



*Author(s): Jesse Roman, Angelo Verzoni. Published on May 7, 2020. Code Revision Roundup*

*An overview of important changes of some of the most commonly used NFPA codes and standards*

*BY JESSE ROMAN, ANGELO VERZONI, AND RANDY WATSON*

*Note: With the cancellation of this year's NFPA Conference & Expo due to the COVID-19 public health emergency, the annual NFPA Technical Meeting will be conducted remotely. For more information, visit [nfpa.org/conference](https://www.nfpa.org/conference).*

## [NFPA 1](#)

The committee responsible for NFPA 1, Fire Code, had a busy cycle as usual, dealing with a host of new and emerging fire threats as well as some familiar issues that won't seem to go away.

### **The vexing problem of valet trash**

[Valet trash](#) collection services allow apartment building dwellers to set containers of trash in the hallways outside their apartments rather than having to lug them all the way outdoors. The trash-hauling company then collects the containers from the hallway. The service is popular among older residents who may have difficulty carrying heavy bags down stairs or on potentially slippery walkways.

While it sounds like a good idea, there are concerns that the trash receptacles will block egress in hallways and could add a substantial fuel load in the event of a fire, overwhelming protection systems and fire-resistance-rated walls. There is also no good way to enforce how long the trash is left in the hallway. Though few committee members had even heard of valet trash before this revision cycle, the topic "was probably the most controversial thing we discussed, to be honest," according to Val Zivras, the [NFPA 1](#) staff liaison.

In its first draft meeting, the NFPA 1 technical committee put together a set of requirements allowing the practice, but it failed ballot and was nixed. In the meantime, the [NFPA 101®](#), [Life Safety Code®](#), committee on residential occupancies included requirements that allowed valet trash under certain conditions. Because NFPA 1 requires compliance with NFPA 101, the Fire Code would have allowed valet trash by default if it remained silent. Instead, the committee's proposed language specifically bans the practice.

NITMAMs, short for Notices of Intent to Make a Motion, have been filed opposing the proposed ban in NFPA 1, as well as against the proposed allowance in NFPA 101. "I honestly have no idea what's going to happen," Zivras said.

### **New chapter on 3D printing**

Debuting in the 2021 edition of NFPA 1 will be a new chapter titled "Additive Manufacturing (3D Printing)."

"This is a technology that has been around for a while, but what we're seeing now are these 3D printers getting put in occupancies that we never expected them in because people are getting more innovative with how they're using them," Zivras said. The hazards could include combustible dust, depending on the type of printer, the materials being used, and where the printer is located.

The new Chapter 46 separates 3D printing into two subcategories: industrial additive manufacturing and nonindustrial. The industrial section includes the 3D printers "that use some of the more hazardous materials, so there are additional restrictions to make sure everything is safe," Zivras said.

The section does not yet include guidance on 3D-printed construction, a topic that was featured in the [cover story](#) of the [March/April 2020 NFPA Journal](#), but "I wouldn't be surprised if it's part of the conversation next cycle," Zivras said.

### **New cannabis guidance**

A [growing industry](#) across North America is the production of cannabis, or marijuana. Chapter 38, "Marijuana Growing, Processing, or Extraction Facilities," debuted in the 2018 edition of the code, and for the 2021 cycle the committee changed the chapter name from marijuana to cannabis to reflect the

preferred nomenclature used across the industry. The committee also added new sections on CO2 enrichment rooms and indoor horticulture structures, and changed language to reflect listing advancements in processing equipment.

Cannabis growers typically pump additional CO2 into rooms to promote plant growth, but this could present a hazard to occupants if there is a leak. Too much CO2 can cause disorientation, asphyxiation, and death. Chapter 38 added language about gas monitoring, alarms, signage, and equipment to minimize the chances of a problem, and to ensure that leaks are caught quickly and occupants and responders are alerted.

