

On the menu: fire-fighting in the kitchen

Growth in the restaurant and fast food sector continues apace. But commercial ambitions can be easily devastated by a fire, making fit-for-purpose suppression systems in the kitchen vital to business resilience, and of course, public safety.

Sarah Colwell of BRE Global discusses.

Despite five years of global recession, restaurants and especially fast food outlets have bucked the trend and seen relatively healthy growth. Consumer lifestyle in the West continues to embrace eating out and take-out food. Demand is growing, too, in emerging economies such as Africa, Russia, India, as well as China and other parts of the Far East.

However, the feel-good story comes with a cautionary note. Fire risks exist in every commercial kitchen.

A report ⁽¹⁾ for the National Fire Protection Association (NFPA) found that U.S. fire departments responded to an estimated average of 7,640 structure fires per year in eating and drinking establishments between 2006 and 2010. These fires resulted annually in two civilian deaths, 115 civilian injuries, and \$246 million in direct damage to property. Cooking equipment was involved in three out of five (57%) of the fires.

Cooking materials, principally fats and oils present in deep fat fryers, grills and cooking ranges, are especially susceptible to ignition. Grease residue on extractor hoods and ducts, fans and grease filters is also flammable, capable of fuelling a fire and precipitating its passage through ductwork.

The effects can reach far beyond the immediate fire and smoke damage to catering equipment and workspace. This in itself can be costly and time-consuming to replace and clean up. But there are potentially much greater impacts. They include disruption of business, loss of revenue and jobs, injury or even loss of life, and inevitable damage to reputation, sometimes unrecoverable. If the kitchen is located within a large complex, a shopping mall, airport concourse or leisure plaza, then impacts can ramify through adjoining businesses and assets.

In 1997, a fast food outlet at London Heathrow Terminal One succumbed to a fire which broke out in the communal roof duct serving a number of food serveries. It took five hours to extinguish the blaze, leaving the terminal closed for ten hours, 300 flights cancelled and affecting an estimated 45,000 passengers.

In 2009, in Vilnius, Lithuania, a fire started in a deep fat fryer in a restaurant in the Akropolis shopping mall. The flames reached the extraction duct, which was coated in fat, fuelling the fire and allowing it to travel through the duct into the main building, activating 19 sprinkler heads. Some 3,000 people had to be evacuated and the cost to the mall, even though it reopened the next day, was approximately €150,000 (\$207,000).

Preventable

However, such incidents are preventable through diligent mitigation and management of risks using a combination of measures. These include regular and thorough cleaning regimes in the kitchen, effective management and training of staff, checks on the provision of suitable local extinguishing equipment, and the installation of a fixed suppression system.

Fixed fire-fighting systems must be carefully selected following an assessment of both the risk of fire and the risks associated with the operation of the fire-fighting system.

Usually installed in the canopies above cooking areas, a pre-engineered suppression system prevents a fire entering the duct and puts it out at source. Effectively, it comprises a series of discharge nozzles over target appliances – such as ranges, skillets, deep fat fryers, high level grilles - connected by pipes to a source of fire suppression agent. Current systems employ a range of extinguishing media including water, chemical and gaseous based systems.

A correctly specified suppression system will extinguish the fire rapidly, allowing kitchen operations to be fully resumed following removal of the fire source, local clean up and reinstatement of the protection system. Key installations may require a duplicate suppression system so that servicing or re-charging of the activated installation does not interrupt business.

Design specifications and performance capabilities for a suppression system may look good on paper. But these need to be backed by third party approval confirming that the installation will actually perform as required in the event of a fire.

As with any fire safety equipment, specifiers need to scrutinise both the approval standard used to certify the design and performance of a kitchen fire suppression system and the product specifications provided by the manufacturer and installer. This will ensure they fully understand the scope of application and operation of the installed systems to ensure they meet the end users requirements.

While there are a number of test standards available in the market covering the design and performance of kitchen suppression systems, it is important that end users recognise the difference between simple type testing and third party approval schemes.

Third party approval schemes such as LPS 1223⁽²⁾ offered by the Loss Prevention Certification Board (LPCB) are not just a one-off type test. LPCB schemes provide a robust third party approval through on-going product and factory production control (FPC) audits to ensure that manufactured systems continue to conform to the design specifications originally tested and certified. The audit process includes site visits to inspect installations and on-going checks of the manufacturer's factory production control and the system's performance.

LPS 1223 sets out the requirements and testing procedures for LPCB certification and listing of fixed fire extinguishing systems for catering equipment.

LPCB, part of BRE Global, has over 100 years' experience working with the fire industry, regulators and insurers setting the standards for evaluating the performance of fire protection and security products.

Key elements

LPS 1223 tests and certifies a fire suppression system on five key elements.

It evaluates the performance of three required design functions: fire detection, annunciation and extinction.

In addition, the standard requires compliance regarding two distinct service elements crucial in supporting system performance.

