An Overview of Pre-Engineered Fire Suppression Systems and Industry Changes That May Affect Your Property

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A restaurant owner awoke in the middle of the night to the sound of a telephone ringing. His alarm monitoring company received a signal from the fire alarm system at one of his area restaurants located in a hotel. He arrived at the building ahead of the fire department and was pleased to see that it was still standing. Seeing no evidence of smoke or flames, he entered the restaurant. In the kitchen, he found a scorched area on the hood above a stove. The area under the hood was coated with a blanket of protective extinguishing agent. Realizing that the fire system saved his restaurant, he immediately called the fire protection service company to recharge his system.

In this situation, the investigation revealed that someone had closed the restaurant not realizing that a sauté pan was left cooking on the stove. The fusible link detector above the range activated the fire suppression system, which triggered the alarm signal, shut down the gas to the burner, and shut down the electrical power. The automatic fire suppression system protecting the cooking area worked exactly as designed, safely extinguishing the fire, allowing the restaurant owner to open for business the next day. Without a properly operating fire suppression system, he might have lost his restaurant while he slept.

This restaurant fire was successfully extinguished by a wet chemical, pre-engineered fire suppression system, which is the best first line of defense against fires igniting over commercial cooking areas. This article will review

Pre-engineered fire suppression systems provide fast, on-site protection at the earliest stage of a fire.

the different types of pre-engineered fire suppression systems available today and industry changes that may affect your property.

First, let's discuss proper fire safety procedures in an event of fire when there are people present. The very first thing that should be done is the fire department needs to be called and the people present in the building should evacuate immediately. Everyone should be safe before considering any other fire safety measure. Fire suppression systems activate automatically, their operation is safe for all employees, and do not require human intervention. They can be manually activated, if needed, in an emergency.

There are two primary types of Pre-Engineered Fire Suppression Systems. The first type is Dry Chemical Systems, which are used for Industrial Fire Protection and utilize dry chemical compounds that suppress fire effectively and provide efficient coverage, are easy to install and maintain in any industrial setting. These systems require recharging after operation. Dry chemical agents are for the protection of ABC or BC hazards. In applications where a dedicated water supply is not available, dry chemical is an easy, affordable alternative to water and some other agents.

Dry chemical systems must comply with NFPA 17, Standard for Dry Chemical Extinguishing Systems, and NFPA 33, Standard for Spray Application Using Flammable and Combustible Materials and also tested to the new real world criteria of UL 1254, Standard for Pre-Engineered Dry Chemical Extinguishing System Units revised as of September 29, 1998.

The second type of Pre-Engineered Fire Suppression System is Wet Chemical Systems, which are used for Commercial Cooking Area Protection. A wet agent system is an effective way for suppressing commercial cooking fires before major damage occurs. When a wet chemical agent is applied in a concentrated liquid spray to a burning surface, it reacts quickly with the cooking media (fats or oils) to produce a foam blanket covering the surface. This reaction, combined with the cooling effect of the wet chemical agent, also reduces the possibility of fire re-flash.

Wet Chemical Systems must comply with NFPA 17a, Standard for Wet Chemical Extinguishing Systems, and NFPA 96, Standard for Ventilation Control and Fire Protection for Commercial Cooking Operations, and also be tested and listed to ANSI / UL 300 Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment.

However, these suppression systems will only perform effectively if the equipment is properly inspected, maintained, and kept current with Underwriters Laboratories (UL) testing standards. Here is an overview of two standards that are critical to each of the two types of pre-engineered fire suppression systems just discussed. Below is an update of UL 1254, which is relevant to the Dry Chemical Systems in Industrial Fire Protection and then a review of UL 300, which pertains to Wet Chemical Systems in Commercial Cooking Applications. Compliance with these two very important UL standards could mean the difference between a single flame and a tragedy for any commercial structure that is protected by pre-engineered systems.

UL 1254: An Overview of How it Impacts Your System

The revised UL 1254 Standard for Pre-Engineered Dry Chemical Extinguishing System Units affects all pre-engineered dry chemical total-flooding systems, auto refueling systems, and paint spray booth systems.

The most significant change in the new standard is the addition of completely new sections covering paint spray booth protection. Under the old standard, all total flooding hazards were protected in the same manner, with a general-purpose total flooding system. The new standard makes a distinction between general total flooding applications and protection provided for spray booths by incorporating elements into the spray booth fire test protocol, such as exhaust airflow and barriers.

The impact that the new requirements will have on existing Industrial Dry Chemical Systems will depend on the situation. It is up to the "Authority Having Jurisdiction", which includes the insurance companies, fire service, and building management, to determine if the existing system is still appropriate for the application. Regardless, FEMA strongly recommends the reevaluation of the hazards and, if appropriate, the upgrading of any older systems to the application-specific requirements of the new UL 1254 standard, since the new designs are tested to the actual challenges that they are installed to protect.

If you find yourself with a pre-engineered, dry chemical system that is already installed and listed prior to the new compliance date of September 28, 1998, you will need to consult the individual manufacturer of the system. Most manufacturers firmly believe that as improved tests requiring manufacturers to simulate real-world conditions are developed, and as systems are approved to this higher level of fire protection, existing installations must be modified to meet the design criteria of this new generation of fire protection. The evolution of fire protection is based on past experience (both successful extinguishment history as well as loss history), advancements in technology, and sound engineering principles.

