120 ft (75 ft in some cases) with fire sprinklers. EOD questions often relate from partial to full sprinkler systems, standpipes, and redundant water supply.

The NFSA action to change these items are consistently acted upon in each model code cycle. It was the NFSA, along with many allies, that finally got the ICC membership to recognize the importance of retrofitting existing assembly and high-rise buildings with sprinklers. The IEBC is a model construction code for existing buildings where the NFSA has made many changes that favor sprinkler installation. Here is an older article that helps break down the IEBC for the fire sprinkler industry user. See the [January/February 2012 issue of SQ \(Sprinkler Quarterly\) titled A Fire Sprinkler Guide to the 2012 International Existing Building Code \(IEBC\) by Jeffrey M. Hugo.](#)

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## High-Rise

The September 11, 2001, attacks on the World Trade Center (WTC) and Pentagon promulgated codes and standards changes over several editions. In the 2009 edition of the IBC, special provisions for redundant water supply and systems were added for [high-rises](#) over 420 ft in height. One of the primary reasons for the WTC failures was the interruption of the water supply to the building and systems. The 2009 IBC changes are not clear, so, several EODs issued informal interpretations for the application of the redundancy objective.

NFSA action based on several EODs written on the 2009 – 2021 IBC editions resulted in sweeping changes in the soon-to-be-published 2024 edition of the IBC. These changes extended into NFPA 13, NFPA 14, NFPA 20 and the IBC to help correlate language, terminology, and application to these super high-rise (over 420 ft) buildings.

## IBC Sprinkler Thresholds

Some buildings have mandatory fire sprinkler requirements, such as residential (multi-family), institutional (hospital, nursing), and high-hazard occupancies. The remaining occupancies, such as assembly, business, factory, mercantile, and storage have fire sprinkler thresholds based on the square footage of the fire area or building. This means several classes of buildings can still be built without sprinklers. Often AHJs or contractors question, through EOD, if another designer, such as an architect, has correctly applied the code to get out of a fire sprinkler system. Navigating the codes can be a tricky endeavor, even for experienced design professionals, so, the EOD program can become the place for several parties to converge to discuss the issue.

NFSA action on fire sprinkler thresholds has resulted in mandatory sprinkler requirements, such as the 2003 IBC multifamily residential and 2009 IRC for single-, two-family, and townhouse requirements in the IRC. The NFSA also reduced educational occupancies from 20,000 sf to 12,000 sf in the 2015 IBC, and was able to get new educational occupancies fully sprinklered in the 2018 NFPA 101. The 2021 IBC and 2024 NFPA 1, NFPA 101, and NFPA 5000 also required sprinklers in most new open parking garages.

## Parking Garages

Mixed use buildings often contain parking underneath, underground, or adjacent to another occupancy. The separation can be podium or pedestal construction, fire walls, or fire barriers. Questions from NFSA members generally surround the separation of the parking garage to the adjacent occupancies, system type and standpipe applications.

NFSA action has made several changes for contractors and designers for parking garages. In the 2021 IBC, the NFSA and allies removed the exemption for open parking garages, and established a threshold requiring sprinklers when the open parking fire area exceeds 48,000 sf. The 2024 NFPA 1, NFPA 101, and NFPA 5000 will also require sprinklers in most [new open parking garages](#). It is worth noting here that the standards side of the NFSA, through the Engineering and Standards (E&S) Committee also made significant changes to the 2022 edition of NFPA 13, such as increasing the parking garage hazard classification from Ordinary Group I to Ordinary Group II.

## Stairwells

Stairwells are a popular topic in the EOD program. Stairwells are also known as exit enclosures and when they do not exit directly outside, the horizontal connection (that appears to be a corridor) to the outdoors is called an exit passageway. Many EOD questions on exit enclosures and exit passageways surround the issue of penetrating the enclosure/passageway wall/ceilings. The IBC permits the combined or standalone standpipe and fire sprinkler riser in the enclosure/passageway to serve the floor(s); however, the IBC prohibits the cross main or branchlines re-entering the enclosure/passageway as a shortcut to gain access to the other side.

Another frequent issue in EOD is the combined or standalone standpipe and sprinkler riser placement on landings. The codes, including the codes that cover the Americans with Disabilities Act (ADA), limit how far the vertical pipe and attached hose connection can encroach in the circulation path. These EODs answer that the minimum stair width, typically 44 inches, arcs around landings and where the vertical pipe (standpipe/riser) is outside this minimum width arc, then generally the placement is compliant.

Here is an older article that helps describe these not-so-well known clearances for the fire sprinkler industry. [See the July/August 2010 issue of SQ \(Sprinkler Quarterly\) titled Clearances for Sprinkler Installation\) by Jeffrey M. Hugo.](#)



## Water Supplies

EOD questions from members regarding water supplies are typically about fire flow, and fire sprinkler adjustments. Both the IFC and NFPA 1 provide reductions in fire flow where the building(s) served are fully sprinklered. Some questions also relate to the wider community and the ongoing risk reduction practices, such as in places with a wildland urban interface code (WUI). Water supply questions also relate to the IBC/IFC water supply flow testing, secondary water supplies for buildings in seismic design areas (C,D,E,F), and redundant water supplies for super high-rise buildings.

NFSA action in model codes has seen an increase in proposals to protect or dedicate water supplies for WUI areas, [water supply for buildings under construction](#), modify and increase the use of fire flow and fire hydrant sprinkler tradeoffs. NFSA made great changes in the super high-rise water supply and redundancy requirements coming up in the 2024 edition of the IBC.

## Want a Collection of the Best of EOD?

See NFSA's very popular [EOD Handbooks](#) that feature the best questions and answers from 2004 to 2020. Lastly, the NFSA has several SMEs who work to the benefit of the fire sprinkler industry on over 250 codes and standards technical committees. They serve as the SMEs for the EOD program and process over 1,500 EODs annually. Lastly, how can we serve you?

- Have a question for the EOD? Go [here](#).
- Have an idea for a code change? Go [here](#).

## Immediate Resources and a Free CEU!

Join us for a TechTuesday on [October 18, 2022, on the Best of EOD – Model Codes](#) where some of these topics will be discussed in deeper detail from 12:30-1:30 pm (EST). This event is free to all members and qualifies as 1 CEU by most accrediting agencies.

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