

The Big Jump!

New Jersey's Transition to 2018 IBC: Fire Alarm Applications



Siemens Smart Infrastructure

Course Synopsis: New construction codes went into effect for New Jersey September 3, 2019 with 6 month-month grace period to incorporate them. The State follows an amended version of the 2018 International Code Council (ICC) Codes. For fire alarm systems, the newer versions affects the design, installation, inspection and enforcement procedures. This 1-hr presentation will assist participants in implementing the transition from New Jersey's current amended 2015 IBC to the amended 2018 version, as related to fire alarm design. The intent of the course is to identify important changes between the editions and their associated NFPA 72 standards. The interactive training also focuses on the critical life safety applications and minimum compliance essentials. Finally key differences between the versions and their impact on projects will be discussed.

Presentation Material: The material will be presented in a PowerPoint format and available digitally afterwards to each participant.

Continuing Education Credits: This course is not manufacturer specific and is approved for self-reporting CEU's. In order to receive CEU & PDH credit, each participant must sign a check-in roster at the event and must attend the entire hour. Certificates are awarded after the confirmation of complete attendance and meeting the learning objectives.

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Objectives

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Upon completion, participants will be better able to:

- Identify the key differences for fire alarm systems between the 2015 NJ-IBC and the 2018 NJ-IBC
- Understand specific building code changes pertaining to new fire alarm systems in different type buildings/occupancies.
- Clarify the intent behind the code changes and the effect on system designs.
- Identify any changes in organization and format.



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The International Building Code® (IBC®), establishes minimum regulations for building safety. This seminar will assist participants in implementing the transition from the 2009 edition of the *International Building Code* (IBC) to the 2015 IBC, relevant to fire alarm and life safety design. Between the 2009 and 2018 editions of the International Codes, there are hundreds of changes; some of which are non-technical, reformatting, and reference updates, while others are more significant, including multiple fire service access elevators and more detailed requirements for combustible exterior wall systems. This interactive training will focus on the key changes and their impact on fire alarm design. Participants will be presented with those changes that will most impact their use of the newer code edition and their associated NFPA standards.

This familiarize users with the new fire alarm code. This guide is meant as a supplement to, and not a replacement of the official ICC codes and NFPA 72 standards. The information provided may have inaccuracies and cannot encompass all of the changes between the two editions of the building code. This presentation will not cover all the revisions, editorial changes, details, requirements or exceptions. Siemens highly recommends purchasing a copy of the ICC and associated NFPA Standards/ handbooks for all the changes, and requirements. Always consult with the AHJ and follow industry practices!

EXTRA BONUS just for you

SLIDE DECK

COMMENTARY

CODE REFERENCES

Comments during the presentation are exclusively the presenter opinions and do not reflect an official position of the International Code Council (ICC) or National Fire Protection Association (NFPA)

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For your convince, I have all of today’s material available for future reference. This includes both the slidedeck along with supporting research notes which contain more detailed code references.

The slidedeck also identifies when a code is newly introduced or modified from the previous version.

The comments and opinions made during the presentation of this session are solely those of the presenter and do not reflect an official position of the International Code Council, National Fire Protection Association, its employees, or any of its technical committees.

OUR KEY SERVICES

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Imagine unlocking the value of your building portfolio. What if you could ensure long-term efficiency, sustainability and reliability? With Siemens, imagination turns into reality.

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Are building codes important???

Yes.

The main purpose of building codes is to protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures.

The First Fire Codes were established After the Great Fire of Rome

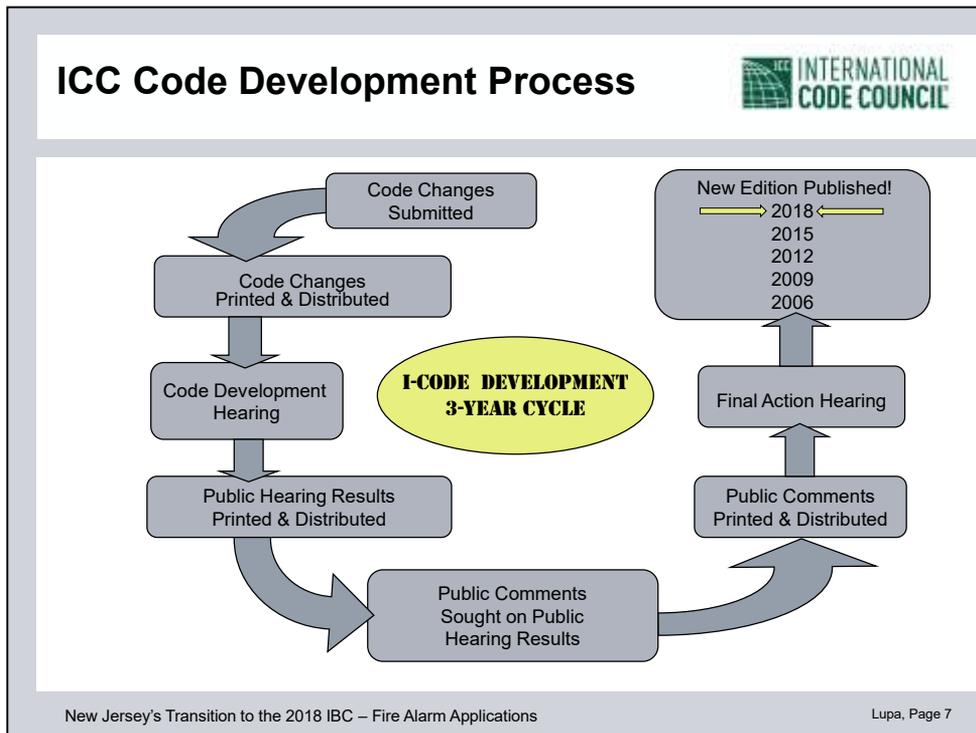
Codes often change due to technology or events.