The chapter also provides guidance for the first time on spaces that are erected within the same building to create different growing zones—essentially indoor greenhouses. These spaces can create problems with egress and sprinklers and add to the fuel load inside the building, depending on the materials used in their construction, which are typically fabric or plastic. “The big focus is on the materials of the structure itself. It has to be either noncombustible or it has to meet specific fire tests in order to be used,” Ziavras said.

All of the cannabis-related changes came from public inputs received by the committee, Ziavras added. “It’s really the public’s knowledge of this expanding technology that is driving the code,” she said.

#### **New warning required for nonsprinklered high-rises**

NFPA 1 requires existing high-rise buildings to be sprinklered within 12 years of the adoption of the code. “Unfortunately, what you see time and time again are jurisdictions changing that requirement and allowing high-rises to not be retrofitted with sprinklers,” Ziavras said. “We’ve been trying for years to encourage fire sprinkler retrofit with code provisions, but there’s been extreme pushback.”



The charred exterior of the unsprinklered Marco Polo Building after in Honolulu, Hawaii, after a fire broke out in July 2017. Four people were killed in the fire. Kent Nishimura/AFP via Getty Images

After several fires in nonsprinklered residential high-rises during the NFPA 1 revision process—including a [blaze in a Honolulu tower](#) that killed four residents in 2017—committee members felt compelled to take additional action. The committee has proposed that all high-rise buildings that aren't protected throughout by an approved automatic sprinkler system must display warning signs at all main building entrances. The signs would say “WARNING: This high-rise building is not protected throughout with an automatic fire sprinkler system,” with further requirements on the size of the lettering and the design of the sign.

“I think much of the public has this expectation that when they walk into a high-rise building, it's going to be sprinklered—most people outside of our industry don't spend a lot of time looking up at the ceiling to see if there actually are sprinklers,” Ziavras said. “This is one way that the committee can drive home the idea that sprinklers are important and that the public should be made aware if sprinklers are not there. It also alerts first responders that the building isn't sprinklered.”

### **Prohibition of consumer fireworks**

Although NFPA has long advocated against the public use of consumer fireworks, that sentiment isn't specifically expressed in any document. The NFPA 1 committee decided to change that this cycle with one short line of text in Chapter 65: “The use of consumer fireworks by the public shall be prohibited.”

“As most people know, NFPA's stance is that fireworks should only be used by trained professionals,” Ziavras said. “The committee decided it would put that into writing.”

The proposed revision is controversial and must be approved by the NFPA Standards Council before it is included in the final 2021 edition of NFPA 1.

—*Jesse Roman*

### **[NFPA 3000](#)**

In May 2018, NFPA published only the second provisional standard in its 120-plus year history: [NFPA 3000 \(PS\), Standard for an Active Shooter/Hostile Event Response \(ASHER\) Program](#). (The provisional tag indicates that approved alternative methods for standards development were utilized to get the information out faster.) It is the first standard to offer comprehensive guidance to responders and local governments on how to collaboratively prepare for and respond to the types of mass shooting attacks and other hostile actions that have plagued communities across the United States.

In July, after its first full revision cycle, an updated version of NFPA 3000 will be published, and the “provisional” distinction will be dropped. The updated document remains very close to the original, said John Montes, the NFPA 3000 staff liaison. “The committee reworded a lot of things to make it clearer, but they didn't change the intent or the requirements,” he said. “I think they found a good starting place for it and they didn't feel comfortable adding lots of new things or changing it too much just two years in.”

The updated document does include a new annex section, which is not mandatory, that offers guidance on how to create an after-action report. The updated standard also provides additional guidance on the difference between a “drill” and an “exercise,” with the former involving building occupants, such as students, and the latter being geared toward emergency responders and those involved with higher-level planning, such as hospital administrators. NFPA 3000 focuses on exercises, and the updated

version provides additional guidance on how to conduct them and who should participate.

