

Fire Safety First

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8 key things to know about the fire-safety requirements of commercial cooking

Restaurant facility professionals protect their facilities from potential fires by complying with the minimum local fire-safety requirements.

A 2012 report titled "Structure Fires in Eating and Drinking Establishments" by Ben Evarts, found that U.S. fire departments responded to an average of 7,640 structure fires per year in eating and drinking establishments between 2006 and 2010. These fires caused an annual average of two civilian deaths, 115 civilian injuries and \$246 million in direct property damage. Provided with this information, it's no wonder fire protection is at the top of the menu for many restaurant facility professionals.

NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, provides preventive and operative minimum fire safety requirements related to the design, installation, operation, inspection and maintenance of all public and private cooking operations. The current, 2014, edition of NFPA 96 provides requirements for exhaust systems, clearance requirements, construction materials for hoods, types of fire extinguishing equipment, routine cleaning, employee training, solid fuel cooking and the inspection, testing, and maintenance of the equipment in the facility. Understanding the purpose of the requirements and applying the provisions in NFPA 96 will reduce your restaurant's potential fire hazard and minimize the probability it turns into another statistic.

With that goal in mind, consider these eight key items that will help you prevent restaurant fires:

1. Exhaust systems for cooking equipment that produce smoke or grease-laden vapors

Although many people think this is a straight-forward requirement, the NFPA Advisory Service Program receives a surprising number of questions on this section. The type of food being cooked, how food is being cooked, the cooking medium, the cooking appliance and how often it is cooked are all important factors to consider in answering this question. For example, grilling burgers and frying French fries produce grease-laden vapors and require a Type I exhaust hood. Meanwhile, muffins baked in an oven require a Type II hood, which is designed for heat and steam removal; however, Type II hoods are not applicable to NFPA 96.

The only exception to this rule is if the cooking equipment has been listed in accordance with ANSI/UL 197, Standard for Commercial Electric Cooking Appliances, or an equivalent standard for reduced emissions, in which case an exhaust system is not required. This requirement specifically applies to equipment served by recirculation systems, also known as ventless-type cooking equipment, which is addressed in Chapter 13 of NFPA 96.

2. Clearance requirements

The issue of clearance from cooking equipment to combustible material is particularly important to prevent fires from spreading. Fires that burn in ducts can reach very high temperatures. Extremely hot temperatures in a duct can create a large amount of radiant heat on the outside of the duct, even where the duct is not compromised. In this case, the radiant heat has the potential to ignite combustible materials and start fires in the combustible concealed spaces of a building. Maintaining a clearance from the duct to combustible and limited combustible materials is intended to reduce this risk.

Section 4.2 of NFPA 96 states where enclosures are not required. It also specifies hoods, grease-removal devices, exhaust fans and ducts are required to have a minimum clearance of 18 inches to combustible material, 3 inches to limited-combustible material and 0 inches are provided in Chapter 3, and examples of each of these materials is material, limited-combustible material and non-combustible material are provided in Chapter 3, and examples of each of these materials is provided in the annex.

Although these requirements are directly related to construction requirements, the clearances should still be observed in the ongoing operational life of the system. For example, placing combustible boxes on top of a hood or directly against its side can present the very same hazards discussed above.

In many existing facilities, combustible material might already be present, and the clearance requirements specified above will be difficult, if not impossible, to achieve. Section 4.2.3 of NFPA 96 provides requirements for clearance reduction systems.

3. Hood construction and sizing

Chapter 5 of NFPA 96 provides all hoods requirements. The three main sections address hood construction materials, how to construct the hood and hood size.

Hoods are required to be constructed of and supported by steel not less than No. 18 MSG in thickness, stainless steel not less than No. 20 MSG in thickness or other approved material of equivalent strength and fire and corrosion resistance. In addition, all seams, joints and penetration of the non-listed hood enclosure that direct and capture grease-laden vapor and exhaust gases are required to have a liquid-tight continuous external weld to the hood's lower out most perimeter. The purpose of the continuous welds is to prevent grease and, in the event of a fire, stop the flames from extending into the overhead of the building.

A common misconception is that NFPA 96 requires a specific value for the size of a hood. Section 5.2 requires hoods to be sized and configured to provide for the capture and removal of grease-laden vapors. While overhang dimensions are typically provided for listed hoods, based on the requirement in Section 5.2, no overhang is actually specified or even necessarily required.

In order to determine the size of a hood, note the front and side overhang requirements from the hood to the cooking appliance, dimensions "F" and "S" respectively. For example, the hood listing could call for 12 inches for dimension "F"

when the hood is over a Charbroiler, 9 inches when over a griddle and only 6 inches when over a convection oven. One important difference between the non-listed and the listed hood is the listed hood "F" dimension is measured from the front of the cooking surface, not the front of the cooking appliance.

While the hood can be sized perfectly at the initial installation, installing new cooking equipment underneath the hood, or moving the equipment for cleaning and not returning it to the properly location, defeats the purpose of the proper hood sizing.

4. Exhaust duct systems

The requirements for exhaust duct systems, provided in Chapter 7, is by far the largest chapter in NFPA 96. This chapter provides requirements for clearance, openings, other grease ducts, exterior installation, interior installations and termination of exhaust ducts, which include both rooftop terminations and wall terminations.

