THE AUSTRALIAN INSTITUTE OF
REFRIGERATION, AIR CONDITIONING AND HEATING

TECHNICAL BULLETIN

Fire safety –
Kitchen hood exhaust systems

Understanding and addressing
the special fire risks inherent in
commercial kitchen ventilation systems

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AIRAH

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Preface

Kitchen exhaust systems continue to feature prominently in commercial building fire events.

Fire safety within kitchen ventilation systems in not just a matter for the system designer or system installer. The actions of the facilities manager, the maintenance contractor, and the system owner or operator are also critical to ensuring safe outcomes.

In the light of recent updates to relevant Australian Standards, recent changes to the maintenance requirements and focus of the National Construction Code, and the continuing fire risks within kitchens, AIRAH undertook to develop a fire safety technical bulletin on the exhaust ventilation topic, in partnership with the industry.

This technical bulletin has been developed for use by technical service providers, facilities managers, and operators of commercial kitchens.

It aims to highlight the main fire safety issues, promote a common language, and improve understanding of the risks and resulting responsibilities of all participants in the supply chain, from design and installation through to operation and ongoing maintenance.

Kitchen ventilation systems and their impact on fire safety can be improved within the community. Systems need to be designed and installed in accordance with the established rules. Ongoing maintenance and inspection should be targeted to the actual usage of the facility and its delivery should be verified. AIRAH hopes that this fire safety technical bulletin will go some way to improving industry performance in this area and reducing the incidence of serious fires within kitchen exhaust systems.

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About AIRAH

The Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) is an independent, specialist, not-for-profit technical organisation providing leadership in the HVAC&R sector through collaboration, engagement and professional development.

The Institute's mission is to lead, promote, represent and support the HVAC and related services industry, and membership. The Institute produces a variety of publications, communications and training programs aimed at championing the highest of industry standards. AIRAH encourages world's best practice within the industry, and has forged a reputation for developing the competency and skills of industry practitioners at all levels.

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There continues to be fire incidents involving the mechanical exhaust ventilation systems of commercial kitchens. Given the presence of heat and high fuel loads, fires in kitchens are not uncommon. However, when the incident extends into the mechanical exhaust system, safety risks and building impacts can rapidly escalate, sometimes resulting in devastating and widespread damage. These high-intensity fires move and spread rapidly, are difficult to locate and extinguish, and are susceptible to remote re-ignition and break-out.

This technical bulletin is provided to help raise awareness among property owners and restaurant proprietors about the fire risks and dangers associated with kitchen exhaust ventilation systems. It discusses the inherent fire risks, outlines regulatory and compliance requirements, highlights recent changes to applicable Australian Standards, looks at best-practice approaches, and emphasises the importance of ongoing effective cleaning and maintenance.

FIRE FACTS

Duct fires can be intense and reach temperatures of 1,000°C within minutes – hot enough to melt some metals and ignite surrounding combustibles. Fire statistics from Australia, the UK and the US show that fires in restaurants predominately occur in kitchens. The ignition of cooking materials accounts for almost half of all commercial kitchen fires and almost all of these (90 per cent) get into the kitchen hood exhaust system. Many restaurants never re-open after suffering a fire loss. Insurance policies may exclude claims related to uncleaned or grease-laden exhaust ducts. Insurers are aware of these fire risks – are you?

Always read the small print!

2. Kitchen exhaust – what are the fire hazards?

Fires are common in restaurants and typically start in the kitchen area. Cooking materials are the most frequent 'first item' ignited. Experience shows that the majority of kitchen fires will involve the kitchen exhaust hood or ductwork.

Kitchen exhaust fires can spread in a number of ways. A fire that originates within the kitchen or at the hood filters can spread into and up the ductwork system, fuelled by the oil and grease within the duct. A fire within the duct can ignite combustible materials outside of the duct, via radiant heat transmission, or can ignite grease that has leaked out of duct seams, spreading the fire in the building. Because fire dampers are not allowed within kitchen exhaust ductwork, fire spread within and between ducts can compromise a building's passive fire protection such as fire-rated compartments.

Fire dampers, which are usually installed in ventilation ducts to prevent fire spread, are not permitted within a kitchen exhaust duct system. They do not work in kitchen exhaust because grease on the downstream side of the damper will ignite before, and irrespective of, damper closure. The potential for false operation of the fire damper is also greater than normal and closure, other than in a fire situation, can have serious consequences for kitchen ventilation.