The biggest changes to the terminology in the document are in Chapter 20, which deals with incident recovery. The first version of the standard called for the creation of a “reunification center” shortly after an incident, where family and friends could go for information on the status of loved ones. The problem with calling it a reunification center, though, is that “there are people in these incidents who are not going to be reunified with anyone—they’re going to be notified of a death,” Montes said. To avoid creating false expectations, the committee decided to change the name to “notification center,” which also aligns with subsequent changes that have occurred to federal guidance on the issue.

In the 24 hours after an incident, NFPA 3000 says that the notification center should transition into a “family assistance center”—a place where loved ones can sign up for various services to aid their recovery. In the updated version of NFPA 3000, the word “family” has been replaced with the incident name, allowing communities to name the center whatever is appropriate (e.g., the Sandy Hook Assistance Center, or the Route 91 Assistance Center). This change is small but important, Montes said. “We’ve learned from several incidents, including the Pulse Nightclub, that many people in the community consider themselves loved ones and family to the direct victims, but because they weren’t blood relatives, they didn’t think they could access resources, and that’s factually inaccurate,” Montes said. “In NFPA 3000, we define victims as people who are directly and indirectly affected by the incidents, so those people do have access to resources. That’s why the committee decided to remove the term ‘family.’”

The updated NFPA 3000 has received no NITMAMs and is expected to be published as a consent document this summer.

—Jesse Roman

## [NFPA 101](#)

For a document as large and comprehensive as [NFPA 101](#)•, [Life Safety Code](#)•, it’s not uncommon for the public to weigh in with hundreds of suggested revisions—but not all of those inputs make it in after both draft revisions. For the 2021 edition, however, many of the suggestions did. “We had somewhere in the order of 300 technical substantive changes from the 2018 edition of the code,” said NFPA 101 staff liaison Gregory Harrington.

### **Revised special amusement requirements**

While requirements for special amusements have been in the code for many cycles, they hadn’t received a thorough update in at least 30 years, Harrington said, even as amusement park rides have become more high-tech and new attractions like escape rooms have emerged. This cycle, those requirements received a significant revision. The bulk of the work was done by a task group comprising code officials and representatives from several well-known parks, including Walt Disney World and Resorts and Universal Studios.

While previous editions of the code lumped all special amusement attractions together, the proposed revisions divide them into three classifications based on how difficult it is for patrons to get off the rides and out of the attraction in the event of an emergency. At the simpler end would be a haunted house at a carnival. “If there’s a fire, the alarms activate, the lights come up, all of the special effects stop, exit

signs come on, and you just walk out of the building,” Harrington said. “At the other end of the spectrum, if you’re on a suspended roller coaster type of attraction, you’re not just going to unharness yourself and jump down and walk out. You don’t want people trying to self-evacuate, so you’ve got to have a higher degree of protection and certain staffing requirements.”



The 550-foot-tall High Roller special attraction in Las Vegas is the highest observation wheel in the world. Ethan Miller/Getty Images

Many other attractions fall somewhere between those extremes, including most escape rooms, where patrons might be required to solve riddles or puzzles to find a key to exit the space. The level of protection requirements increases as you move up in classification, Harrington said.

### **Classroom door locks**

In a world where the dangers of fire and shooting violence exist side by side, the issue of door locks in K-12 classrooms has been a persistent challenge for NFPA 101 committee members. On one side of the argument, door locks must be robust to keep intruders out. On the other side, complicated or aftermarket locks could prevent occupants from escaping in a fire or keep emergency responders from entering.

With that in mind, the NFPA 101 committee has proposed allowing existing schools to install door locks and latches that require up to two releasing motions to open. This is a departure from the 2018 edition, which only permitted locks and latches with one releasing operation. (This requirement would still apply to new schools.) From a practical standpoint, the one-motion rule “resulted in some school districts having to spend a lot of money to retrofit the locking hardware on the doors, and many districts were just not able to meet the financial demands,” Harrington said. That led some to install aftermarket barricade devices, which are relatively low cost, but potentially difficult to remove during an emergency.

