

Fire Protection for Deep Fat Fryers

Technological advances in commercial cooking equipment, new cooking methods for unique foods, and the use of “healthier” specialty cooking oils have contributed to increase the fire challenge of deep fat fryers. Consequently, providing adequate fire protection for this hazard is becoming more difficult.

The following provides information on selecting a fixed fire protection system for controlling or extinguishing fires that can occur in deep fat fryers in a commercial cooking environment. It covers factors that should be considered when evaluating the effectiveness of older fire suppression systems and whether those systems should be replaced. It also covers handheld portable fire extinguishers for deep fat fryers and outlines the problems associated with the use of deep fat fryers and the accepted method of providing adequate fire protection. It also will explain some of the changes that have occurred in the area of fire protection for deep fat fryers.

This document addresses fire protection for deep fat fryers, but does not cover other fire protection and detection systems. Those systems have their own safety concerns.

The Problems

For years, an accepted method of protecting deep fat fryers has been the pre-engineered, dry chemical, fixed fire suppression system. Dry chemical systems use an alkaline based chemical that, when mixed with heated fatty acids from lard-based cooking oils, creates a soap-like substance that blankets the cooking oil surface and extinguishes the fire (a process called saponification).

Vegetable-based cooking oils have a lower amount of fatty acids compared to lard-based oils. As a result, the saponification process and resulting blanket effect from dry chemical suppression agents are reduced. Additionally, the higher auto-ignition temperature of low fat oils results in a hotter fire. The cooling effect of suppression is less effective at this higher temperature, resulting in an increased likelihood of re-ignition.

In order to cook faster and more economically, equipment manufacturers created higher efficiency, better-insulated deep fat fryers capable of economically sustaining higher temperatures. Better-insulated deep fat fryers result in a slower cooling effect from suppression and a reduced effectiveness of the dry chemical extinguishing agent. Significant fire potential exists with the mixing of new deep fat fryer equipment and old fire protection system technology.

Hazardous conditions are created in these situations:

- Using older deep fat frying equipment to heat vegetable oils to higher, more efficient cooking temperatures, causing the cooking unit to overheat
- Using newer, more efficient deep fat fryers with animal-based cooking oils can overheat the oil

In either situation, an intense fire can result, and the dry chemical system may not be able to extinguish it.

As a result of the changes in technology, new standards were developed to ensure that any extinguishing system can provide adequate fire protection for commercial cooking facilities. All new fire protection systems for restaurant cooking areas must meet these requirements.

Fire Protection Systems

Existing fire suppression systems include dry chemical, wet chemical, water spray, gaseous agents, and portable fire extinguishers. These fire suppression systems have met with varying degrees of success when tested to standards.

Dry chemical: At the present time, dry chemical systems have not proven able to meet the requirements and should not be used for deep fat fryers. However, existing dry chemical systems may still be used for plenum and

duct protection, as well as cooking areas that do not have deep fat fryers. They are also acceptable if the fryer installation has not been modified by the use of highly insulated fryer vats.

Wet chemical: Newer wet chemical fire extinguishing agents have been able to successfully meet the applicable standard. However, more extinguishing agent is needed as compared to older wet chemical systems. On average, about five times more wet chemical agent is needed to meet the requirements, depending on the specific system manufacturer.

If the wet chemical system was manufactured after November of 1994 and is listed, it almost certainly will have met the standard. If the unit was manufactured prior to November 1994, it may need to be upgraded or replaced in order to provide adequate protection for newer deep fat frying equipment. Contact your local fire equipment contractor to verify that your wet chemical extinguishing equipment is acceptable for your situation.

Water spray: Water spray systems have potential to extinguish deep fat fryer fires. However, to date, the spray head manufacturers have not been inclined to go through the new testing procedures. The potential market for water spray protection of deep fat fryers is relatively small and the wet chemical systems are proving to be successful. There are currently no water spray heads that have been tested and have met the requirements.