To understand the purpose of all these provisions, think about the air flow through the system. Once the smoke and grease-laden vapors have been captured by the hood and the majority of the grease is removed from the air by grease-removal devices, the air is carried through the exhaust duct to be expelled at the system termination. The main principals of the duct system design are meant to provide enough access so that it can be cleaned and inspected, and ensure that it is constructed with materials and connections that will not compromise its integrity should a duct fire occur. It also must terminate at a location that will prevent any contaminated air from being recirculated back into the building or an adjacent building.

5. Fire extinguishing systems and how to use them

Cooking equipment that produces grease-laden vapors is required to be protected by fire-extinguishing equipment. This includes automatic extinguishing systems as the primary protection method and portable fire extinguishers for backup.

Automatic extinguishing systems are required to comply with the ANSI/UL 300, Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment, or other equivalent standards and must be installed with the requirements of the listing. It is important to note that in the early 1990s, the ANSI/ UL 300 test standard was modified to reflect modern cooking conditions with new energy-efficient appliances and an up dated cooking medium in the test by replacing animal lard with vegetable oil, which burns hotter. Dry chemical systems are no longer capable of passing the ANSI/UL 300 test standard. Check the fire extinguishing systems installed in your facility and make sure the system complies with the ANSI/UL 300 test standard, or an equivalent test standard.

In addition, all sources of fuel and electrical power that produce heat to equipment requiring protection by a fire extinguishing system are also required to be automatically shut off to prevent re-ignition.

The manual pull stations associated with the automatic fire extinguishing systems are required to be located a minimum of 3 feet and maximum of 6 feet from the

protected hood and in the path of egress. Remember, they are required to be accessible (i.e., do not block these manual pull stations or any means of egress). All employees should know the location of these manual pull stations, as well as how and when to operate them.

Portable fire extinguishers are required and must be installed in accordance with NFPA 10, Standard on Portable Fire Extinguishers. They also must be listed for their use. Class K fire extinguishers should be used if vegetable oils and animal oils/fats are present in the kitchen. However, all buildings have Class A fire hazards where ordinary combustibles are present (e.g., in dining areas of restaurants). Employees should be trained on the various types of portable extinguishers and how to use them in the event of a fire.

To use an extinguisher, remember the P.A.S.S. technique:

Pull the pin.

Aim low, pointing the extinguisher nozzle at the base of the fire.

Squeeze the handle to release the extinguishing agent.

Sweep from side to side at the base of the fire until it appears to be out.

6. Inspections, testing and maintenance

Although inspections for grease buildup and fire extinguishing systems at specified intervals are typically contracted out, several items can be inspected on a daily basis by restaurant employees through a training program in which you develop and have your managers enforce. First, have employees routinely look out for normal wear and tear of equipment (e.g., broken seals, missing screws, exposed wires).

All employees should start their routine by inspecting the equipment to ensure it was properly cleaned from the previous night (or shift), confirm that if the equipment requires a fire extinguishing system, the nozzles are clear and not clogged with grease. Many restaurants use heaters to keep the food hot after it has been cooked; make sure employees know to check that there are no flammable materials on top of or near the heaters. Before starting the fryer, employees should check to make sure the oil level isn't too low, because if the heating coil is exposed above or close to the oil surface, residue and oil can catch fire. These are all very simple yet effective steps in the fire protection program of your facility that do not require an outside contractor.

There are items that need to be inspected that only trained, qualified and certified person(s) are capable of conducting. For example, cooking equipment must be inspected and serviced annually and the fire extinguishing system needs to be inspected at least every six months. The entire exhaust system is required to be inspected for grease buildup in accordance with Table 11.4 of NFPA 96, which bases the quantity of inspections on the amount of cooking and type of cooking taking place at a facility.

7. The role of cleaning

Since one in every five fires cited in Evert's report had "failure to clean" as a factor contributing to its ignition, cleaning seems like an easy and obvious solution to mitigate fire risks. However, when many hear the word "cleaning," they assume it means hiring a company to clean the grease within the ductwork. Although this is a critical process that cannot be missed, there are many ways restaurant facility professionals can ensure the staff knows how to reduce the risk of fire within their facility. Developing and enforcing a training program for all employees is a great method to achieve this goal. New employees should be trained and current employees should be recertified on specific procedures every six to 12 months.

If during the scheduled inspection, the exhaust system is found to be contaminated with deposits from grease-laden vapors, the contaminated portions of the system are required to be cleaned by a properly trained, qualified and certified person. Once the cleaning is complete, a written report must be provided to the owner of the system, detailing the amount of grease buildup, as well as any maintenance or repairs needed, and any areas that were inaccessible or not cleaned.

8. Owners' responsibility

NFPA 96 requires that the standard be applied as a united whole. It is important to recognize that all the chapters in NFPA 96 may be working on individual components of ventilation control and fire protection, but each of them are needed for the overall goal of reducing the potential fire hazard of cooking operations.

Ultimately, it is the owner's responsibility that cooking equipment, hoods, ducts, fans, fire-extinguishing equipment and special effluent or energy-control equipment installed in their facility be maintained to ensure the entire system works properly and provides the appropriate level of protection. In addition, the owner is responsible for the inspection, testing, maintenance and cleanliness of the ventilation control and fire protection of the commercial cooking operation, provided that this responsibility has not been transferred in written form to a management company, tenant or other party.

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