Moving to two locking motions “is a case where we need to balance the needs for life safety against the needs for security,” Harrington said. “While we’ve always required the one motion, as long as teachers and staff are trained on how to open those two-motion doors in an emergency, the committee felt that should be a safe arrangement while also providing the needed security.”

Another proposed revision in the 2021 edition addresses school drills. Previous editions required schools to perform a fire drill each month—any other drills, such as those for active shooters or tornadoes, had to be conducted in addition to the fire drills. “Schools were kind of being put on emergency drill overload, and teachers were finding that they didn’t have enough time to do what they’re really there for, which is education,” Harrington said. Proposed language for 2021 would allow schools to substitute two fire drills per year for other kinds of drills as they see fit.

### **Health care, CO alarms, and sprinklers**

A number of other changes throughout the code could have large impacts on an array of occupancies.

Responding to concerns in the health care sector, the committee has made changes to alleviate some of the unforeseen noncompliance issues that occurred when the Centers for Medicare & Medicaid Services recently updated to the 2012 version of the *Life Safety Code*. For example, some nursing homes had previously installed nonrequired sprinklers to compensate for building construction deficiencies—a move that was allowed previously by using [NFPA 101A, Alternative Approaches to Life Safety](#), but became noncompliant when CMS updated to the newer edition of the code. Proposed language in the 2021 edition would remedy this unintended consequence.

Another change that could have a significant impact on health care and other occupancies is a proposed revision that would eliminate the inspection, testing, and maintenance requirements for extraneous fire doors that aren’t required by code. Those fire doors would now be treated as regular doors, resulting in time and cost savings for facilities.

In certain residential occupancies, the proposed 2021 Life Safety Code would add requirements for all existing hotels and dormitories to be outfitted with carbon monoxide detection, as well as new requirements for low-frequency alarm signals in sleeping rooms of new hotels, dorms, and new apartment buildings.

The committee also proposed eliminating the option of forgoing sprinklers in most types of high-rise buildings that don’t already have what are known as approved engineered life safety systems (ELSS). ELSS were put in place in the 1980s as an alternative to retrofitting existing high-rise buildings with automatic fire sprinklers. The committee eliminated the option for some existing buildings that don’t already have an ELSS. The code continues to mandate that all new high-rises have sprinklers.

“What this means is, if this edition of the Life Safety Code gets adopted, unless you already had a previously approved engineered life safety system, this requirement would say you’ve got to go into your building and install sprinklers within a specified number of years, depending on the occupancy classification,” Harrington said. The move was made with the recognition that automatic fire sprinklers have proven to be the simplest, most effective way of saving lives and property, he said.

—*Jesse Roman*

## [NFPA 99](#)

Two major technical changes related to electricity in health care facilities lead the proposed revisions to the 2021 edition of [NFPA 99, Health Care Facilities Code](#).

### **Health care facility microgrids**

One important change has to do with microgrids. In 2018, [Kaiser Permanente Richmond Medical Center](#) in Richmond, California, a 50-bed acute-care facility, became the first hospital in the state to install a microgrid—an on-site, localized electrical grid delivering power to the facility in conjunction with utility power and, if needed, diesel-powered generators. In a press release, the center said its new microgrid—powered by a 250-kilowatt sheet of solar panels positioned atop a five-story parking garage—was capable of keeping critical electrical systems running for three hours. It was also expected to cut the facility’s energy costs by about 50 percent.

But if a facility manager, designer, or authority having jurisdiction involved in that project had looked to NFPA 99 for information on microgrids, they would have found nothing. That’s set to change soon, as the 2021 edition of NFPA 99 is expected to include new language related to health care facility microgrids, including performance criteria for the systems.

“The change will allow these microgrids, which utilize green technologies like solar, geothermal, fuel cells, batteries, and wind power, to be more commonly used in health care facilities,” said Jon Hart, an engineering technical services lead at NFPA. “It could save facilities money and be more efficient than just using utility power.” The change was advocated for by an NFPA 99 task force on electrical systems, Hart said, and will position the code to be more in line with global trends focused on the use of renewable energy sources including solar power.