- *Rome burned in 64 A.D.*
- *Fire quickly spread due to narrow streets, tall buildings, combustible building materials, and common walls between structures.*
- *Emperor Nero created a new urban code:*
 - *Wider streets, height restrictions; requirements for fire resistant materials (stone vs. wood) and restrictions on shared walls.*



On the night of July 18 in the year 64 CE, a fire began within the city of Rome at the Circus Maximus, the hippodrome for the city that was not far from the Roman Colosseum today. It would rage for over a week. With the help of an architect named Severus and an engineer named Celer, Nero set out to rebuild the city and to construct his own palace, the Domus Aurea ('Golden House'). To avoid another deflagration, Emperor Nero developed a master plan for what he felt would be an idealized Roman city.

His plan included mandates based on sound construction principals regarding fire resistance and sanitation being applied to all structures.



The International Code Council (ICC) promulgates a new International Building Code every 3 years through the ICC Code Development Process to allow for new construction methods and technologies to be incorporated. Alternative materials, designs and methods not specifically addressed in the code can be approved by the code official where the proposed materials, designs or methods comply with the intent of the provisions of the code (see Section 104.11). In general, the IBC is focused on means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire, explosion, and other hazards.

Read more at the ANSI Blog: 2018 International Building Code (ICC IBC-2018) <https://blog.ansi.org/?p=8429>

Three typical processes for adoption:

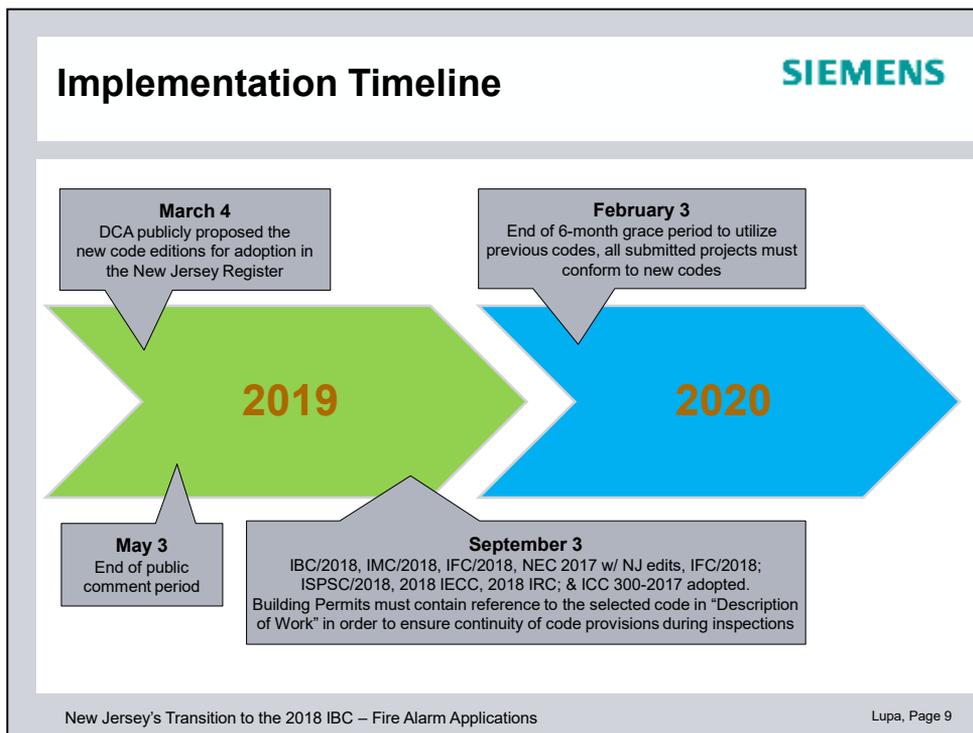
- Legislative adoption
- Direct regulatory adoption (no building code council)
- Periodic review and adoption by a state or county building code council.

States with regulatory adoption or building code councils typically update their code every 3 years. Some states wait several years before they adopt an updated version.



Example of the voting assembly.

The ICC code development process is open and inclusive allowing input from all individuals and groups who might submit related code change proposals.



In the March 4th New Jersey Register, DCA publicly proposed the new code editions listed below for adoption, with amendments. The proposal was subject to a 60-day comment period, which ended on May 3rd. The opportunity to comment on the proposal was open to all, and formal adoption is expected this summer. Following a six-month grace period (early 2020), the codes will replace 2015/2014 editions currently in force. These codes will make up the new Uniform Construction Codes (UCC) for the State.

- 2018 International Building Code (IBC) - Building Subcode
- 2018 International Mechanical Code (IMC) – Mechanical Subcode
- 2018 International Fuel Gas Code (IFGC) – Fuel Gas Subcode
- 2018 International Energy Conservation Code (IECC) – Energy Conservation Subcode
- 2018 International Residential Code (IRC) – One and Two-Family Dwelling Subcode
- 2018 National Standard Plumbing Code (NSPC) – Plumbing Subcode
- 2017 National Electrical Code - NFPA 70 (NEC) – Electrical Subcode

New Jersey codes are enforced statewide.



Under the State Uniform Construction Code (UCC) Act, the Commissioner of the Department of Community Affairs is charged with adopting model codes as part of the Uniform Construction Code (UCC). In order to implement the most recent published technical standards, the Department proposes the 2018 editions of the IBC, IRC, IMC, IFGC, IECC, and NSPC, and the 2017 edition of the National Electrical Code (NEC) to update the above referenced subcodes of the UCC with amendments. These proposed amendments reflect the changes to the IBC/2018, IRC/2018, IMC/2018, IFGC/2018, IECC/2018, NSPC/2018, and NEC/2017 that modify the codes to align with New Jersey conditions and law.

For additional information visit

www.nj.gov/dca/divisions/codes/codreg/pdf_rule_proposals/2018_code_prop.pdf

New Code, New Standards

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The building code describes 'when' and 'where';
the standards describe 'how' systems are installed.

JURISDICTION	CODE	STANDARD
New Jersey 	NJ-IBC 2018 	NFPA 72 – 2016 

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The International Building Code (IBC) contains requirements for fire alarm systems based on how the building will be used, called the occupancy type. Section 907 of the 2018 IBC includes fire alarm system requirements for the occupancy groups listed within the IBC. The NFPA 72: National Fire Alarm and Signaling Code defines the requirements for implementing fire alarm systems.