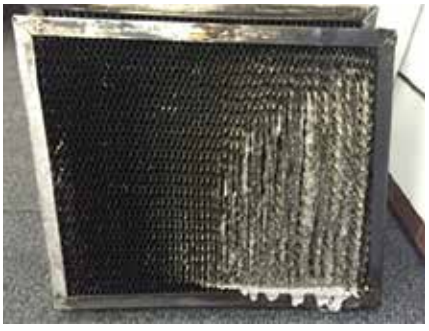

Figure 1: Heat of the fire melted the metal grease filter.

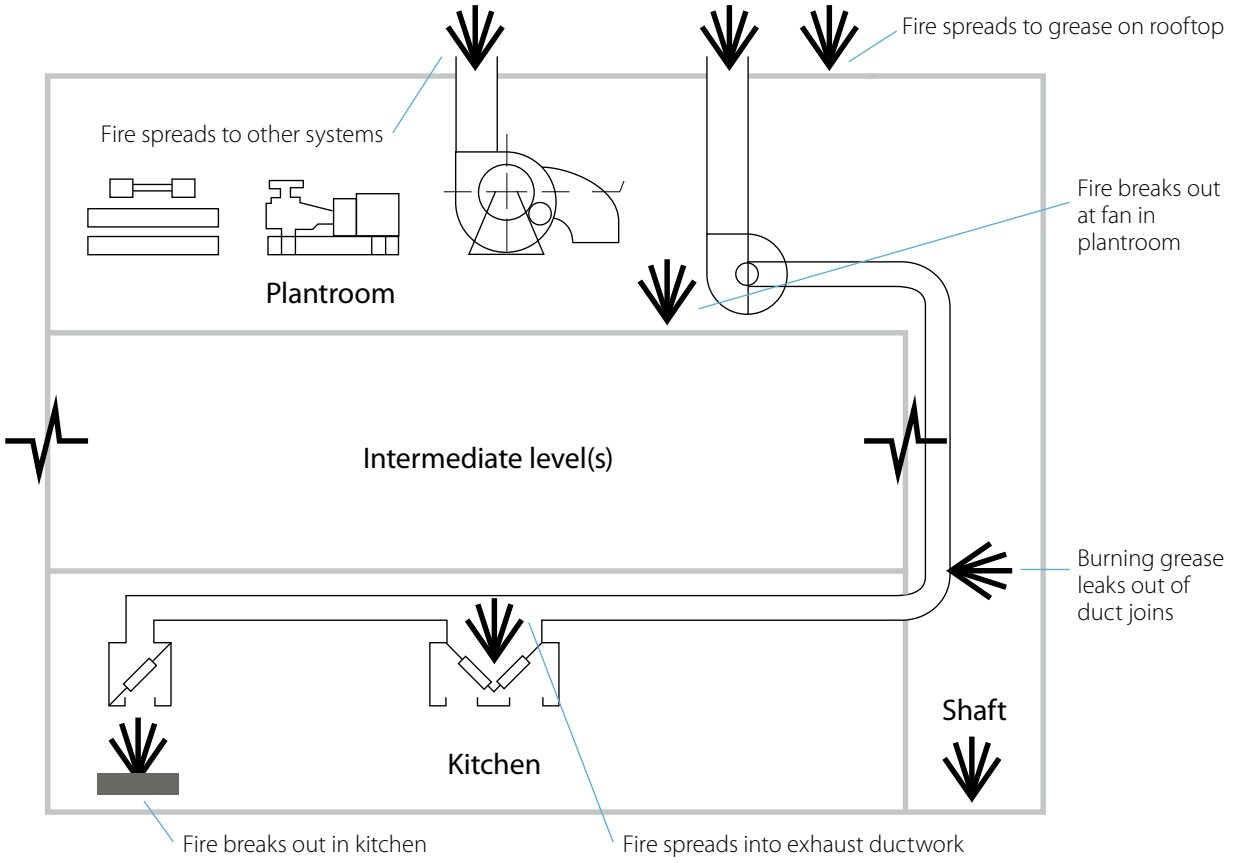

Figure 2: Fire in kitchen spreading into duct and then fire in duct spreading/breaking-out to another area.

