ZURICH

RISKTOPICS

Ventilation control and fire protection of commercial cooking operations
January 2013

Restaurants and other commercial cooking operations must stay diligent in fire prevention and control as new equipment, cooking methods and NFPA standards present new challenges.

INTRODUCTION

According to NFPA (National Fire Protection Association) statistics, there were an estimated 7, 670 fires reported to public fire departments nationwide each year in restaurants between 1999 and 2002. These fires resulted in direct property damage of $153 million USD annually. In 2002, the latest year for which statistics are available from the National Fire Protection Data Center of the U.S. Fire Administration, 7,100 restaurant fires resulted in 108 injuries and $116 million USD in property loss.

Along with the direct property damages, business interruption and indirect losses have a significant negative economic impact. Many restaurants never re-open after suffering a fire loss.

The food service industry continues to be big business. According to the National Restaurant Association's 2004 industry forecast, more than one million restaurant establishments will exist in the U.S. by 2010. Today's restaurants and other commercial cooking operations need to be aware of how changes in the industry, such as new types of equipment and cooking practices, affect fire hazards and how to stay in compliance with NFPA standards.

COMMERCIAL COOKING FIRE HAZARDS

Historically, commercial cooking operations present fire risks from an ignition standpoint as well as a ready source of preheated fuels. Cooking oil and greases are the materials most frequently ignited first. Every vaporized or coagulated drop of grease in a duct should be considered flammable, and duct fires can reach temperatures of 1,600 degrees to 2,000 degrees Fahrenheit within minutes. This is hot enough to melt ductwork quickly and ignite surrounding combustibles. Commercial cooking appliances that provide a significant fire risk include broilers, woks, griddles and deep fat fryers.

In the past several years there have been major changes in commercial cooking. New kitchen equipment uses more efficient burners resulting in much higher heating rates. Animal fats have been replaced with vegetable oil, which burns at hotter temperatures, thus increasing the risk of a re-flash in the event of a fire.

Dry chemical fixed fire suppression systems are no longer as effective in controlling or extinguishing vegetable oil fires. Vegetable oils have only a limited amount of fatty acids to saponify, resulting in a thinner foam blanket forming when combined with the dry chemical. Coupled with the higher heat levels used by the new fryers and longer heat retention by increased insulation in these fryers, the thinner foam blanket breaks down before the grease can cool below its auto-

ignition temperature. When the oil reignites, there is no longer a charged suppression system to extinguish it, which leads to fires that cause a much greater degree of damage to restaurants.

In response to this, Underwriters Laboratories (UL) developed the UL 300 standard "Fire Testing of Fire Extinguishing Systems for the Protection of Restaurant Cooking." In order to obtain and maintain a UL Listing, operators must upgrade the protection systems for this hazard to meet the UL 300 standard. Because of their capability with UL 300, "wet chemical" extinguishing systems are now the protection system of choice today.

RESTAURANT FIRE PROTECTION, CONTROL AND SUPPRESSION

Commercial cooking fire suppression systems need to be installed in compliance with NFPA 96, NFPA 10, and NFPA 17A as well as any additional state or local requirements.

- NFPA 96 – Ventilation Control and Fire Protection of Commercial Cooking Operations
- NFPA 10 – Standard for Portable Fire Extinguishers
- NFPA 17A – Standard for Wet Chemical Extinguishing Systems
- NFPA 96 provides the minimum fire safety requirements for both public and private cooking operations.

EXHAUST HOODS AND SYSTEMS

- NFPA 96 requires that exhaust hoods are equipped with listed grease removal devices such as filters and that there is at least 18 inches of clearance between the grease removal filter and cooking surface – unless the filter is listed for closer separation distances. Filters should be easily accessible and removable for cleaning and installed at an angle not less than 45 degrees from horizontal.
- The exhaust system and ducts must be constructed of, and supported by, carbon steel not less than 0.054 inches in thickness or stainless steel not less than 0.043 inches in thickness.
- Ducts should be installed without dips or traps that might collect residues, such as grease, and there must be access to all parts of the duct to facilitate cleaning.
- All exhaust ducts must lead directly to the exterior of the building in order to have the shortest length of ductwork necessary, which helps limit the area available for grease to build up and the amount of duct that has to be cleaned.
- Lengths of ductwork must be installed vertically or at a substantial incline – rather than horizontally – to allow for better grease drainage and faster vapor exit.
- The hood or that portion of a primary collection means designed for collecting vapors and residues shall be constructed of and be supported by steel not less than 0.043 inches in thickness, stainless steel not less than 0.037 inches in thickness.
- All seams, joints, and penetrations of the hood enclosure that direct and capture grease-laden vapors and exhaust gases shall have a liquid-tight continuous weld.
- The system shall be connected to the building fire alarm system.

DEEP FAT FRYERS

- All deep fat fryers shall be installed with at least a 16 inch space between the fryer and the surface flames from adjacent cooking equipment.
- Where a steel or tempered glass baffle plate is installed at a minimum height between the fryer and the surface flames of the adjacent appliance, the requirement for a 16-inch space does not apply.

FIRE EXTINGUISHING EQUIPMENT

- Cooking equipment producing grease-laden vapors must be protected by a fire extinguishing system.
- The fire extinguishing system should include both the automatic extinguishing system and a portable fire extinguisher as a secondary back up. Portable fire extinguishers must be installed in kitchen cooking areas in accordance with NFPA 10 and must be specifically listed for such use.
- Automatic fire extinguishing systems need to comply with UL 300.

- Automatic shut off of all sources of fuel and electric power to heat producing equipment when the automatic extinguishing system activates is required.
- Automatic shut-off devices must have a manual reset.
- A readily accessible means of activation for the extinguishing system, such as a manual pull, should be located between 42 and 48 inches above the floor along a path of fire egress.

USE AND MAINTENANCE

- Exhaust systems must be operated whenever cooking equipment is turned on, and cooking equipment must not be operated while protective systems are inoperative or under repair.
- Properly trained and qualified personnel should perform maintenance on the fire extinguishing systems at least every six months and inspect the entire exhaust system for grease build up regularly, depending on the type of operations.

REFERENCES

- NFPA 96: Standard for Ventilation Control and Fire Protection of Commercial Cooking Appliances
- NFPA 17A: Standard for Wet Chemical Extinguishing Systems
- NFPA 10: Standard for Portable Fire Extinguishers

Zurich Insurance Group Ltd.
Mythenquai 2 CH-8022 Zurich – Switzerland
www.zurich.com