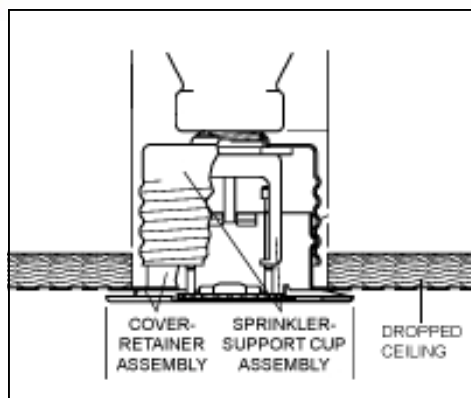




Drop-Out and Open Grid Ceilings

Concealing sprinklers the old-fashioned way

In the past few decades, fire sprinkler manufacturers have responded to the desire of many architects and owners for unobtrusive sprinklers. The most dramatic example is the concealed sprinkler, in which a cover plate hides the sprinkler assembly behind a ceiling or wall. The first concealed sprinkler, the Star "Unspoiler," was introduced in 1971. Before that, however, drop-out and open grid ceilings were two options to hide sprinklers above ceilings or to avoid relocating sprinklers when ceilings were installed in previously open areas. NFPA 13, Installation of Sprinkler Systems, still contains requirements addressing these types of ceilings.



Drop-out ceilings are required to be specially listed for installation below sprinklers and to be installed in accordance with their listings. Such ceilings are generally made of expanded polystyrene with nominal 1 pound/foot³ (16 kilogram/meter³) density and are intended to twist or shrivel from the early heat of a fire and "drop out" of the ceiling grid, allowing proper operation of the sprinklers above.

In August 2003, recognizing the greater use of fast response sprinkler technology, Underwriters Laboratories added a requirement to its listing criteria that "unless otherwise noted ... drop-out ceilings are intended for use with standard response sprinklers only" and has no listings to the contrary. FM Global maintains the same policy, with all current listings applicable only to the use of standard response sprinklers. A section had been added to NFPA 13 beginning in the 1987 edition: "Special sprinklers shall not be installed above drop-out ceilings unless specifically listed for

this purpose." Although the definition of "special sprinklers" has since changed, the term at that time included both quick response and extended coverage sprinklers. So, at this time there are no drop-out ceilings listed for use with quick response or residential sprinklers.

Considering that NFPA 13 requires the use of quick response sprinklers or residential sprinklers for all new light hazard applications, this means no drop-out ceilings are currently available for use as part of a conversion of industrial properties to offices or residential lofts.

Open grid ceilings do not necessarily have to be listed, although that option is open to manufacturers. NFPA 13 contains specific geometric criteria by which open grids can be placed below sprinklers. Openings must be at least ¼-inch (6.4 millimeters) wide in the least dimension, and at least 70 percent open. The depth of the ceiling panels is not permitted to exceed the least dimension of the grid openings. Minimum clearance between sprinkler deflectors and the ceiling is based on hazard classification and sprinkler spacing as follows:

For light hazard, minimum clearance is 18 inches (457 millimeters) for spacing up to 10 feet x 10 feet (3 meters x 3 meters); 24 inches (610 millimeters) for spacing up to 10 feet x 12 feet (3 meters x 3.7 meters); and 36 inches (914 millimeters) for greater sprinkler spacing. These criteria apply to both spray and old-style sprinklers. Ordinary hazard criteria apply only to the use of spray sprinklers. Minimum clearance is 24 inches (610 millimeters) for spacing up to 10 feet x

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Drop-Out and Open Grid Ceilings

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10 feet (3 meters x 3 meters) and 36 inches (914 millimeters) for greater sprinkler spacing.

These specific requirements can be modified if the ceiling is installed in accordance with a product listing.

As with drop-out ceilings, changes to basic definitions have affected the apparent intent of the rules. Beginning with the 1996 edition of NFPA 13, extended coverage sprinklers were defined as a "type of spray sprinkler," which raises the question of whether the open grid ceilings can be used below extended coverage sprinklers. No changes were ever made to the standard with regard to the use of these ceilings below extended coverage sprinklers, but in general it can be seen that the distance of the open grid ceiling below the sprinklers must be increased with the spacing of the sprinklers. The spray trajectory is necessarily more horizontal as sprinkler spacing increases, and the grid is more likely to obstruct the spray pattern.