The simple way to understand the differences between these documents is that IBC determines what fire alarm components are required and NFPA determines how they are to be implemented. Additional requirements exist in codes adopted by municipalities, states, and federal agencies. For example, the Unified Facilities Criteria (UFC), Section 4-021-01, may be required on government projects for the U.S. Air Force, Army, Marine Corps, Coast Guard, or Navy.

Highlights from the 2015 code cycle

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- All code definitions moved to a single location in Chapter 2
- Condition 1 and Condition 2 definitions for supervised care
- New voice requirements for 'open malls' [402.7.4]
- Smoke duct detectors may only report a supervisory signal [907.3.1]
- Addressable fire alarm systems required [907.6.3]
- Smoke coverage required for critical fire alarm equipment [907.4.1].
- New carbon dioxide (CO₂) detection requirements [IFC 5307.5]
- New carbon monoxide (CO) Detection requirements [915]
- Smoke detectors permitted in R-occupancies' when programed as smoke alarms [907.2.11.7]
- Smoke detector requirements for Group R-2 higher-ed [907.2.9.3]
- Several voice notification construction trade-offs
- A supervised voice evacuation fire alarm system must be installed in all Educational Group E occupancies [907.2.3]
- The elevator hoistway venting provisions of Section 3004 deleted

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USE CLASSIFICATIONS (IBC SECTION 302)

<u>Classification</u>	<u>Groups</u>	<u>Examples</u>
Assembly	A-1 thru, A-5	Restaurant, gymnasium, church
Business shop	B	Offices, dentist office, beauty shop
Educational	E	Charter school, day care
Factory	F-1, F-2	Bakery, wood shop
High Hazard	H-1 thru H-5	Fire works factory
Institutional	I-1 thru I-4	Jail, hospital
Mercantile	M	Drug store, boutique, sales room
Residential house	R-1 thru R-4	Single family home, apartment
Storage	S-1, S-2	Stock room, warehouse
Utility	U	Barn, fence, shed

First mention of mass notification in IBC

Section IBC 917

New college and university buildings with an occupant load greater than 1,000 requires a mass notification risk analysis in accordance with NFPA 72.



This new provision stipulates that New Jersey colleges and universities (high-ed) with 1,000 or more students must perform risk analyses in accordance with the National Fire Protection Association's National Fire Alarm and Signaling code to determine whether mass notification software is necessary. Should the data suggest installation, these higher education institutions are required to move forward with this work. This new regulation is in response to active shooting incidents on college campuses. Section 903.3.1.2.3

Per 917.1, prior to construction of a new building requiring a fire alarm system on a multiple-building college or university campus having a cumulative building occupant load of 1,000 or more, a mass notification risk analysis shall be conducted in accordance with NFPA 72. Where the risk analysis determines a need for mass notification, an approved mass notification system shall be provided in accordance with the findings of the risk analysis.

Carbon Monoxide Detection

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IBC 2018 Modification

- The carbon monoxide (CO) alarm provisions have been relocated, reformatted and revised; the scope has been modified to exclude Group I-3 occupancies while adding Group E occupancies.
- Now applicable to Groups I-1, I-2, I-4, R, and classrooms of Group E.
- Specific requirements and exceptions for:
 - Fuel-burning, forced-air furnaces
 - Fuel-burning appliances and fuel-burning fireplaces
 - Private garages



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Carbon monoxide (CO) is primarily a concern in buildings with fuel-burning appliance. It is a colorless, odorless and tasteless gas that in sufficient concentrations, can threaten life. Due to recent deaths attributed to CO, the codes now have requirements to install CO detectors or alarms in both commercial and residential occupancies that have attached garages or when fossil-fuel burning appliances are in use in an enclosed area. If a building has natural gas or oil fired appliances such as a furnace, boiler, water heater, stove, clothes dryer, etc, then CO detection will be required. CO detection is now required for Group I-1, I-2, I-4, Group R and Group E occupancies when fuel-burning appliances (HVAC, hot water, gas dryer, etc.) and fireplaces are installed. [Section 915].

915.1 General. Carbon monoxide detection shall be installed in

new buildings in accordance with Sections

915.1.1 through 915.6

existing buildings in accordance with Section 1103.9.

New Chapter 2 - CO Definitions

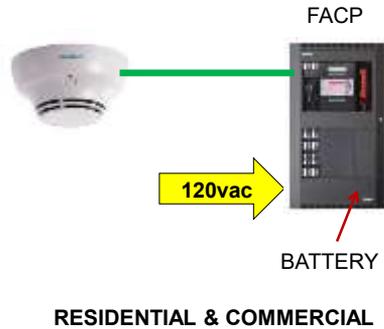
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New for IBC 2018

Carbon Monoxide Alarms



Carbon Monoxide Detectors



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Although they look alike, a smoke alarm is a stand-alone device with a built-in audible sounder, a control component such as a power supply (typically battery or electric with battery backup), and a sensor. A smoke alarm is not connected to a fire alarm control panel, but it may sound several smoke alarms within the building if it is interconnected with other smoke alarms. On the other hand, a smoke detector typically has only a built-in sensor and is part of a system. This means that to function, the detector also requires an external sounding audible device (such as a horn/strobe appliance or local sounder base) and a control component such as a power source, typically found at the fire alarm panel.

CARBON MONOXIDE ALARM. A single- or multiple-station alarm intended to detect carbon monoxide gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

CARBON MONOXIDE DETECTOR. A device with an integral sensor to detect carbon monoxide gas and transmit an alarm signal to a connected alarm control unit.

Carbon Monoxide Detection

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New for IBC 2018

The 2018 edition removes the detection method option and requires system detectors when applying the exception.

915.1.1 Where required. Carbon monoxide detection shall be provided in Group I-1, I-2, I-4 and R occupancies and in classrooms in Group E occupancies

915.1.3 Forced-air Fuel burning forced-air furnaces. Carbon monoxide detection shall be provided in *dwelling units, sleeping units* and classrooms served by a fuel-burning, forced-air furnace.

