Emerging Technology: Remote Inspections

Resources

Remote Virtual Inspections (International Code Council)

NFPA Remote Video Inspections

NFPA 915: Standard for Remote Inspections

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When Emerging Technologies Meet Codes and Standards

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Fire sprinkler systems evolve and adapt all the time. When a new problem arises, such as higher piled storage, wildland exposure protection, lithium-ion battery protection, remote inspections, and more, the fire sprinkler industry solves these emerging issues with new methods and technology. When the fire sprinkler industry reacts (or for the lack of reaction), the market can quickly become inundated with alternate, modified devices, equipment, and worse, gadgets and counterfeits. Fire sprinkler contractors, building owners, and code officials deal with emerging technologies and fancy marketing all the time and often are at a loss on when or how to accept something new. Fortunately, the fire sprinkler industry has robust codes and standards that narrow the acceptance of any sprinkler appearance or practice.

Process for New Equipment in Codes and Standards

When emerging technology equipment or process is presented to a contractor, owner, or code official there is a process for local acceptance. For this discussion, it is helpful to keep in mind a model code, for example, International Building Code (IBC) or NFPA 101 Life Safety Code, states when fire sprinkler systems are required. A referenced installation standard, such as NFPA 13 or NFPA 25, states how sprinklers systems are installed. When model codes (IBC) are locally adopted, they and their referenced standards (NFPA 13, NFPA 25) are enforceable. In short, codes say when a building needs a sprinkler system and standards say how to install it.

For Emerging Technology, the Standards Come First

When emerging technology is presented, the acceptance process is backwards, meaning, it must first comply with the installation standard(s). For example, an IoT (Internet of Things) device that is inserted into sprinkler piping to monitor temperature. This device would first need to be accepted by the installation standard, NFPA 13. This typically includes being listed and approved (as defined) when required by the standard and installed accordingly. Another example could be wildland urban interface protection devices and equipment, the same process of getting acceptance by the installation standard is necessary. When the installation standard permits the equipment, the codes (IBC Section 104.9) accept the system, providing a path of compliance for the contractor, owner, and code official.

The Code Official or Authority Having Jurisdiction is Part of This Process

Codes and standards are just words in a book until adopted. Then the words in the book are legally enforced by the code official or the Authority Having Jurisdiction (AHJ). The ICC family of codes, such as the IBC, and the NFPA, such as NFPA 13, puts the responsibility of accepting emerging technology on the code official and AHJ. Often the code official and AHJ are the building official and fire marshal. Codes and standards do not prohibit emerging technology (see IBC Section 104.11 and NFPA 13 Section 1.7) but the AHJ needs to be convinced it will be effective and reliable in its installation. This can be accomplished by becoming:

- Approved. Both the IBC/IFC (Section 202) and NFPA 13 (Section 3.2.1) have a similar definition but approval of using or installing merging technology comes from the AHJ.
- Listed. A listed product, per NFPA 13 Section 3.2.3, often satisfies the AHJ for any emerging technology. However, NFPA 13 (see Section 7.1.1), as well as other installation standards NFPA 13R and NFPA 13D, have varying requirements for installing listed equipment. For example, a pressure gauge is not required to be listed for NFPA 13, NFPA 13R, or NFPA 13D, however a control valve is required to be listed by NFPA 13 and NFPA 13R, but not NFPA 13D.
- Alternative materials and methods. As noted above, the codes and standards do not prohibit new technology, but there are times when a listed process is not available or developed. The IBC provides a path in Section 104.11 for equivalency, reports, and testing to convince the AHJ the emerging technology meets the minimum requirements of the code.

The path is wide, but the gate is narrow

Fire sprinkler systems are property- and life-safety systems. Their operation is critical. The listing and approval process is often a deterrent for new and emerging technologies. When other fire protection and mechanical systems seem to outpace the sprinkler industry in cutting edge technology, it is important to know what tempers our progress is for our own good. Getting to market with an emerging technology is long and expensive, but we have rarely seen it fail us as an industry. When determining if the new equipment or process is acceptable for the building or system, the first step is found in the codes, standards, and the local AHJ.

REFERENCES
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NFSA NATIONAL FIRE SPRINKLER ASSOCIATION
The Voice of the Fire Sprinkler Industry

TechNotes

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Remote inspections have increased dramatically over the past couple of years. NFPA, ICC, and local codes are expanding their rules and recommendations on this developing practice. Other digital verifications, such as remote and distance monitoring to meet the requirements of NFPA 25 inspection and testing frequencies are also being developed and installed every day. These technologies are making an impact on local code officials, fire sprinkler contractors, inspectors and building owners, but often questions and concerns of doing something new or different meets resistance.

What is a remote inspection?

