

Getting your ducts in a row

Ductwork ventilation systems can present a considerable fire hazard in kitchens as they accumulate grease and other contaminants. Good design that enables regular cleaning and maintenance can reduce these risks

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How can we all work together to make buildings safer? How can a better understanding of cleaning and maintaining ductwork improve the design of ventilation systems and reduce fire risk?

These were among the questions that prompted the formation of the National Association of Air Duct Specialists UK (NAADUK). Our aim is simple: to talk to and work with surveyors, manufacturers, designers, installers, maintainers, fabricators, fire prevention associations, fire brigades and environmental health authorities to solve such problems together.

Ductwork contaminated by grease and other substances can contribute to kitchen fires if poorly cleaned and maintained. Such fires put at risk the lives not only of staff and the general public but also the fire

crews who have to tackle them. Although at the time of writing there has yet to be a loss of human life through such fires, damage to or destruction of property has become a considerable expense for the courts and the insurance profession.

The aim of this article is thus to consider how we make ductwork accessible for cleaning and maintenance, and hence make it fire-safe for all.

Regulatory requirements

In April 2004, the European Parliament introduced regulation (EC) 852/2004 on the general hygiene of foodstuffs, with which food business operators must comply to protect consumers (bit.ly/ECfoodsafety). These rules took effect on 1 January 2006 and, in the case of UK law, became

enforceable by environmental health officers, leading to kitchen shutdowns and fines related to fire safety considerations in some cases.

Annex II, chapter 1, paragraph 5 of the regulation states: 'There must be suitable and sufficient means of natural or mechanical ventilation. Mechanical airflow from a contaminated area to a clean area must be avoided. Ventilation systems must be so constructed as to enable filters and other parts requiring cleaning or replacement to be readily accessible.'

Since ductwork is a component part of a kitchen ventilation system it falls under the regulation's requirements – and hence, under paragraph 5, 'Filters and other parts of the system must be accessible either directly or through access panels.'

There has yet to be a loss of human life from kitchen duct fires, but damage to or destruction of property has become a considerable expense

This regulation thus has potentially far-reaching consequences for the design, construction and installation of kitchen grease extraction ductwork because it has to enable maintenance and cleaning.

When assessing whether ductwork is accessible for cleaning and maintenance, it is important to consider the following.

- Can all access panels be removed by an operative without being obstructed?
- Can an operative access all panels using either a stepladder or tower?
- Fabrications such as fan or attenuator housings, supports and lighting tray conduits, along with fans themselves and other in-line components, should not need to be moved to enable access.

Inspecting and cleaning ductwork

To inspect or clean the inside of a duct, there must be a point of access via a hatch. As stated, these must be readily accessible and sufficient in number to allow full system cleaning. The design and fitting of the ductwork by the architect and installer is therefore key to the cleaning and maintainability of a duct system.

NAADUK has tested a number of different samples of ductwork supplied by manufacturers and made unidentifiable so no bias could affect the outcome. The aim was to see how the samples would respond to caustic chemicals used in commercial cleaning, combined with agitation from a rotary brush system. The findings were presented to the manufacturers via the Association for Specialist Fire Protection.

In a number of cases the intumescent seals were found to be damaged when using high concentrations of sodium hydroxide, a caustic cleaning chemical. It was concluded

that a solvent-based cleaner, the use of grease-scraping tools or a combination of the two would be a safer option to maintain ductwork integrity.

A number of examples of poor system design reviewed by the NAADUK membership included:

- duct located behind a solid ceiling with no point of access
- duct located in a surrounded riser with no point of access, for example, a riser surrounded by wall fabric or brickwork
- low-level plant, conduit, lighting or other fittings obscuring the duct
- an external riser
- pitched roof exhaust
- horizontally obscured duct with other services running alongside, above or below
- false, tiled or suspended ceilings restricting access to void and duct
- no fan access
- two or more in-line components adjacent to each other in a duct system
- silencer, fire-rated duct, insulation or suppression systems, all of which might prevent ready access to ductwork to carry out maintenance
- obscured access panels
- flat roof access without edge protection
- welded or riveted exhaust grilles preventing easy removal
- duct located directly over hoods or canopies, which will not support operatives' weight and enable safe access for cleaning
- open ceiling height
- data trunking or cabling physically restricting access
- physical obstructions below the duct.

To conclude, there a number of principles to consider when designing kitchen extraction ductwork, as follows.

First, avoid costly retrofit of panels or post-installation building works to provide access: access should be considered and installed at the time of fabrication or manufacture as recommended in DW 144, the specification for sheet metal ductwork.

Second, eliminate the number of inaccessible sections. Keep the ductwork as short as possible and make a feature of it in the kitchen and associated areas so it is not hidden away and forgotten.

Third, it is NAADUK's contention that a combination of the above could reduce the need for more expensive cleaning methods and specialist access equipment. Excessive emission of aerosols into the atmosphere along with the huge increase in restaurants and takeaways are becoming a concern for environmental health officers, but exhaust systems no longer need to run vast distances up the side of buildings, as cooking technology and improved filtration methods combined with well-trained technicians should lower the levels of aerosols being emitted (bit.ly/UKrstrts0817).

Filter systems can protect the fan and should be routinely monitored, cleaned and, when necessary, replaced. Carbon filters can be used to remove odours and smells associated with cooking, while wool-type pre-filters may also help reduce contamination at the point of entry into the duct system.

Finally, detection in a fire suppression system should be made less invasive, as its physical location inside a duct or plenum can prohibit cleaning of either without specialist dismantling and servicing.

As an association, we are constantly reviewing the impact of corrosive chemicals used on fireproof ductwork, and also excessive panels cut into it that may affect its structural ability to resist collapse during a fire.

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Related competencies include: Design and specification, Fire safety, Inspection