Exception: Carbon monoxide detection shall not be required in *dwelling units, sleeping units* and classrooms where a carbon monoxide detector is provided in the first room or area served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location.

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Because carbon monoxide (CO) alarm systems are a bit different from the other types of emergency alarm systems covered within Section 908, the provisions have been relocated to a new Section 915. Many new requirements were also added to the IRC. §915 requires CO detection in dwelling units and sleeping units of new Group I-1, I-2, I-4 and R and in Group E classrooms that contain a fuel-burning appliance or a fuel-burning fireplace. You are also required to have CO detection in the above locations that are served by a fuel-burning, forced-air furnace. If a fuel-burning appliance or fireplace is in the building but not in the dwelling unit, sleeping unit or classroom, some exceptions will apply. CO detection would not be required in the above locations if no communicating openings between the fuel-burning equipment and the above locations are installed, if CO detection is installed between the fuel-burning equipment and those locations, or if CO detection is installed on the ceiling of the room containing the fuel-burning equipment. In addition, if those occupancies have an attached enclosed garage, CO detection must be installed in any openings between the garage and the living space.

In a review of the revised scoping provisions, it can be seen that the Group I-3 occupancies are no longer included. However, Group E occupancies are now regulated, as well as the continued application to all Group R and Group I-1, I-2 and I-4 occupancies.

The reformatting of the provisions helps clarify the requirements by describing specific locations where CO alarms are, and are not, required in regard to fuel-burning appliances.

Highrises must use multi-channel

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New for IBC 2018

Section 907.2.12.3

High-rises with an occupied floor over 120 feet MUST use multi-channel notifications for emergency voice communications systems (EVACS), in lieu of single channel system.



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A new high-rise requirement for emergency voice/alarm communications systems (EVACS) was added to require the system to be a multiple-channel system for buildings with an occupied floor more than 120 feet above the lowest level of fire department vehicle access to allow a message to be broadcast to those floors closest to the fire area and a second message broadcast to other areas as needed.

A fire alarm system that has multiple channels allows one area of the building to receive an evacuation message, while other areas of the building can be given other instructions. This may be done to warn them to prepare to accept relocation of occupants from other areas or to allay any anxieties caused by seeing fire apparatus and personnel or other occupants leaving. Section 907.2.13.3 adds language to require multi-channel notifications fire alarm systems of high-rise buildings, in lieu of single channel systems.

Stadium Voice Systems

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NEW
CLARIFICATION

IBC 2015
IBC 2018



907.5.2.2.4 requires voice evac systems messages in stadiums to be captioned and displayed. IBC 2018 added a 15k fixed-seat threshold.

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In stadiums, arenas, and grandstands, the emergency voice/alarm communication system shall include the ability to display captions where audible public announcements are also required to include captions by Paragraph 1108.2.7.3 (Paragraph 907.5.2.2.4).

IBC 2018: A modification was made to the language for the stadium, arenas and grandstand captioning requirement, adding a 15,000 fixed-seat threshold that will require prerecorded or real-time captioning by the EVACS.

Low Frequency Sounders

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IBC 2015 section 907.2 required a fire alarm system to be installed in new buildings in accordance with NFPA 72.

NEW	IBC 2015
CLARIFICATION	IBC 2018

NFPA 72 2013 required T3 low frequency sounders which produce a 520 Hz, square-wave in all sleeping areas for smoke detectors and fire alarm systems. These include all rooms or sleeping, such as hotel rooms, college dorms, apartments, or assisted living.



IBC 2018 clarifies low frequency notification is required in both sleeping and living areas in residential units.



NFPA 72 2016 removed Implementation date.

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NFPA 72 2013 Edition's low frequency signal requirement was created to address people in sleeping areas. The new requirement has two portions to the code. Mandated by NFPA 72 Chapters 18 and 24 to provide notification in sleeping areas that are not staffed and Chapter 29 for individuals with hearing disabilities, the low frequency tone has been added to the standard. The intent of the new requirement is to improve people's waking effectiveness. Smoke alarms and fire alarm systems provide value when occupants are awake, but their greatest benefit may be when occupants are asleep. This observation is illustrated in a 2010 U.S. Fire Administration study, which reports that 50% of fire fatalities in residential buildings occur between the hours of 10 PM and 6 AM – the time when most people are sleeping. According to a 2008 Dorothy Bruck study, most unimpaired adults wake up quickly to the so-called standard audible fire alarm signal, even at levels well below 75 dBA. The majority of fire alarm horns produce a signal with a frequency range between 2 KHz and 4 KHz. Also, integral sounders in nearly all smoke alarms produce a 3 KHz audible alarm signal.

2018 Definition of Unit/Sleeping Unit. The significance of the change in defining sleeping unit, is the use of the term unit versus room. In previous editions of the IBC, a sleeping unit was defined by the room in which the occupant had the provisions for living, eating and either sanitation or cooking. By defining the space as a unit, the code will now classify the entire unit where these features are present opening up suites found in dormitories, hotels and assisted living as sleeping units.

Audio Levels for sleeping areas

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NEW	IBC 2015
NO CHANGE	IBC 2018

Previous versions of the IBC listed special requirements for sleeping audio levels; which were mirrored in NFPA 72 in greater detail. Conversely IBC did not list any special requirement for visible appliances in sleeping areas, but NFPA 72 stipulated both placement and intensity levels.

The IBC 2015 & 2018 editions now provide only general min/ max audio alarm level requirements in section 907.5.2.1.1. All performance design criteria for special-use areas such as sleeping rooms are now only contained in NFPA 72 18.4.5.

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IBC made some changes to the 2015 audio levels but the same design thresholds are still in place. Previous versions of the IBC listed special requirements for sleeping audio levels; which were mirrored in NFPA 72 in greater detail. Conversely IBC did not list any special requirement for visible appliances in sleeping areas, but NFPA 72 stipulated both placement and intensity levels. The IBC 2015 & 2018 editions now provide only general min/ max audio alarm level requirements. The performance design criteria for certain areas such as sleeping rooms are now only contained in NFPA 72, which is referenced by IBC. So sleeping areas must meet the general IBC audio requirements and the additional criteria for audio and visual alarms in NFPA 72 18.4.5.