A remote inspection is an alternative verification to an onsite physical inspection. Where the onsite physical inspection is done in-person by a qualified person, the remote inspection process is performed using sophisticated technological tools transmitted by one party to a qualified person. In other words, someone is operating the digital inspection tool, i.e. camera, on a job site and the inspector reviews the content, such as the video (synchronous or asynchronous) from another location for compliance to the codes and standards.

Benefits of remote inspections

The remote inspection application for code officials or sprinkler contractor inspectors, has several benefits for new installation or existing systems, such as:

- Reduces or eliminates the inspector risk exposure to hazardous conditions, pandemic restrictions, and dangerous tasks.
- Global collaboration and optimization of workforce use allows qualified inspectors to use time and talents more efficiently.
- Inspection costs are reduced with less travel expenses, scheduling, and site access.
- Real-time communication, feedback, reporting, metadata, and logs indicate verification of the work performed.
- Inspections can be scheduled and completed during off business hours and approved during normal business hours.
- Remote inspections are eco-friendly by helping to reduce overall global carbon footprint.

Tools of the remote inspection

In many cases, aspects of remote inspections are not new. Sprinkler contractors have used small video cameras for pipe inspections. Code officials have asked for photos to verify a field correction was completed. Facilities and contractors use drones to verify a process in inaccessible areas. Remote inspections use the same tools, i.e. cell phones, drones, iPads, 360° cameras, but broadcasts the inspection feed live or recorded to a distant location to a qualified person who reviews the data on standard office equipment such as a computer and monitor.

Is it allowed by code?

Model codes, such as the International Building Code and referenced standards, such as NFPA 13 and NFPA 25 do not prohibit remote inspections. Codes, by issuing permits, require periodic inspections to be performed during construction or operations. Standards, such as NFPA 25, require inspections and testing by frequency, many of which can be done by remote inspection techniques. The method of how to perform the inspection is not limited or restricted to a live person performing visual inspection or testing.

Who is qualified to approve remote inspections?

This technology advancement permits a smarter use of personnel. For example, the qualified person, whether it is a licensed inspector, engineer, or code official, reviews the digital content and issues an approval or correction from a central remote location. The camera or drone work is performed on-site by individuals with a different skill set, sent and scripted to locations on the site or are directed live by the qualified person. Remote video inspections provide several economies of scale. Often one remote video inspection can be viewed in one location by several qualified persons, such as the building, plumbing, and fire department, reducing redundant inspections. These actions are considered inspections that comply with the codes and standards.

Are there remote inspection resources?

Remote inspections have their place in new construction and existing buildings. Some code officials and departments are using more remote inspection technologies than others. Sprinkler contractors are adapting their service and installation departments to accommodate this technology. Both NFPA

and the ICC have been on top of this changing inspection environment for a few years with the following content:

- ICC Whitepaper: Recommended Practices for Remote Virtual Inspections (RVI) available free at Remote Virtual Inspections (RVI) – ICC (iccsafe.org)
- NFPA Whitepaper: Conducting Remote Video Inspections available free at WhitePaperRVI.pdf (nfpa.org)
- NFPA 915 Standard for Remote Inspections is under development. A draft version is available free at www.nfpa.org/915.

Where is it going?

The available remote inspection platforms and digital offerings are numerous. The benefits mentioned above, are many, but there are many areas to improve upon, such as mobile data access, video quality, and funding resources. Remote inspections and distance monitoring are not stagnant technologies. Code and standards compliance and the demand for inspection reports on new and existing construction are increasing and the available qualified workforce is not meeting the demand. Diversifying the workforce and construction technology with digital tools and processes improve the project management and facilities management.

Is this the end of in-person inspections?

Attracting, training, and retaining inspectors for jurisdictions and contractors is a challenge. The labor pool for these jobs is shrinking. Using digital assets, such remote inspections, distance monitoring, and off-site verifications keep travel and training costs down. It also allows for the qualified personnel to focus on meaningful tasks, such as servicing equipment instead of mundane (but important) inspection tasks.

Newer tech for inspections

While remote inspections seem to be on the edge of modern technology and consumer use, construction and inspection documentation has yet to meet the blockchain. Future generations of blockchain containing property or geographical information could store and execute smart contracts relating to service work, distance monitoring, and remote inspections. One of the key differences between blockchain data and a database is the immutable (unchangeable) data the blockchain contains. Unchangeable, reliable, and consistent data on the local, national, and global scale is necessary for all stakeholders to advocate, install, and maintain fire protection systems. Blockchain technology and artificial intelligence (AI) are tools that are yet to be fully realized in the fire sprinkler industry but are well on their way. Having consistent and accurate construction, inspection, and building maintenance records promotes the reliability and reliance on fire sprinkler systems.