The new NFPA 99 language will provide performance criteria for health care facility microgrids, which is especially pertinent for microgrids intended as sources of emergency backup power. If a microgrid system is being used for backup power, Hart said, the new language will require it to be programmed so that it always has enough energy stored to serve that purpose. “We obviously wouldn’t want to drain our alternative energy resource below what may be needed in an emergency while we still have utility power,” he said.

### **Inspection, testing, and maintenance of electrical equipment**

A proposal has been made for the new edition to require hospitals to operate a more comprehensive electrical maintenance program. The anticipated addition outlines specific criteria and intervals for the inspection, testing, and maintenance (ITM) of all electrical equipment and distribution system components at health care facilities. It’s based on information found in another NFPA document, [NFPA 70B, Recommended Practice for Electrical Equipment Maintenance](#).

According to Hart, previous editions of NFPA 99 have required such a program for some electrical equipment found at health care facilities, and this change will simply close the loop on those recommendations.

“We’ve always had requirements to test generators and transfer switches and portions of emergency power systems, as well as to test electrical receptacles and line isolation monitors,” Hart said. “But we’ve never had a full electrical maintenance program spelled out, and a lot of AHJs require hospitals to have maintenance programs for critical utility systems, of which electrical systems would definitely be



included. Many facilities will already have a program like this in place that meets the new requirements, but it's still recommended that they review the criteria in full once it's available to ensure their ITM documentation and intervals align with the new section."

—*Angelo Verzoni*

### [NFPA 30](#)

What is the difference between a combustible liquid and a flammable liquid?

To the layperson, those terms might seem interchangeable. But technically, they're not. Flammable liquids ignite more readily than combustible ones, according to the technical definitions of the terms. But at what point does a combustible liquid become prone enough to ignite that it can be classified as flammable? The answer depends on who you ask.

[NFPA 30, Flammable and Combustible Liquids Code](#), currently defines flammable liquids as those with flash points that do not exceed 100 degrees Fahrenheit, while the flash point of a combustible liquid starts at 100 degrees and goes up from there. A liquid's flash point is the temperature at which the liquid produces enough vapor to ignite in air.

Other organizations, however, have starkly different definitions for the combustible/flammable threshold. For instance, the US Department of Transportation, in an effort to align more closely with global definitions, says flammable liquids don't become combustible ones until their flash point hits 141 degrees. Confusing, right?

That's why the 2021 edition of NFPA 30 is expected to stop using the terms "flammable" and "combustible" and focus solely on the flash points of liquids.

"Flash point alone defines the degree of hazard posed by that liquid, which in turn defines what protections should be applied to storage applications," said Guy Colonna, an engineering director at NFPA. "With this change in NFPA 30, where ability to ignite and contribute to combustion is the critical concern of the code, liquids will now be assessed on the single characterizing property of flash point." Nothing in the code will change regarding the protection levels that are mandated for liquids based on their flash points, quantity of liquids stored, and storage conditions, Colonna added.

The proposal appears to be one that many industry safety professionals would describe as a long time coming. [An article published in Industrial Safety & Hygiene News](#) in 2013 said the flammable/combustible divide "could be the root of miscommunication and potentially result in an accident."

—*Angelo Verzoni*

### [NFPA 921](#)

[NFPA 921, Guide for Fire and Explosion Investigation](#), continues to grow and expand to keep up with the ever-changing science and testing. The first edition came out in 1992 and had 14 chapters and 119 pages. The 2021 edition will have 29 chapters and over 400 pages, including color photographs and images. The goal of the committee is to continue to raise the bar of professionalism within the fire

investigation community. With over 500 public inputs and more than 300 public comments, the 2021 edition will see the most changes in the document's history.

