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

TechNotes

Editor - Roland Asp, CET | #458 | 02/23/2021

This edition of TechNotes is a summary of ITM Storage Frequencies through the Codes prepared by Jeffrey M. Hugo, CBO, Vice President of Codes, Standards, Public Fire Protection and Training.

New ITM Storage Frequencies in the 2021 Fire Codes

High-piled storage occupancies present numerous challenges to fire sprinkler systems. Commodity classification, storage arrangement, unit placement, types of systems, and building maintenance are some of the challenges for industry and owners to consider during construction and ongoing building operations. As building operations, unit configurations, and shipping logistics change and adapt to consumer demand; altering the fire sprinkler systems is usually one of the last steps for a building owner to address. Codes and standards, such as NFPA 25, the *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, puts the responsibility squarely on the building owner to evaluate and address the fire protection system when processes and commodities change (See NFPA 25, Sections 4.1.6 and 4.1.7).

Owners are not fire protection experts and often rely on fire sprinkler contractors to point out when the fire protection system and the storage layout are in conflict. For example, an owner may receive a unit that is configured differently, such as a commodity with more plastic, a change in the pallet type, the unit is encapsulated, etc. Contractors know that these factors affect the fire sprinkler system, but contractors and inspectors using NFPA 25 will quickly point out that the evaluation of the existing storage configuration and sprinkler system design is outside the scope of their NFPA 25 inspection. This is correct, however, if the owner does not know the rules for changing commodities and the contractor is not able to point these out during a NFPA 25 inspection, there is a gap of knowledge that puts both parties at risk. The updated 2021 fire codes close this gap.

The 2018 and 2021 *International Fire Code* (IFC) along with the 2021 NFPA 1 *Fire Code* and 2021 NFPA 5000 *Building Construction and Safety Code* have a new storage plan and annual evaluation frequency for high-piled storage occupancies that bridges the gap between the owner and contractor. Maintaining fire sprinkler systems and building operations are requirements of both fire codes.

2018 and 2021 IFC Adds New Storage Plan and Frequencies

New to 2018 IFC is Section 3201.3.1. This new section requires a floor plan of the storage layout mounted on the wall, in an approved location. The floor plan is a reference for all future inspectors, owners, users of the space, and is required to have the following on the posted plan (Hugo 2017):

1. Locations, dimensions, and rack layout of high-piled storage areas.
2. Design storage height for each storage area.
3. Types of commodities.
4. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
5. Aisle dimensions between each storage array.
6. For palletized and solid-piled storage, the maximum pile volume for each storage array.
7. Location and classification of commodities in accordance with Section 3203.
8. Location of required fire department access doors.
9. Location of valves controlling the water supply of ceiling and in-rack sprinklers.

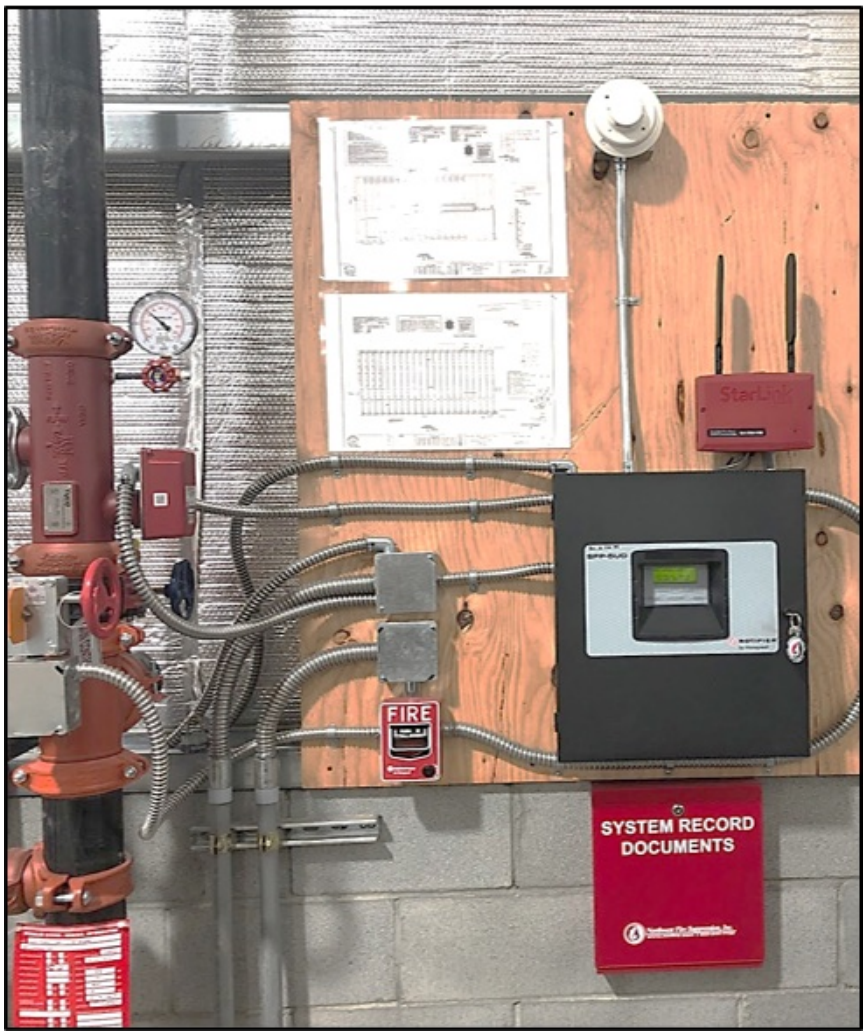

Photo credit: Chase Browning, Medford Oregon Fire Department

The evaluation frequency comes into the text of the 2021 IFC, in Chapter 32's high-piled storage housekeeping and maintenance section. This section is for the building owner, enforced by the fire code official, for existing storage buildings

such as aisle width, height of storage, and flue space clearances. The 2021 IFC text for maintaining storage is below:

3205.1 Storage layout plan maintenance. *The approved storage layout shall be verified and evaluated annually in accordance with Section 3201.3.2 (2018 IFC, Section 3201.3.1, as noted above). Modifications or changes to the provisions of the approved storage layout shall not be made without prior approval of the fire code official (International Code Council, 2020).*

The posted storage layout plan is required to be "…verified and evaluated…". The verification portion is to ensure the previous posted floor plan is still posted. It would be difficult for facility manager or building owner to continue with these maintenance requirements if the original and approved storage plan is missing. The evaluation portion of the text is to visually check the storage plan to the actual storage conditions. The important part here is the approved storage plan and fire protection system was designed together and needs to remain in-sync for the life of the building.

The "…annually…" portion of the text is the frequency that the verification and evaluation of the current storage situation to the approved plan must occur. The annual inspection is performed by the owner or the owner's representative. It would be a mistake to confuse this inspection by the owner to an annual inspection using NFPA 25. Both inspections are required. The annual inspection of NFPA 25 is for the fire protection system, (i.e., sprinklers, fire pumps, tanks, etc.) as installed. NFPA 25 does charge the owner, in Section 4.1.6, to evaluate any system changes, changes in commodity, etc., but there is no codified mechanism to require such inspection until the 2021 IFC and NFPA 1. (Hugo, 2020).

2021 NFPA 1 and NFPA 5000 Adds New Storage Plan and Frequencies

The 2021 editions of NFPA 1 and NFPA 5000 follow suit from the changes to the IFC. It is important to note, many users and readers may not be familiar with NFPA 5000. In short, it is NFPA's building code, and while it is not adopted in the US or Canada, it is used elsewhere in the world. NFPA 5000, through Section 30.1.1.5 and A.30.1.1.5 (Chapter 30 is for new storage occupancies) requires a similar approved storage plan as NFPA 1 (noted in 34.1.3 below), mounted on the wall. This requirement in NFPA 5000 only applies to the plan and does not have an annual inspection frequency.

NFPA 1 as the fire code has the approved storage plan and annual frequency, similar to the IFC (see NFPA 1, Section 34.1.3). The plan and annual frequency in Chapter 34 is for new storage occupancies and for previously approved storage occupancies. This means the posted storage plan and annual inspection would not apply to existing buildings, however, as required by Section 10.3.2, the existing storage must remain unchanged from the original approval. This means,

where the storage has changed, the authority having jurisdiction (AHJ) could require the plan retroactively. From the 2021, NFPA 1:

34.1.3 Approved Storage Floor Plan. An approved storage floor plan that documents the permissible use of the storage area, based on the occupancy classification and the design basis of the automatic sprinkler system, shall be provided, and mounted in an approved location (National Fire Protection Association, 2020).*

The frequency for inspection through NFPA 1 is nearly identical to the IFC. NFPA 1, Section 34.7.6.3 requires storage plan to be, "…evaluated and verified…once per year." Where changes are made from the original approved storage plan, the AHJ is involved before modifications or changes are further made.

Application and Conclusion

The storage plan and maintenance are for new construction and not applied retroactively for existing high-piled storage, except as noted above for NFPA 1. It is important for owners and NFPA 25 inspectors to be aware of the changes to the 2018 and 2021 fire codes. At the printing of this edition of TechNotes, currently no jurisdiction has adopted the 2021 IFC or NFPA 1, but that will surely change as time moves on. For code updates, see NFSA's Code Tracker at **https://nfsa.org/code-tracker/** for the latest codes and standards adoption of each state.

The correlation of the storage plan, maintenance, and frequency for the 2021 fire codes (IFC and NFPA 1) did not happen by accident. It came through the diligent work of the National Fire Sprinkler Association (NFSA) and the wisdom of its member run Engineering and Standards (E&S) committee.

References

Hugo, Jeffrey M. 2020. "**2021 IFC Storage Frequency Inspections**" Edited by Joanne Genadio. *National Fire Sprinkler Magazine*, March/April 2020.

Hugo, Jeffrey M. 2017. "**2018 IFC Chapter 32 Changes**" Edited by Joanne Genadio. *National Fire Sprinkler Magazine*, September/October 2017.

www.nfsa.org.

International Code Council. 2020. IFC : ***International Fire Code, 2021***. Country Club Hills, Il: International Code Council.

National Fire Protection Association. 2020. "***NFPA 1 Fire Code***."

Top Tech Competition

The 2021 Top Tech Competition will be held in October 2021. The window for testing will open summer 2021. We look forward to your participation. More details will be out soon. Keep studying!

New EOD Process

Starting on July 15, 2020, the NFSA has a new EOD process where members can submit questions, track the progress, and view their EOD cases. The step by step process is detailed in **TechNotes #442**.

National Fire Sprinkler Association
514 Progress Dr, Ste A,
Linthicum Heights, MD 21090
1-800-683-NFSA (6372)

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

Contact Us