The first is the provision by the manufacturer of a manual with full instructions for system design, installation, operation, recharge and maintenance. Secondly, the supplier must ensure systems are designed and installed by their authorised agents, maintaining an up-to-date list of appropriate engineers and companies. They must also ensure that agents design, install and maintain the suppression system in accordance with the manufacturer's requirements.

The suppression systems must protect the cooking appliance and extractor hood as well as detecting and extinguishing fire in both. In addition, the extinguishing systems need to isolate and shut-down the cooking units while allowing connection to a fire alarm system to annunciate the event.

Both manual and automatic activation (actuation) of the systems is also required. While there are concerns that manual override could be misused by personnel, it is a feature critical to the effective implementation of the kitchen fire suppression system to ensure it can be operated in all eventualities.

Additionally, it must be impossible for the user to isolate the power supply to the suppression system without also isolating power and fuel supply to the catering equipment. For pumped systems, electricity supply should be from a dedicated feed circuit with its own RCD protection.

Onerous

Performance tests in LPS 1233 are based on subjecting equipment to challenging extinguishing situations.

Tests ensure that certified equipment extinguishes the fire within the system discharge time and that no burning oil splashes out of the appliance as a result of agent discharge. On completion of discharge, equipment temperature must be lower than at the time of actuation and below auto-ignition temperature of the cooking fat used. Successful testing also requires that there is no re-ignition of fire in the catering equipment after discharge of the suppression agent.

LPS 1233 also includes tests to verify distribution balance of discharge agent between nozzles at upper and lower flow rate ranges for the system. Components are also subject to comprehensive testing of pressure strength, corrosion, operation/ageing, thermal shock, clogging in addition to pump running tests, where applicable.

While LPS 1223 provides leading assurance of suppression equipment performance, it must also be supported by rigorous procedures covering training, maintenance and cleaning.

Kitchen staff should be trained in how the system works and the procedures to observe during day-to-day tasks to ensure the on-going operation of the system. They should also be trained and shown how operations such as operation of manual activation are undertaken.

As part of the LPS 1223 scheme all system designs, installation, commissioning and maintenance can only be undertaken by the LPCB approved manufacturers' contractors.

During any maintenance of equipment, components must be replaced with approved components to ensure the system conforms exactly to the design and component specification which was tested and approved.

LPCB has an allied test standard (LPS 1263) for the fire performance of grease filters used in commercial kitchen extract systems, to complement the robust fire performance of LPS 1223.

Modular kitchens

With the growth in modular kitchens, great care must be taken when rearranging equipment layouts due to changes in kitchen menu or for other operational reasons. By their very nature, kitchen suppression systems are networked in bespoke configurations to cover all relevant cooking appliances and their associated risks. If appliances are relocated, then the suppression system will need to be reconfigured accordingly and possibly extended. Again, this work must be undertaken by the approved manufacturer's authorised installers.

A key design requirement for these systems is the need to protect the discharge nozzles from the build-up of cooking deposits such as fat to ensure they continue to operate correctly. Grease residues will build up on the nozzles and pipework of a fire suppression installation over time and will require routine cleaning, just like the appliances and extraction hoods they protect. This task, however, introduces the potential to dislodge nozzles or inadvertently disturb or damage pipework that could affect the performance of the suppression system.

Kitchen house-keeping and staff training should include strict procedures for monitoring grease build-up, implementing timely cleaning and supervising the cleaning methods of in-house personnel or external contractors.

If possible, cleaning should be arranged to coincide with maintenance inspections, providing the opportunity for the approved manufacturer's installers to pick up and resolve any issues. Otherwise, management procedures should make extra provision to oversee that cleaning activities avoid damage or displacement to the physical installation.

Loss Prevention Standards such as LPS 1223 are continually evolving to keep in step with changes in industry practice, regulations and technological advances and is currently under review to ensure all aspects of the standard remain effective for current product technology, kitchen installation trends and good practice in fire protection/safety.

As with all LPCB fire safety and security standards, LPS 1223 kitchen fire suppression standard is free to download from the Red Book Live website www.redbooklive.com.

A full list of LPS 1223 approved systems can also be found on this website which is updated daily online at www.redbooklive.com. It is also available as a freely downloadable App (LPCB Redbook) from iTunes and Google Play.

Implementation of effective fire suppression in the commercial kitchen accounts for a relatively small part of operational overheads. Its failure to perform, however, could lead to devastating impacts and financial losses for a restaurant and neighbouring businesses.

In underpinning care of duty and business resilience, there is much to gain from investing in the robust fire performance provided by kitchen suppression systems certified to LPS 1223.

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More information on LPS 1223 and LPCB approved fire suppression equipment at www.redbooklive.com

1. Source: Structure Fires in Eating and Drinking Establishments, Ben Evarts, November 2012. For the National Fire Protection Association, Fire Analysis and Research Division.
2. LPS 1223: Requirements and testing procedures for the LPCB certification and listing of fixed fire extinguishing systems for catering equipment.