Restaurants in buildings are a fire hazard. When a restaurant is located in a larger building or complex, such as a hotel, hospital, mall, airport or multi-storey residential development, the risks increase exponentially. A fire in a kitchen exhaust system in Heathrow Airport shut down three terminals, delayed or cancelled hundreds of flights, and generated hundreds of millions of dollars in losses that far exceeded the physical damage bill. That fire spread through 200m of exhaust ductwork to a plantroom before it was extinguished.

Figure 3: A fire within the duct can ignite combustible materials outside of the duct, spreading the fire in the building.

3. Identifying the fire risks

A fire within the duct system generally occurs due to the ignition of flammable material that has built up at the grease removal device (filters). The combination of fuel, air movement and heat can result in a strong and significant fire event.

All fire risk analysis fundamentally boils down to the three elements that are required for a fire to occur: fuel, oxygen, and ignition or the Fire Triangle.

Figure 4: The Fire Triangle – fuel/heat/O_2 = grease/flame/air.

Fire prevention must disrupt one or more of these elements.

Without heat the fire can't begin, without fuel the fire can't grow and without air the fire can't spread.

In a commercial kitchen hood exhaust ventilation system all three of these elements are highly prevalent –

Fuel: The grease derived from cooking processes enters the system with the ventilation air. High air velocities help to entrain and entrap cooking contaminants. Grease filters will capture a percentage of this, depending on their performance efficiency, installation quality, and cleanliness management. No filter captures 100 per cent of the grease, and any grease that passes through or around the filters will build-up on the internal hood, duct, and fan surfaces. Accumulated grease can leak out through duct seams and joins, or can pool in some parts of the ductwork to provide reservoirs of warm, highly flammable fluids and vapours that are ripe for ignition. Solid fuel cooking can create volatile gases created by incomplete combustion of the wood. These gases condense in the exhaust duct and mix with water vapour to form a tar-like creosote substance that sticks to the duct.

Ignition: There are many ignition sources within commercial kitchen environments: open-flame cooking devices, flaming cooking techniques, sparks and soot from wood or charcoal burners, even the heat generated from some types of cooking appliances can provide enough energy to ignite warmed grease, which then only needs a supply of oxygen to continue burning. Flare-ups from cooking equipment are the dominant cause of ignition.

Oxygen: The primary purpose of the ventilation ducts is air movement, so there is more than enough air available within the duct system to support a large fire. Once combustion commences the duct often acts as a chimney, channelling smoke and air to ventilate the fire. If this occurs in the reverse direction, large amounts of hot toxic smoke can enter the kitchen area and building, via the hoods.

Fire-related hazards in a kitchen include:

- Flames, sparks and hot gases from food preparation can ignite residues in exhaust ducts
- Food preparation equipment left without supervision during operation
- Failure to switch-off equipment, especially at the end of activity
- Overheated oils that can lead to spontaneous combustion
- Food preparation equipment based on solid fuels
- Gas blowtorches used for browning some foods
- Poorly operating thermostats or lack of thermostat or fault-detecting equipment
- Faulty or overheating electrical equipment
- Metal exhaust flues that conduct heat and ignite nearby material or debris
- Ovens without igniters/pilot lights (lit with burning pieces of paper).

4. Addressing the fire risks

Meeting the latest standards

Compliance with the relevant standards is very important.

The National Construction Code (NCC V1 2016) requires that commercial kitchens are provided with kitchen exhaust hoods in compliance with AS/NZS 1668.1-2015 and AS 1668.2-2012. In order for a hood to comply with AS/NZS 1668.1, the whole exhaust system must comply. These standards have been updated and it is important that designers and installers are working to the correct editions. The NCC and AS 1668.2-2012 determines where kitchen exhaust hood systems are required, the minimum ventilation rates, the construction details in terms of functionality and hygiene and, importantly, the minimum distances between the grease removal device and the heat source. The NCC and AS/NZS 1668.1-2015 specifies the design and installation precautions that need to be included to mitigate the results of any fire that occurs in the exhaust system.