In my experience, horns are required in each bedroom to meet the min. code sound levels. Likewise for voice evacuation, speakers are required in each bedroom to meet the levels along with intelligibility. There are software programs to predict sound levels and calculation methods can be found in the SFPE Handbook, 5th edition, Chapter 40, but because of different manufacture's sound outputs and interior finishes/ construction materials this level of design is not recommended.

Fire Alarm Shop Drawings

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Section 907.1.2

New for IBC 2018

- **2015** – Provides a list of requirements for fire alarm construction documents . Different shop drawing requirements listed in NFPA 72.
- **2018** – Aligns requirements for fire alarm plans and documentation requirements with NFPA 72 requirements.

Section 907.1.2 & NFPA 72 7.2.1.10

Fire alarm shop drawings must show the calculated audibility level for voice notification systems.

NFPA 72 – 2016 Chapter 10, Section 5
new qualifications for system designers, programming personnel, plans examiners and inspectors

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The new codes also require additional information on shop-drawing submittals. Section 907.1.2 states that fire alarm system shop drawings must be submitted for review and approval prior to installation.

Item No. 4 is particularly important because it requires the designer to calculate the necessary sound levels in each space to ensure audibility. NFPA 72 2013, requires a sound level of 15 decibels (dBA) above the ambient noise level or 5 dBA above the maximum ambient sound levels having a duration of 60 seconds or more. Some jurisdiction require the vendor's shop drawings to show the calculated sound levels, other will just accept a physical field test with a sound meter

The IBC 2018 include the elimination of the list of minimum required documents that was in 907.1.2, Fire Alarm Shop Drawings, in 2015. Instead, this paragraph now points to NFPA 72. Specifically, the intent is to point to the shop drawing requirements in Chapter 7 of NFPA 72, so there will be just one list instead of two. This should help reduce conflicts going forward. The NFPA 72 list in 7.2.1 includes the same requirements that were in the IBC and IFC. Some wording changes were proposed and accepted for the 2019 NFPA 72 to better match what was in the I-Codes.

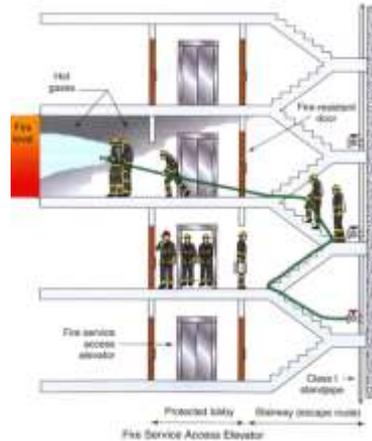
Fire Service Access Elevators (FSAE)

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Two areas modified in 2018 edition:

1. The number of floors served by the FSAE reduced to those floors above and including the lowest level of the building that provides fire department vehicle access.
2. Elevators that only serve an open or enclosed parking garage with access limited to the building lobby are no longer required to be constructed as a FSAE.

IBC 2018 Modification



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Fire Service Access Elevators or F.S.A.E. for short, are designed with strict and rigorous standards to allow firemen and first responders to utilize the elevator for the purpose of quickly accessing floors as well as evacuating occupants in the event of an emergency. The requirement to provide fire service access elevators can be found in the IBC section 403.6.1. IBC 3007.1

The change consists of two parts, with the first reducing the number of floors served by the Fire Service Access Elevators (FSAE) to those floors above and including the lowest level of the building that provides fire department vehicle access. The second part of the change, is elevators that only serve an open or enclosed parking garage with access limited to the building lobby are no longer required to be constructed as a FSAE.



Occupant Evacuation Elevators (OEE's)

- Clarifies only OEE's are required to comply with Section 3008; previously required all passenger elevators in the building had to comply.
- New calculation methods for determining the proper number of OEE's.
- OEE standby power clarifications exempts OEE for elevators that serve open and enclosed parking garages.



Occupant evacuation elevators. Where installed in accordance with IBC 3008, passenger elevators for general public use shall be permitted to be used for occupant self-evacuation per IBC 403.6.2.

This change significantly affects the required number, use and design of occupant evacuation elevators in three ways. First, it clarifies that only the elevators to be used for occupant evacuation need to comply with this section of the code, where as the code previously required all passenger elevators in the building had to comply. Second, it adds two option for determining the proper number of occupant evacuation elevators to be installed (1-hour total building evacuation or 5 consecutive floors in 15 minutes). Lastly, the code clarifies that only those elevators classified and used as occupant evacuation elevators shall be provided with stand by power.

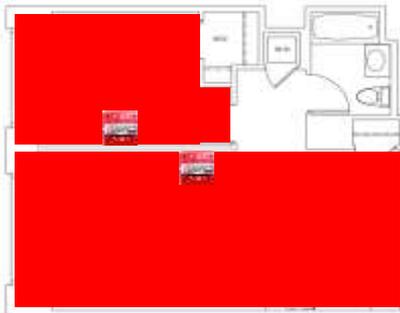
Section 3008.6.1 exempts elevators that serve open and enclosed parking garages from be designed to the requirements for occupant evacuation elevators.

Visible Notification Appliances

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New for IBC 2018

Habitable spaces in Group I-1 and R-1 occupancies must have visual appliances in accordance with Table 907.5.2.3.2 activated by both the in-room smoke alarm and the building fire alarm system.



Designed to be used for living, sleeping, cooking, or eating purposes, excluding bathrooms, laundries, pantries, foyers or communicating corridors, closets, and storage.

The 2013 IBC did not provide specific locations for visible signals.

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907.5.2.3.2 Groups I-1 and R-1. Habitable spaces in dwelling units and sleeping units in Group I-1 and R-1 dwelling units or sleeping units occupancies in accordance with Table 907.5.2.3.2 shall be provided with a visible alarm notification appliance,. Visible alarms shall be activated by both the in-room smoke alarm and the building fire alarm system.

