What You Should Know About Sprinkler Systems

How they can SAVE (and COST) you money

Sprinklers were invented by an American, Henry S. Parmalee, in 1874 to protect his piano factory. Until the 1940s and 1950s, sprinklers were installed almost exclusively for the protection of buildings, especially warehouses and factories. Insurance savings, which could pay back the cost of the system in a few years time, were the major incentives.

Following several fires with large losses of life (Coconut Grove Nightclub, Boston, 1942 - 492 dead, LaSalle Hotel, Chicago, 1946 - 61 dead; Winecoff Hotel, Atlanta, 1946 - 119 dead) fire and building officials searched for a means to provide life safety for building occupants. They found that factories and other buildings equipped with automatic sprinklers had an amazingly good life safety record compared with similar unsprinklered buildings...the chance of dying in a nonsprinklered building is 400 times greater than that in a sprinklered building. Sprinkers dramatically reduce the heat and smoke from a fire, enabling the occupants to safely escape. In fact, according to the National Fire Protection Association (NFPA), except for explosions, flash fires, and fire figher deaths, there has never been a documented loss of life in a building fully protected by a properly designed and maintained sprinklered building.

Building codes over the years have increasingly called for sprinklers throughout buildings for life safety, especially buildings in which rapid evacuation of occupants is difficult or the hazard posed by occupancy is high. Where the building codes don't go far enough, many states and cities enact special tough sprinkler ordinances. The State of West Virginia, for example, requires sprinklers throughout all new buildings exceeding 40 feet in height. The city of Oak Brook, Illinois, requires sprinklers throughout all new buildings exceeding 1,000 square feet in area except single-family dwellings. Some communities, such as San Clemente, California, and Greenburgh, New York, require fire sprinkler protection even in new single-family homes.

In addition to requiring sprinklers throughout new buildings, some cities have encouraged sprinkler installation in existing buildings. These include New York City's landmark Local Law 5 for high-rise office buildings and a Chicago ordinance requiring sprinklers throughout all nursing homes. High-rise hotels have been required to retrofit with fire sprinklers in the states of Nevada and Florida, and in the city of Honolulu, Hawaii.

Most automatic fire sprinklers are individually heat-activated, and tied into a network of piping with water under pressure. When the heat of a fire raises the sprinkler temperature to its operating point (usually 165 degrees Farenheit), a solder link will melt or a liquid-filled glass bulb will shatter to open that single sprinkler, releasing water in a scientifically calculated distribution pattern directly over the source of the heat. Contrary to what you see in the movies and on TV shows, when a fire breaks out, all of the sprinklers in a building do NOT activate...only the ones in the vicinity of the fire where the temperature has reached 160-165 degrees Farenheit. If ALL of the sprinklers were to activate simultaneously, the water pressure would drop so low that water would just drip from the sprinklers, rendering them totally ineffective.

Sprinklers operate automatically in the area of fire origin, preventing a fire from growing undetected to a dangerous size, while simultaneously sounding an alarm. Automatic fire sprinklers keep fires small. The majority of fires in sprinklered buildings are handled by one or two sprinklers. According to the NFPA, sprinklers are effective over 97% of the time in extinguishing or controlling a fire until the fire department can arrive. When you consider that some of the fires not adequately handled by sprinklers are due to faulty design, use or maintenance, and that many minor fires controlled by 1-2 sprinkler heads are not reported, the effectiveness nears 100%. In fact, the Australian Fire Protection Association calculates their effectiveness to be 99.76% since, by law, virtually all fires, however small, must be reported.

Proper design and installation of sprinkler systems is standardized nationally in a consensus standard promulgated by the National Fire Protection Association (NFPA Pamphlet No. 13). A basic premise of proper sprinkler protection is that sprinklers be installed throughout all building areas. Partial sprinkler protection is a game of chance, since a fire originating in an unsprinklered area can overpower sprinklers once given a head start.