UL 300: An Up-To-Date Compliance Review

It is very important that all restaurant owners are aware of UL 300, a fire test procedure written by Underwriters Laboratories to ensure that all manufacturers are designing their systems to perform in the real world when called upon to extinguish restaurant fires.

Effective November 21, 1994, UL 300 was revised to incorporate changes which specifically addressed cooking appliances in an effort to provide test protocols that more closely reflect real world fire risks. The evolution of these appliances over the years created a far more challenging fire hazard as appliance manufacturers strive for improved performance. Cooking methods had changed significantly and stricter fire testing had become necessary to validate fire protection systems reliability.

The new testing standard dramatically affected the way several appliances are protected including fryers, griddles, ranges, charbroilers (gas radiant, electric, lava rock), and woks. Although each manufacturer's system is different, on average, up to five times more agent is required for protection of these appliances under this revised Standard. Additionally, nozzle placement became critical in order to extinguish the fires while maintaining a high degree of safety for kitchen occupants.

UL's requirements provide the basis for acceptable fire protection for commercial cooking hazards. However, it is the Authority Having Jurisdiction (AHJ), not UL, which governs the acceptability of installations. Some manufacturers no longer provide support and will not accept liability for dry chemical or pre-UL 300 systems that continue to remain in place or have been salvaged and re-installed in another location. The concept of "grandfathering" is not approved by many manufacturers and is highly discouraged by most, when life safety is at risk. If there is a question as to the level of support for a particular installation, consult the manufacturer of the system.

It is the obligation of all industry affected to provide reasonable assurance that the fire protection solution incorporates the latest in technology and

provides the highest level of safety to life. For this reason, several important questions must be asked and answered when reviewing the acceptability of a fire suppression system installation in a commercial cooking operation.

Consider these basic questions:

Is the system installed in accordance with the listed manual that was in place at the time of the original installation including all technical bulletins, addenda, etc.?

Are the cooking appliances currently in place, the original appliances installed at time of system installation?

Do the cooking appliances in place meet the definition of "High Efficiency" as listed in UL 300 testing protocol?

Is the cooking media being used that of a vegetable shortening, animal fat, or other synthetic type of cooking oil? What is the auto ignition temperature?

Have the owners and operators in the cooking establishment been properly educated on the operation of the system and the changes in complexity of systems installed prior to the UL 300 testing compliance dates, vs. those installed to a previous listing?

Are these operators also aware of the changes to the complexity of the fire hazard if they make changes to cooking appliances by purchasing newer modern appliances, change to a different cooking media, or make changes to appliance layouts? All of which require re-examination of the fire protection for the hazard?

The two ways to know whether a cylinder assembly is listed in accordance with UL 300 is: 1) to look at the cylinder assembly manufacturing date and; 2) to read the cylinder label which references the manufacturer's installation, operation, maintenance, and recharge manual, thus linking the cylinder assembly and system design to the listing approvals. In some cases, the label may also state "meets the requirements of Standard UL 300."

The Clear Benefits of All Pre-Engineered Fire Suppression Systems

The first and foremost benefit is early detection and quick response to the fire. Pre-engineered fire suppression systems provide fast, on-site protection at the earliest stage of a fire. Depending upon the detection package installed, the system response could be immediate or timed delay.

Second, pre-engineered fire suppression systems are safe and easy to use. Since pre-engineered fire suppression systems activate automatically, they are safe and easy to use. Systems do not require human intervention although they do provide a manual override option in case of emergency.

Third, pre-engineered means pre-tested to ensure success. Designed in accordance with NFPA 17a and 96 and tested to stringent Underwriters Laboratories Inc. (UL) testing protocols, pre-engineered fire suppression systems are pre-tested to effectively extinguish specific types of fires in special hazard situations.

A fourth benefit of pre-engineered fire suppression systems is that it eliminates the fuel source. The fuel or electrical source of a fire contained within cooking equipment often continues to feed the fire after it has ignited. Pre-engineered fire suppression systems eliminate the fuel source automatically.

If you are a fire protection professional providing a service and expert advice to your customers on their fire protection systems, you are obligated to provide the very best fire protection solution to protect their assets. The best solution for your customer should include a balanced approach using all of the available links in the chain of survival: smoke and heat detectors, defend-in-place products, such as portable extinguishers and fire hose, sprinkler systems, special hazard systems protecting high-value assets or processes, and fire department notification systems that exist in today's fire alarm systems. All these components must work together to provide a complete and balanced fire protection plan.

If you have additional questions about your pre-engineered fire suppression system, FEMA recommends that you contact the manufacturer and they will be able to assist you in determining if your system is up-to-date an in compliance. FEMA recommends that all systems meet or exceed the recommended minimum safety standard requirements as set forth by The National Fire Protection Association, The International Fire Codes, as well as federal, state, and local code bodies. These standards have been accepted worldwide by various code bodies as a minimum safety standard when addressing pre-engineered fire suppressions systems. ❖

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