Both drop-out and open grid ceilings can still be found in existing applications, but are rare in new installations. Obviously, neither drop-out nor open grid ceilings are considered ceilings for other purposes of NFPA 13, such as the point of reference for positioning of sprinklers,



A Common dropped ceiling

or for protection of nonmetallic pipe or soft-soldered copper tube. Sprinklers are not permitted to be installed below drop-out ceilings due to concern for potential obstruction of sprinkler spray, and can only be installed below open grid ceilings if fitted with shields in the manner of in-rack sprinklers to prevent "cold-soldering."

Cold-soldering is the term traditionally applied to the phenomenon whereby one sprinkler is prevented from operating due to the water discharge from another sprinkler. Considering that most sprinklers now rely on liquid-filled glass bulbs rather than solder links for their operating mechanism, the term is somewhat out of date. However, like drop-out and open grid ceilings, it is still with us.

(Reprinted from NFPA Journal)

NFSA Donates Books to Universities



**NATIONAL
FIRE
SPRINKLER
ASSOCIATION, INC.**

NFSA is very pleased to announce it has donated copies of its Sprinkler Protection for Warehouse and Storage Occupancies book to the technical libraries of the following institutions of higher learning that include fire and safety engineering technologies in their curriculums:

Oklahoma State University, University of California at Berkeley, University of Maryland, University of New Haven, University of Cincinnati, University of Texas at Austin, University of Tennessee, Virginia Tech, Worcester Polytechnic Institute, University of Houston-Downtown, Delaware Technical & Community College, Northeast Wisconsin Technical College, Seneca College of Applied Arts & Technology, Eastern Kentucky University, Sinclair Community College.

The book's author, Kenneth E. Isman, P.E., is NFSA's Assistant Vice President of Engineering. He holds a Bachelor of Science degree in Fire Protection Engineering and a Masters of Science in Management, both from the University of Maryland and is a licensed Professional Engineer. He represents the fire sprinkler industry on many National Fire Protection Association committees including the Technical Committees on Sprinkler System Installation Criteria, Fire Pumps and the Technical Correlating Committee on Automatic Sprinklers. Until the committees were disbanded due to the consolidation of requirements, he was also a member of the Technical Committee on Rack Storage and the Technical Committee on General Storage.

(Reprinted from NFSA)

Sprinkler protection of shelf storage ...

... and its relationship to ordinary hazard occupancies

A major issue facing the NFPA 13 Discharge Criteria Technical Committee is the changing nature and configurations of commodity storage that must be protected through the requirements of [NFPA 13, Installation of Sprinkler Systems](#).

The NFPA 13 Discharge Criteria Technical Committee is responsible for the sprinkler design and storage protection requirements contained in NFPA 13.

The issues they face range from the gradual increase in plastic materials in retail and other occupancies to the increasing volume of stored commodities in these occupancies. In addition, there are the changes in shelving materials and layout in today's stores. Look no further than an office supply store of the 1960s and compare that with today's superstores. This sums up the challenge that the NFPA 13 Discharge Criteria Technical Committee faces in evaluating the appropriateness of sprinkler protection requirements contained in NFPA 13.

To address one of the issues facing the NFPA 13 Discharge Criteria Technical Committee, a Task Group was formed to examine the solid shelf storage arrangement and whether the presence of solid metal shelving, including back-to-back cantilever arrangements, has an impact on the effectiveness of ceiling sprinkler protection.

The Fire Protection Research Foundation was asked by the NFPA 13 Discharge Criteria Technical Committee to undertake a test program that explored whether the current protection criteria as required by NFPA 13 are

adequate for this type and arrangement of storage. The study would also help in defining shelf width in the context of back-to-back shelving arrangements, and determine the upper bound of ordinary hazard protection design criteria as applied to retail shelving. An industry consortium consisting of the American Fire Sprinkler Association, the National Fire Sprinkler Association, GE



Global Asset Protection Services, Viking Corporation, Reliable Automatic Sprinkler Corporation, Victaulic Corporation, and **Tyco Fire & Building Products** provided sponsorship for a series of five full-scale fire tests. The tests were carried out at Underwriters Laboratories. The Technical Committee's Solid Shelf Task Group provided technical oversight to the project.