NEW for 2018, Definition of Unit/Sleeping Unit

The significance of the change in defining sleeping unit, is the use of the term unit versus room. In previous editions of the IBC, a sleeping unit was defined by the room in which the occupant had the provisions for living, eating and either sanitation or cooking. By defining the space as a unit, the code will now classify the entire unit where these features are present opening up suites found in dormitories, hotels and assisted living as sleeping units.

Visible Notification Appliances

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Section 907.5.2.3.4

CLARIFICATION

IBC 2018

Group R-2 occupancies must have future capability for visual appliances utilizing one of the following methods:

- The interconnection of the building fire alarm system with the unit smoke alarms.
- The replacement of audible appliances with combination audible/visible appliances.
- The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.”



Model 5LH-N
Horn



Model 5LH-N-F
Horn - Visible

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The last few editions have had a number of changes for the ability to add strobe lights in R-2 occupancies (apartments/ condos). Originally, the IBC referenced ICC A117.1, and the common interpretation was that wiring and a back box was required in all apartments and bedrooms of all apartments in case a strobe light was required to be added for a self-identifying hard-of-hearing or deaf person. It was felt that this was excessive and costly, since very few apartments would ever actually have the need to add the strobe light. There has been discussion about how the language could be changed to still allow installation of a strobe light without having to prewire every apartment and bedroom.

In 2018, Group R-2 occupancies required by Section 907 to have a fire alarm system, all floors each story that contain contains dwelling

units and sleeping units shall be provided with the future capability to support visible alarm notification appliances in accordance with Chapter 10 11 of ICC

A117.1. Such capability shall be permitted to utilize wired or wireless equipment. The future capability shall be permitted to include any of the following:

1. The potential for future interconnection of the building fire alarm system with the unit smoke alarms
2. Replacement of audible appliances with combination audible/visible appliances
3. Future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances

Integrated Fire Alarm Testing

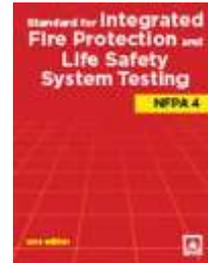
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New for IBC 2018

Section 901.6.1 requires compliance with NFPA 4 for high-rise buildings.

This new test criteria is to ensure that where multiple fire protection systems or life safety systems are integrated, the acceptance process and subsequent testing must evaluate all of the integrated systems as a whole.

The major items outlined in NFPA 4 include identifying the people on an integrated system testing team who are responsible for writing the test plan, developing test scenarios and test frequencies, and documenting this information in a final test report to submit to the owner.



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The most common misconception about integrated system testing is that it is already being done. Typically fire alarm, sprinklers, etc are functionally tested individually. NFPA 4 is a new standard for testing integrated fire protection and life safety systems. The 2018 IFC/IBC references the 2015 NFPA 4 for integrated testing on high-rise buildings and when a fire alarm system is integrated with a smoke control system. For all other buildings, when two or more fire protection or life safety systems are integrated, the IFC/IBC only requires verification that the integrated systems signal, when initiated. It is important to highlight that these systems (other than high-rise and those connected to smoke control) are not required to comply or follow the procedures in NFPA 4.

SECTION 202: INTEGRATED TESTING (FIRE PROTECTION AND LIFE SAFETY SYSTEM). A testing procedure to establish the operational status, interaction and coordination of two or more fire protection and safety systems.

901.6.2.1 For high-rise buildings, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.

Additional IBC 2018 Changes...

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New for IBC 2018

- New manual pull requirements for Group A occupant loads greater than 100 located above or below the level of exit discharge [907.2.1].
- Installation of manual fire alarm system and automatic smoke detection system no longer required in Group R-4 occupancies per 907.2.10. Smoke alarms continue to be required.
- For Group R-4's with Condition 2 occupancy, there is an exception to provide heat detectors in place of fire sprinklers, for certain types of construction [903.31.2.3].
- Live/work units may be required to have a monitored fire alarm system as if it is a R-2 occupancy.
- Airport Control Towers have new smoke detection requirements [907.2.22].

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A new threshold was added to Group A occupancies that adds a requirement for a manual fire alarm system when the occupant load is greater than 100 above or below the lowest level of exit discharge instead of just 300 or more total occupancy load.

For assembly occupancies, the code requires the building dimmer panel to activate 100% and the music to stop so that occupants can hear instructions and follow any evacuation orders.

The entire section on Group R-4 was eliminated. The proponent's reason was that the requirements for a manual fire alarm system and an automatic smoke detection system in a facility with 16 or fewer residents is unwarranted. Such a system would not be required in an apartment building until there were at least 16 apartments—which potentially have many more people.

A new threshold was added to Group A occupancies that adds a requirement for a manual fire alarm system when the occupant load is greater than 100 above or below the lowest level of exit discharge instead of just 300 or more total occupancy load.

For assembly occupancies, the code requires the building dimmer panel to activate 100% and the music to stop so that occupants can hear instructions and follow any evacuation orders.

A new section requiring an automatic smoke detection system was added for areas containing capacitor energy storage systems, per Section 1206.3 of the IFC.

New NFPA 72 chapter

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Administrative Chapters 1 - 9	Support Chapters 10 - 19	System Chapters 20 - 29	Usability Annexes A - G
<ol style="list-style-type: none">1. Administration2. Referenced Publications3. Definitions4. Reserved5. Reserved6. Reserved7. Documentation8. Reserved9. Reserved	<ol style="list-style-type: none">10. Fundamentals11. Reserved12. Circuits and Pathways13. Reserved14. Inspection, Testing, and Maintenance15. Reserved16. Reserved17. Initiating Devices18. Notification Appliances19. Reserved	<ol style="list-style-type: none">20. Reserved21. Emergency Control Functions and Interfaces22. Reserved23. Protected Premises Fire Alarm Systems24. Emergency Communications Systems25. Reserved26. Supervising Station Alarm Systems27. Public Emergency Alarm Reporting28. Reserved29. Single-Multiple Station Alarms and Household Fire Alarm Systems	<ol style="list-style-type: none">A. Explanatory MaterialB. Engineering Guide for Automatic Fire Detector SpacingC. System Performance and Design GuideD. Speech IntelligibilityE. NEMA SB 30, Fire Service Annunciator and InterfaceF. Sample Ordinance Adopting NFPA 72G. Informational ReferencesH. Cross-Reference Table<ul style="list-style-type: none">▪ Index

 2016

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New Chapter 7 consolidates all documentation provisions into one location, helping Code users and AHJs improve efficiency and save time. Other major changes include a reorganized inspection table with specific inspection methods; a new testing table that merges two previous tables into one -- with both test methods and frequencies side by side for improved usability; revised supervising station transmission methods; and new requirements for audible and visible occupant notification.