Gaseous or “clean” agent: Traditionally, gaseous agents have not been considered a reliable fire suppression method for cooking areas. The airflow associated with cooking area exhaust hoods would dissipate the agent before it could provide adequate control of a fire.

Portable fire extinguishers: A new Class of portable fire extinguisher has been developed for use in cooking areas. This extinguisher uses a wet chemical agent, and is now the accepted fire extinguisher type for deep fat fryer protection. This extinguisher can be identified by the words “Wet Chemical Fire Extinguisher for Use on Cooking Appliances.”

Firefighting Procedures

If a deep fat fryer fire occurs, the fire department should be notified immediately. Portable fire extinguishers should only be used if the fire is small enough to safely fight using hand held fire extinguishers. When a fire is fought with portable extinguishers it will be necessary to manually shut down the cooking equipment since the interlock with the fixed suppression system will not be activated until the fixed system operates.

Activation of the fixed fire protection system will also activate the interlock to shut down the power source to the cooking appliances. This allows the cooking units to cool and decreases the chance of injury from electrical shock while spraying the wet chemical agent from the portable fire extinguisher.

Use of portable extinguishers as backup to the automatic fire protection system may require a major education effort. Historically, the portable handheld fire extinguisher was considered the “first line of defense” against most fires. Now the first line of defense against fire in deep fat fryers is to activate the fixed fire-extinguishing system. Employees should be trained in how to manually activate the system. If there is more than one system, it is important that each manual activation point be clearly labeled to identify what system or appliance is involved.

Inspection, Testing and Maintenance

A qualified contractor should inspect and service cooking area fire protection systems every six (6) months. Cooking hood grease filters should be thoroughly cleaned regularly (e.g. once per week.) as this is the first point where grease will collect. Exhaust ducts also need to be cleaned as not all grease will be captured by the filters and thus are subject to grease-laden vapors. Both the fire protection system and the exhaust hood should be labeled with the most recent date of service and the name of the company that performed the service. The hood and duct inspection and cleaning frequencies should follow one of the following frequencies:

- Monthly – Systems covering solid fuel cooking operations
- Quarterly – Systems covering high-volume cooking/frying operations such as 24-hour cooking, charbroiling, or wok cooking operations
- Semi-annually – Systems covering moderate-volume cooking operations
- Annually – Systems covering low-volume cooking operations, such as churches, day camps, seasonal businesses, or senior centers

Summary

For adequate fire protection of deep fat fryers, existing dry chemical extinguishing systems should be replaced with fire extinguishing equipment that meets or exceeds applicable standards. Upgrading an existing wet chemical system to one that meets the new standards is recommended (and may be required by the local jurisdiction) when existing appliances are rearranged or appliances are added. All fire protection systems and exhaust ducts should receive periodic inspection, testing and maintenance.

References

Underwriters Laboratories Inc., Standard for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas, UL 300

Underwriters' Laboratories of Canada, Fire Testing of Restaurant Cooking Area Fire Extinguishing Systems Units, ULC/ORD C1254.6.

Underwriters Laboratories Inc., Standard for Pre-Engineered Dry Chemical Extinguishing Systems Units, UL 1254

National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96

National Fire Protection Association Standard for Dry Chemical Extinguishing Systems, NFPA 17

National Fire Protection Standard for Wet Chemical Extinguishing Systems, NFPA 17A

Kerry Bell and Kenneth W. Zastrow, Pre-Engineered Chemical Extinguishing Systems

Loss Prevention Certification Board, Loss Prevention Standard LPS 1223 2.1 Requirement and testing procedures for the LPCB certification for and listing of fixed extinguishing systems for catering.

Fire Prevention Association RC16b FPA recommendations for cooking equipment (Other than fish and chip shop frying ranges)

UL 300 is internationally recognized and is used worldwide as the benchmark for the design and testing of all "restaurant" wet chemical fire suppression systems. Always consult your local authority having jurisdiction for local requirements.

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