The sprinkler characteristics and design criteria variables addressed were: discharge coefficient (K factor), discharge density, temperature rating, spacing, orientation, and element response type. In addition, the storage variables addressed were: total storage height, aisle spacing, and shelf depth. The commodity tested was boxed Group A materials, and solid steel

cantilever shelves were used for all tests. A matrix of test variables and test results, as well as the full report of the test program, can be found on the Foundation's Web site .

Testing program results provided valuable feedback to the NFPA 13 Discharge Criteria Technical Committee on the overall performance of sprinkler system protection for shelf storage.

Effects such as "shielding" from overhead sprinkler discharge caused by the shelving units and the importance of sprinkler sensitivity, temperature rating, and aisle width in fire spread throughout the test array were evaluated. After the Task Group review of the study, it was determined that there is no immediate need for changes in the protection criteria in NFPA 13 and that more study is required to explore shelving details such as back-to-back shelving, the influence of vertical flues (within the shelving unit), and vertical barriers to prevent fire spread along the aisles.

One lesson relearned from the study was that, although we will increasingly turn to fire models and other engineering tools to bound and direct full-scale testing programs, fire spread and sprinkler protection in storage of commodities are complex phenomena and often provide results that may not be consistent with predictive models.

The Foundation is currently exploring other issues of concern to NFPA 13 Discharge Criteria Technical Committee including protection of commodities in mobile compact shelving (a special configuration of solid shelf storage).

(Reprinted from NFPA Journal)

Without Fire Sprinklers, 6 Killed in Historic Reno Hotel Fire

RENO, Nevada (AP) -- A woman who previously served prison time for second-degree murder was arrested Wednesday and accused of setting a blaze that killed six people and gutted much of a historic brick building in Reno's downtown casino district.

Valerie Moore, 47, a casino cook, was arrested on arson and murder charges stemming from Tuesday night's blaze at the Mizpah Hotel that police said began when she set fire to a mattress. It was the city's deadliest blaze in more than 40 years.

About 30 people were injured, some of them after they leaped out the windows of the three-story building, which was primarily a residential hotel. Hotel workers and neighbors, who described Moore as "nice" and a "good tenant," said she had been drinking and may have lost control after an argument with another tenant. Moore was booked into the Washoe County Jail on suspicion of first-degree arson and six counts of first-degree murder. She also faced a parole violation charge, sheriff's Deputy Brooke L. Keast said.

Police said 60 to 80 people were inside the 84-year-old, recently renovated hotel when the fire started. It quickly engulfed the north wing of the hotel, near Harrah's casino. None of the downtown high-rise hotel-casinos were threatened.

Firefighters said they did not know of anyone still missing in the fire, but they had yet to search some areas. The roof collapsed, and authorities said the building would have to be shored up.

One hospital reported that two people were hospitalized in critical condition, and a third was flown to a burn center in California.

Keast told The Associated Press she had no immediate details of the original charge against Moore but confirmed that she served time in prison for second-degree murder.

State corrections records obtained by the AP show Moore was convicted on September 24, 1987, in Washoe County District Court for a killing in February of that year. She started serving two life sentences on November 5, 1987, but was released on parole in June 2005, state corrections records show.

Authorities said Wednesday there was no record that Moore had hired a lawyer. Neighbors and hotel workers described Moore as a normally pleasant woman.

"She didn't seem like a crazy person," said Maxie Birch, 42, who lived down the hall from Moore. "But something happened last night to push her over the edge. She just flipped. I don't know what caused her to flip."

Steven Purcell, 53, the hotel's front desk clerk, said Moore asked him to escort her from a nearby liquor store to the hotel late Tuesday afternoon.

"She was a really good tenant. She just had way, way too much to drink yesterday, causing trouble all day," said Sharon Steele, the hotel's general manager.

It was Reno's deadliest fire since 1962, when six people died at the Golden Hotel, said fire department spokesman Steve Frady. He said the Mizpah had smoke alarms but not sprinklers, which was allowed by city code because of the building's age.

The Mizpah was built in 1922 and added to the National Register of Historic Places in 1984. Fire officials said they did not know whether the building could be saved.

"It was just gorgeous, and now it's all gone," said Steele. "It's a brick building. I don't know why it burned so fast."

The Mizpah Hotel before the Fire



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