What about the possibility of accidental sprinkler discharge? The amount of water which is applied to a fire by fire department hoses in an unsprinklered building fire is nearly always tens to hundreds of times more than that which sprinklers would have discharged. Sprinkers are also designed to use very little water, relying on a mathematically calculated discharge pattern to control or extinguish a fire...in many cases, it is this fine water pattern that is turned to steam by the fire to extinghish it with minimal water damage. And, again, during a fire, only those sprinklers closest to the fire activate, limiting the total amount of water needed.

Also, with regard to accidental discharge, sprinkler systems are, by and large, extremely reliable...IF they and the building are properly maintained and the building is used for the purpose for which the sprinklers were designed. Also, while there is a risk of accidental sprinkler discharge due to system failure or, for example, damaging a sprinkler head or pipe with a lift truck, Factory Mutual Research indicates that the probability of accidental discharge is only 1 in 16,000,000 sprinklers per year in service. It is essential that ALL areas of the building be sprinklered, that fire walls and barriers be kept intact, and that sprinkler lines along roof lines and exterior loading docks be protected from freezing or a "dry pipe" system be used in those areas.

The cost of a complete sprinkler system depends on many factors, such as the building type and construction, availability of public water supply, and degree of hazard of the occupancy. For new construction, systems usually cost from $1.00 to $1.50 per square foot, less than the cost of carpeting! Retrofit installations in existing buildings can be expected to cost somewhat more than new construction, depending on the difficulty of installation and other factors. A general rule of thumb is to add 50%, though this is still a bargain compared to the insurance premium savings for many installations.

How much will an insured save, compared to a nonsprinklered building, if they build a sprinklered building or retrofit an existing nonsprinklered building? In general, there will be proportionately less savings if the building is more fire resistive and/or the occupancy is low hazards...for example, a fire resistive office building. The less substantial the construction (e.g., wood frame or steel) and/or the more hazardous the occupancy (e.g., a woodworker or restaurant), the greater the savings. In many cases, a sprinkler system's cost can be offset by premium savings over a period of 1-3 years for inferior construction/high hazard buildings and 10-15 years for superior construction/low hazard buildings, not counting any financial or tax depreciation savings. In addition, sprinklered buildings, according to codes, often enable construction cost savings by permitting trade-offs such as reduced fire-resistant requirements for structural components, longer exit travel distances, and larger building areas and heights. One estimate is that, for an investment of perhaps $1.50 per square foot for sprinkers, a building owner can save $10 per square foot in construction costs, thus more than paying for the system up front.

Finally, when a rate credit is given for a sprinkler and alarm system, your insurance company will usually attach something called a *Protective Safeguards* endorsement. This endorsement usually says something like:

> *We will not pay for loss or damage caused by or resulting from fire if, prior to the fire, you:*
>
> 1. *Knew of any suspension or impairment in any protective safeguard listed in the Schedule above and failed to notify us of that fact; or*
>
> 2. *Failed to maintain any protective safeguard listed in the Schedule above, and over which you had control, in complete working order.*
>
> *If part of an Automatic Sprinkler System is shut off due to breakage, leakage, freezing conditions or opening of sprinkler heads, notification to us will not be necessary if you can restore full protection within 48 hours.*

This is an extremely restrictive coverage condition. If your negligence causes a fire, you're normally covered by your policy. However, if you fail to maintain your sprinkler system, through negligence or othewise, you have NO coverage. Therefore, unless you have properly trained personnel on staff, it is critical that a reputable sprinkler contractor be used for periodic inspections, tests, and maintenance on the sprinkler and alarm system. In addition, if any part of the sprinkler system is shut off for more than 48 hours without notice to your insurance company, coverage is suspended.

While a sprinkler system is usually a good deal, from a property loss, life safety, and insurance savings perspective, those benefits carry a hefty responsibility to properly maintain the system. Failure to do so can result in a penalty (no coverage) far greater than the loss expected if the building was not sprinklered.

For additional information about sprinkler systems, check out the following web sites:

- http://www.nfpa.org/
- http://www.usfa.fema.gov/
- http://www.firesprinklerassoc.org/insurance.htm
- http://www.charweb.org/organizations/sfpe/spklr.htm
- http://www.waycool.com/southwest/intro.html
- http://www.hollistonmass.com/fire/prevent.html

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