Chapter 2 Referenced Publications

Updated all date references for:

- NFPA Publications
- ANSI Publications
- IMSA Publications
- ISO Publications



This edition added NFPA 1031, Standard for Professional Qualifications for Fire Inspector and Plan Examiner

Record Maintenance, Chapter 7

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NFPA 72 – 2013 edition

As-built plans and other related system manuals must be stored in a documentation cabinet.

NEW	NFPA 2013
CLARIFICATION	NFPA 2016



NFPA 72 – 2016 edition

- AHJ can limit the documentation requirements to just the new work being performed.
- Site-specific software must be provided along with the user access passcode.
- The building owner or representative must review annually.

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The 2013 edition contains a new chapter titled "Documentation." The intent was to provide a central location for all the documentation requirements of the code. From the perspective of the design professional, Section 7.3 addresses the design documentation requirements. In many cases, the section refers the user to documentation requirements found elsewhere in the standard, such as identifying the acoustically distinguishable spaces (ADS) in accordance with 18.4.10 and specifying the rooms and spaces that will have visible notification in accordance with 18.5.2.1. Design documents are also required to include ambient sound pressure levels and audible design sound pressure levels in accordance with 18.4.1.4.3.

2016 edition added 7.7.1.5 permitting the emergency communications system (ECS) and fire alarm system as-built plans and other related documentation to be maintained together. Also added 7.7.2.6 regarding review of electronic documentation media formats. Revised and added items to the minimum documentation required in 7.2.1. Revised 7.5.4 to list the documentation required for new emergency communications systems relocated from Chapter 24. Revised 7.5.7 to include the software documentation requirements relocated from Chapter 14 and added criteria for access credentials.

NFPA 72 Circuit Pathways

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NEW NFPA 2013

CLARIFICATION NFPA 2016

Fire alarm system circuit paths have seven classifications:

- Class A - IDC, NAC, or SLC
- Class B - IDC, NAC, or SLC
- Class C - WLAN, LAN, IP-based circuits
- Class D - fail-safe circuit and not supervised
- Class E - not supervised, i.e. 120VAC power
- Class X - similar Class A, Style 7 circuit
- Class N - Ethernet

Revised pathway separation for Class A & X

Added in 2016 edition

The NFPA 72 wire 'styles' are no longer applicable.

New Jersey's Transition to the 2018 IBC – Fire Alarm Applications

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NFPA 72 – 2016 EDITION

Added subsection 12.3.6 for a new pathway designation: Class N. It is to address issues with the use of Ethernet and other non-fire mass notification system (MNS) networks. A Class N pathway is to have the same physical installation requirements as Class A and Class X circuits regarding separation of primary and redundant circuit paths.

Revised the Class A and Class X pathway separation requirements in 12.3.8, including language explaining that 12.3.8.1(3) is not intended to permit emergency control function interface devices controlled by the fire alarm system to be installed on a circuit where the outgoing and return “legs” are installed in the same raceway within the 1000 ft² (93 m²) space

Survivability Requirements

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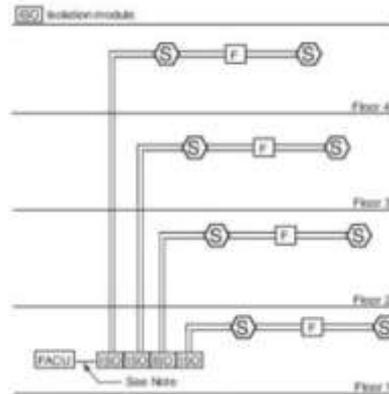


NEW	NFPA 2013
CLARIFICATION	NFPA 2016

NFPA 72 2013, Section 23.6.1 required a single fault on a SLC not cause the loss of more than 50 addressable devices.

Some relief has come in the 2016 edition which now reads: “SLC Zones. A single fault on a pathway connected to the addressable devices shall not cause the loss of the devices in more than one zone.

Each zone on the floor shall be considered a separate zone.



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Lupa, Page 32

NFPA 72 2013, Section 23.6.1 now requires that, when a single fault occurs on a pathway connected to addressable devices, the fault will not cause the loss of more than 50 addressable devices on that pathway. This requirement applies only to signaling line circuits that connect to addressable devices and not to signaling line circuits that interconnect fire alarm control units. ^[P]_[SEP]

Fire incidents have occurred where substantial losses resulted from the shorting and failure of a signaling line circuit damaged by fire prior to the initiation of an alarm. In addition, a short circuit on a signaling line circuit—caused inadvertently as part of building operations and activities—that remains uncorrected, can result in a catastrophic failure of the fire and life safety system. If a fire occurs after the short-circuit fault condition, an alarm would not be received. ^[P]_[SEP]

A single short on a pathway can disable the capability of the system to initiate an alarm and, as stated in the Annex A of the code, “the alarm notification appliances and critical life safety emergency control functions including atrium smoke control, stairwell pressurization, door unlocking, and HVAC shutdown can all be disabled as well. In some configurations, even off-premises alarm, trouble, and supervisory reporting functions can be disabled

False Fire Alarm Management

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NEW	NFPA 2013
CLARIFICATION	NFPA 2016

Historically monitoring companies automatically dispatched the fire department for any incoming alarm. Beginning in 2013, with AHJ approval, a new option allowed for a confirmation prior to dispatch. The 2016 edition clarified the dispatch procedures.

NFPA 72 26.2.2 has revised the eight requirements for the on-site personnel to avoid fire department dispatch.



