Fire Protection

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Nuts and Bolts of Sprinkler Installations — Part VIII

Hazard Classification

The design of most building sprinkler systems really involves only two basic engineering decisions — the available water supply at the site and the hazard classifications of the building. (In most designs, the rest of the design is just "layout" and, in my opinion, can adequately be performed by sprinkler designers employed by the sprinkler contractor using the design requirements contained in NFPA 13, *Installation of Sprinkler Systems.* Obviously, there are exceptions.) Determining the available water supply at the building site has already been discussed in Part V of this series (November 1999 *Plumbing Engineer*, page 10). Now let's discuss hazard classification.

Hazard classification hierarchy

The requirements contained in NFPA 13 are keyed to the hazard classification. Section 2-1 in the 1999 edition of NFPA 13 indicates there are three basic hazard classifications used in the design of sprinkler systems. These three hazard classifications are as follows:

- Light Hazard
- Ordinary Hazard
- Extra Hazard

This same section in NFPA 13 also indicates that the ordinary hazard classification is divided into two sub-classifications — an ordinary group 1 hazard and an ordinary group 2 hazard. Similarly, the extra hazard classification is also divided into two sub-classifications — an extra group 1 hazard and an extra group 2 hazard.

The definitions of each of the hazard classifications are also included in section 2-1 in NFPA 13, which defines hazard classification based upon a number of occupancy characteristics. These characteristics are as follows:

- The combustibility of contents.
- The quantity of combustibles.
- Rate of heat release.
- Storage height.
- Quantity of flammable and/or combustible liquids.

NFPA 13 defines a light hazard occupancy using the following description:

- Combustibility of the contents is low, and
- Quantity of the combustible is low, and
- Low rates of heat release.

The NFPA 13 definition an ordinary group 1 hazard is as follows:

- Combustibility of the contents is low, and
- Quantity of the combustibles is moderate, and
- Moderate heat release rates, and
- Height of storage is 8 feet or less.

NFPA 13 defines an ordinary group 2 hazard as follows:

- Combustibility of the contents is moderate to high, and
- Quantity of the combustibles is moderate to high, and
- Moderate to high rates of heat release, and
- Storage height is 12 feet or less.

The NFPA 13 definition of an extra group 1 hazard is as follows:

- Combustibility of the contents is very high, and
- Quantity of the combustibles is very high, and
- High rates of heat release, and
- Quantity of flammable and/or combustible liquids small.

Finally, the NFPA 13 definition of an extra group 2 hazard is as follows:

- Quantity of flammable or combustible liquids is moderate to high, or
- Extensive shielding of the combustibles is present.

Interpretation by example

If this is the first time you've seen these definitions, I'm sure you're shaking your head right about now. The obvious question is, "What are the definitions of the adjectives used to describe the combustibility and quantities of the contents and the rates of heat release?" Well, NFPA 13 doesn't contain engineering definitions of the term "low rate of heat

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release" or "moderate rate of heat release," or of what the difference is between "high" and "very high" as it relates to the combustibility of the contents. This makes it extremely difficult for someone unfamiliar with NFPA 13 to be able to determine hazard classifications.

Although NFPA 13 doesn't define the hazard classifications in precise terms, information provided in Appendix A in NFPA 13 does provide "clues" as to what the adjectives used in the definitions of the hazard classifications actually mean. For instance, section A-2-1.1 in NFPA 13 indicates that the following occupancies are typically classified as light hazards:

- Offices.
- Dwelling units.
- Restaurant seating areas.
- Unused attics.

Occupancies which are typically classified as an ordinary group 1 hazard include the following:

- Kitchens.
- Mechanical rooms.
- Electrical rooms.
- Elevator equipment rooms.
- Parking garages.

Occupancies which are typically classified as an ordinary group 2 hazard include the following:

- Retail stores.
- Storage rooms.

It should be noted that the list of typical hazard classifications for various rooms and spaces are just that — typical hazard classifications. For instance, the sales area of a retail stores is typically classified as an ordinary group 2 hazard, but this hazard classification isn't correct for all retail stores. For example, contrast the typical supermarket with low shelving used to display goods (and a separate storage area) with the supermarket which displays goods in racks and uses the upper portions of the racks to store goods. Both supermarkets are retail stores, however, the supermarket which uses the sales area to also store goods above the goods which are offered for sale would not be classified as an ordinary group 2 hazard.

Another key to understanding the hazard classification system used by NFPA 13 is that each room or space in a building is classified separately. In other words, few buildings are a single hazard classification. For instance, the hazard classifications that would normally apply to a "full service" hotel are as follows:

Guest Rooms	Light
Corridors	Light
Meeting Rooms	Light
Toilet Room	Light
Restaurant Seating	Light
Kitchen	Ordinary Group 1
Parking Garage	Ordinary Group 1
Mechanical Rooms	Ordinary Group 1
Electrical Rooms	Ordinary Group 1
Storage Rooms	Ordinary Group 2
Ballroom	Ordinary Group 2

In the example above, the ballroom in the hotel is classified as an ordinary group 2 hazard, rather than a light hazard, because occasionally the ballroom will be used as an exhibition space. If the sprinkler system protecting the ballroom were designed for a light hazard occupancy, then the hotel would not legally be permitted to use the ballroom as an exhibition space.

While grasping the concept of sprinkler system hazard classification is difficult because of the imprecise manner in which the various hazard classifications are defined, once you become comfortable with the concept, determining hazard classification is normally an easy task. □