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Modified NFPA 13R in Multiplex Residential Buildings

Multiplex residential buildings are unique building types that warrant a balanced approach to the reliability, safety, and cost-effectiveness of the applicable NFPA standard. This bulletin summarizes the acceptable sprinkler system design criteria for Part 9 and Part 3 multiplex residential buildings containing 3 to 8 dwelling units.

Background

The implementation of new zoning policies has led to a rapid increase in the development of multiplex residential buildings on single land parcels. Multiplex buildings typically do not have public corridors, shared exit stairs, or fire alarm systems. While these buildings fall under the scope of NFPA 13R standard, the use of NFPA 13R presents reliability, cost-effectiveness, maintenance, and ultimately safety concerns because the required backflow preventer valve assembly is usually in an underground vault and without electrical supervision by a fire alarm system.

Clarification/Requirements

To increase the reliability, safety, and cost-effectiveness, while meeting the intent of NFPA 13R, the following measures are required for Part 9 and Part 3 multiplex buildings with residential occupancy throughout.

1. A combined supply for the building, with each dwelling unit provided with a dedicated system riser, dual check valve, sprinkler flow switch connected to the interconnected smoke alarms, and flow-through connection to the most remote toilet. This also applies to buildings on the same parcel that are designed to NFPA 13D.
2. An audible and visual strobe outside of each unit's principal entrance, to be interconnected with the smoke alarms.
3. All rooms, closets, and compartments to be sprinklered, including common area sprinkler and electrical rooms.
4. Hydraulic calculations to be based on a maximum of four sprinklers, inclusive of any water curtain sprinklers, in the most demanding design area.
5. Each dwelling unit shall have a separate exterior exit door not more than 2.0 m above adjacent ground level.
6. The building permit drawings shall be consistent with the requirements of this generic alternative solution, and include a note to design to this compliance option.

Explanation/Technical Rationale

<u>Sprinklers in Every Compartment</u>
This exceeds the minimum NFPA 13R requirements and enhances life safety and property protection. NFPA 13R contains exemptions for sprinklers in various types of small compartments. However, multiplex buildings are designed to maximize useable floor area and site density, resulting in many small compartments and

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ambiguous usage labels. This can result in numerous unsprinklered compartments with disproportionate hazard levels (e.g. small closets packed with storage).

Operational and Maintenance Vulnerability

Cross-connection policies require NFPA 13R systems to use a dedicated fire line with a common isolation valve, which can be unintentionally shut off and disable sprinkler protection for all units. In addition, occupants will not be alerted to this hazardous condition due to the separate domestic supply. This generic alternative solution allows for independent control and built-in supervision of the sprinklers for each unit without compromising the protection of other units.

Alarm Identification and Response

Typical NFPA 13R systems are zoned by floor or by clusters of units, which does not provide the most efficient way to identify the unit in alarm and delay subsequent emergency response. The audible and visual signals provided outside of each unit may better alert the occupants of the entire building as soon as a sprinkler flow or a smoke alarm is triggered. This generic alternative solution provides improved identification and emergency response of the unit in alarm.

Installation and Operational Cost

For the dedicated fire line on a NFPA 13R system, cross-connection policies mandate a double check valve assembly that requires annual inspection, testing, and maintenance. This backflow prevention device may require an underground chamber with onerous surface access requirements. In addition, fire department connections are currently always required if the building has more than two dwelling units. This generic alternative solution does not require a double check valve backflow assembly or a fire department connection.

Conclusion

The above measures generally match or exceed the minimum NFPA 13R requirements, but provide a more nuanced and hybrid approach for the multiplex residential building type. Therefore, they will enhance the reliability and safety of the fire sprinkler system while eliminating unnecessary cost and infrastructure.

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