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It has been proven that confirming and verifying an alarm signal by a monitoring central station will drastically reduce false dispatches. Beginning in 2013, there is a new option for how Supervising Stations route commercial fire alarms. Previous versions required the monitoring company to automatically dispatch the fire department for any incoming alarm. NFPA 72 [2013] 26.2.2 allows the local authority having jurisdiction to require “Alarm Signal verification” for specific properties. When enacted, the monitoring company has up to 90 seconds to contact the on-site authorized personnel to verify a false/unwanted alarm and stop the operator’s dispatch of the local fire department. The on-site authorized personnel reset the fire alarm panel. If on-site personnel can not be reached, or if confirmation is inconclusive, the fire department is dispatched immediately.

The 2013 edition requires the monitoring company personnel to “preverify” by calling the fire department when a signal was received and was being verified with the property manager. That was dropped in 2016 because it was confusing and redundant. The language has been modified to now require verification when all of eight different requirements are met (see 26.2.2), including being required by the fire department, the fire department provides notification in writing of this requirement, the verification doesn’t take longer than 90 seconds and is performed only by predetermined authorized personnel on-site. Verified unwanted alarms are communicated as directed by the fire department.

NFPA 72 – 2016 changes

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- Two-Way Radio Enhancement System requirements have been removed from NFPA 72 and relocated to NFPA 1221.
- T&I: Control valve inspections switch back to Semi-Annual Testing in sync with NFPA 25 [Table 14.4.3.2].
- Total (Complete) Coverage: Removed “inside of all closets, elevator shafts, enclosed stairways, dumbwaiter shafts and chutes.” [17.5.3.1]
- Eliminated duplicate language and legacy definitions in many areas of the Chapter 26 Supervising Station Alarm Systems.
- Added “or fire-resistive” as an alternative to circuit integrity (CI) cable and revised the performance alternatives for pathway survivability Level 2 and pathway survivability Level 3 in 12.4.3 and 12.4.4.

The 2013 edition contains a new chapter titled "Documentation." The intent was to provide a central location for all the documentation requirements of the code. From the perspective of the design professional, Section 7.3 addresses the design documentation requirements. In many cases, the section refers the user to documentation requirements found elsewhere in the standard, such as identifying the acoustically distinguishable spaces (ADS) in accordance with 18.4.10 and specifying the rooms and spaces that will have visible notification in accordance with 18.5.2.1. Design documents are also required to include ambient sound pressure levels and audible design sound pressure levels in accordance with 18.4.1.4.3.

NFPA 72 – 2016 changes

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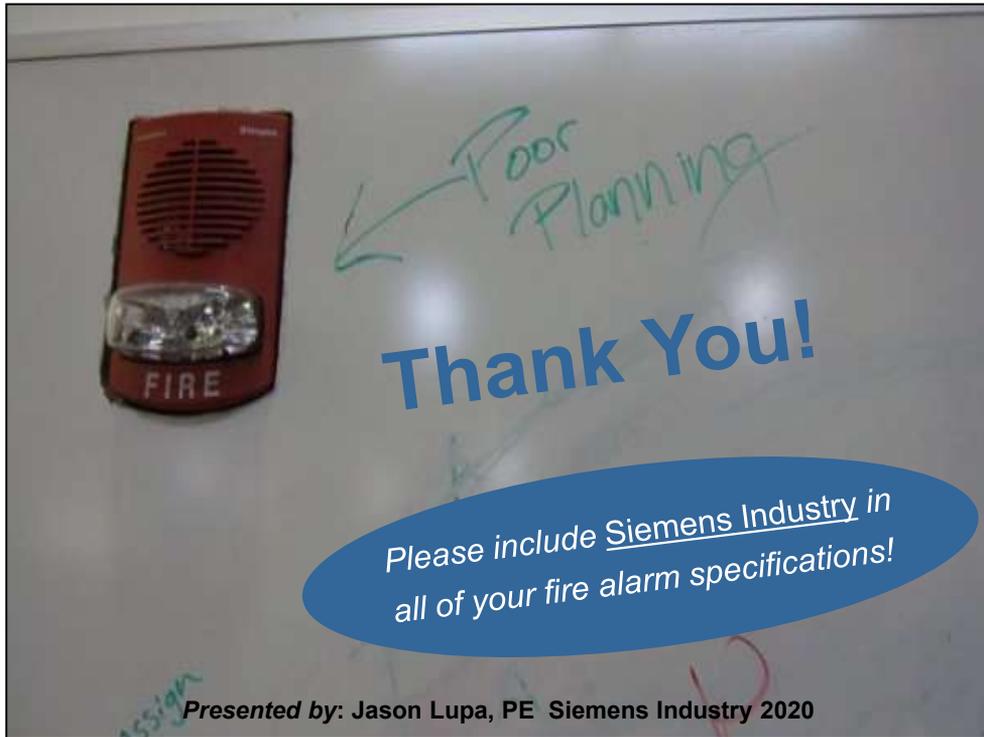
- Revised several of the requirements for placement of smoke detectors used for door release to provide additional flexibility in locating detectors; revised Figure 17.7.5.6.5.1(A) to delete the minimum 4 in. (100 mm) requirement for placement of detectors on sidewalls.
- Revised 10.6.5.4 to require an approved breaker locking device.
- Revised 10.6.10.2 and 10.6.10.3 to clarify requirements for batteries and for battery charging.
- Added 10.11.3 to clarify the intent for the operation of visible notification appliances for non-emergency paging.

The 2013 edition contains a new chapter titled "Documentation." The intent was to provide a central location for all the documentation requirements of the code. From the perspective of the design professional, Section 7.3 addresses the design documentation requirements. In many cases, the section refers the user to documentation requirements found elsewhere in the standard, such as identifying the acoustically distinguishable spaces (ADS) in accordance with 18.4.10 and specifying the rooms and spaces that will have visible notification in accordance with 18.5.2.1. Design documents are also required to include ambient sound pressure levels and audible design sound pressure levels in accordance with 18.4.1.4.3.



**No major
changes in NEC
fire alarm
Chapter 3 or
Article 760 since
the 2011 edition**

No changes



The views and opinions expressed in this seminar are those of the speaker(s) and do not necessarily reflect those held by Siemens.

Please contact me if you have any questions about any of the presented material.

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