### **Fire cause classification**

Among the major changes to the new edition was the deletion of a chapter on fire cause classification. The 1992 edition included a short discussion in the fire cause chapter addressing the classification of fire cause. In the 2014 edition, the section addressing fire cause classification was moved to a separate chapter.

There has been ongoing confusion between the concept of the cause of a fire and the classification of the fire cause. These are two different things. The cause of the fire is related to the circumstances that bring the fuel, ignition source, and oxygen together in such a way that a fire begins. Once the cause of the fire is determined, then the classification of that cause can be evaluated. The four classifications that NFPA 921 identified were accidental, natural, incendiary and undetermined. Two of the main purposes for identifying the classification of a fire cause were for the compilation of accurate statistical data and for the completion of [National Fire Incident Reporting System](#) (NFIRS) reports by fire departments.



Investigators at the scene of a fire that destroyed a home in Somerville, Massachusetts. David L. Ryan/The Boston Globe via Getty Images

Even so, confusion between cause and classification remained. For example, someone would indicate the cause of a fire as “accidental,” though that term doesn’t adequately describe the actual cause. If the fire originated on the burner of a stove, then the cause should be listed as “unattended cooking,” which describes the circumstances that brought together the necessary elements for the fire to begin. Even if the cause were clearly identified, further confusion could exist in the classification. It could be “accidental” due to the fact that the homeowner was distracted. It might be “incendiary” because the homeowner intentionally placed something on the burner that caused a fire. Or it could be “undetermined” because the investigator could not determine the intent of the homeowner.

This confusion, along with concern on the part of people who were completing NFIRS reports that someone could use NFPA 921 to challenge their classifications, caused a disproportionate number of fire incidents to be classified as “undetermined,” reducing the overall accuracy of fire statistics. This concern was brought to the attention of the committee by various fire marshals’ organizations prior to the issuance of the 2017 edition. A task group was appointed to look at the problem, and a new section was added to Chapter 1 to indicate that the completion of NFIRS reports was not covered by this guide—those reports should be considered incident reports rather than investigative reports. With this change in the 2017 edition, a public input was made for the 2021 edition to delete the fire cause classification chapter, since classification relates to NFIRS reports and is thus outside the scope of this guide.

This proposal was supported by the observation that the classifications listed in NFPA 921 and those listed in NFIRS were different. It was also pointed out that attempting to apply the scientific method to fire cause classification was problematic. As part of an ongoing effort to move the document to a more scientifically sound footing, the committee made the decision to delete the fire cause classification chapter. The committee also added a short paragraph to the end of the fire cause chapter to direct investigators in need of guidance on the classification of fire cause to the appropriate standards.

### **Fire patterns**

Another significant change was the reorganizing and editing of the chapter on fire patterns. For example, the topic of arc mapping was moved into the fire patterns chapter from the origin determination chapter. Arc mapping is a process by which a fire investigator evaluates the electrical circuits within a fire-damaged location. The investigator then examines the circuits looking for locations of electrical activity (arcing). These locations are then mapped to identify clusters. The concept is that there will be indications of electrical activity where the fire first breaches the wiring insulation of energized conductors, likely providing information for determining the fire origin area. As the fire progresses, electrical activity will not be visible due to the circuit protection device (breaker or fuse) activating and de-energizing the electrical circuit. The relationship between arc mapping and origin determination meant that arc mapping was originally placed in the origin chapter.

There were numerous public inputs and comments relating to this subject, however. The task group working on the patterns chapter ultimately recommended that the full discussion concerning arc mapping be moved to the patterns chapter, because the electrical activity was an effect of the fire that created a pattern of arcing. The committee decided to keep all of the arc mapping discussion together in the fire patterns chapter.

*—Randy Watson, chair,  
NFPA 921 committee*

JESSE ROMAN is associate editor at NFPA Journal. ANGELO VERZONI is staff writer at NFPA Journal. RANDY WATSON is chair of the NFPA 921 technical committee. Top illustration:Getty