AS/NZS 1668.1 requires 300mm separation or fire insulation between ducts and combustible materials, and separate shafts for kitchen exhaust ducts from different compartments. Flame barriers (in accordance with UL 1046) are required in hoods under some circumstances, such as when the length of kitchen exhaust ductwork within the building exceeds 10m in length or where exposed flames or embers are part of the cooking process. Where appliances can produce sparks – e.g. solid-fuel ovens – a spark arrestor is required at the connection. Systems that are already operating should not shut down in fire mode.

Where located in a building required to have fire sprinkler protection to AS 2118.1-1999 or AS 2118.4-2012 kitchen exhaust systems must also be protected with sprinklers. Both standards require sprinklers to be installed under kitchen hoods and within kitchen exhaust ductwork.

Figure 5: Access panels every three metres in horizontal graded ductwork.

Pre-engineered fire protection systems:
It is recommended that pre-engineered fire protection systems, in accordance with AS 3772-2008, be installed instead of sprinklers within kitchen hoods to protect cooking equipment such as deep fat fryers, sprinklers are still required in the ductwork. These are typically wet (water/chemical) suppressant based systems that require an alternative solution to meet the requirements of the NCC and should be maintained in accordance with AS 3772.

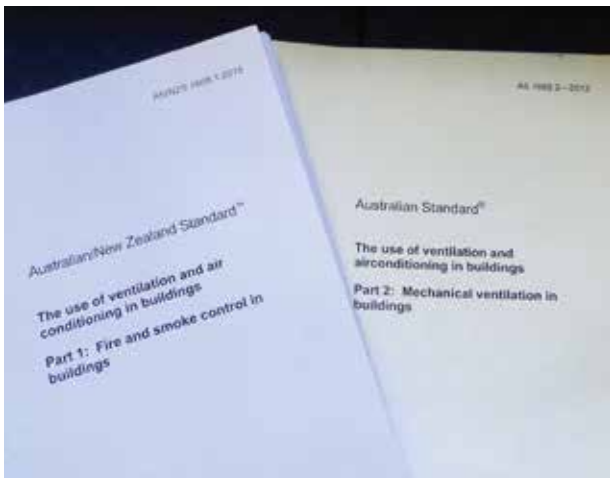

Figure 6: Relevant Australian Standards.

Grease filters

If the cooking process generates grease or oil, and most do, then AS 1668.2 requires that grease filters or grease removal devices are provided to reduce grease entering the exhaust duct. There must be a minimum distance between the grease removal filter and the cooking surface – 1350mm for open-fire cookers (charcoal or wood fires), 1050mm for naked flames (gas cooking), and 600mm for electric plates and rings. Filters should be easily accessible and removable for cleaning and be installed at an angle not less than 30 degrees from vertical.

Grease particles can be broken down into three size categories: grease smoke particles ranging from 0.03 to 0.5 microns, grease steam particles (grease-covered moisture particles) ranging from 0.5 to 6.0 microns, and grease spatter, or larger visible particles ranging from 6.0 to 150 microns. Different filter designs work better for different particle size ranges and not all devices can capture all particle sizes effectively. High temperature cooking processes convert some grease into the gaseous phase which cannot be captured by filters and eventually condenses and accumulates on ductwork walls.

Grease filters can't prevent grease entry into the exhaust system but they can reduce entry and extend the length of time required between duct cleaning.

Ductwork

AS/NZS 1668.1 requires ductwork outside of dedicated fire-resistant shafts or structurally independent fire-resistant enclosures to be manufactured from 1.2mm galvanised steel, 0.9mm stainless steel, or equivalent. Ducts must be vertical where practicable. Ducts that are not vertical must be graded upwards (at least 1:200) in the direction of airflow allowing grease and moisture to drain back towards the hood. Drainage points fitted with a grease tight tap or plug must be provided, as well as access panels/cleanout hatches at each change in direction and every 3m run of (non-vertical) ductwork. Access panels must be airtight and not compromise the fire integrity of the exhaust duct. Joints and seals must be grease tight; fully welded, rivet and soldered, or be sealed with a liquid mastic or sealant that is unaffected by water, grease or cleaning solvents. Flexible connections must be grease tight, grease proof, fire resistant and not longer than 300mm.

Vertical ducts are safer ducts: Horizontal duct runs should be minimised on all systems as there is a high risk of grease build-up and grease leakage in these sections. They also have the potential for the reverse flow of smoke into the kitchen during a fire event. Ducts should be vertical and take a direct route (or as short as possible) to the outside.

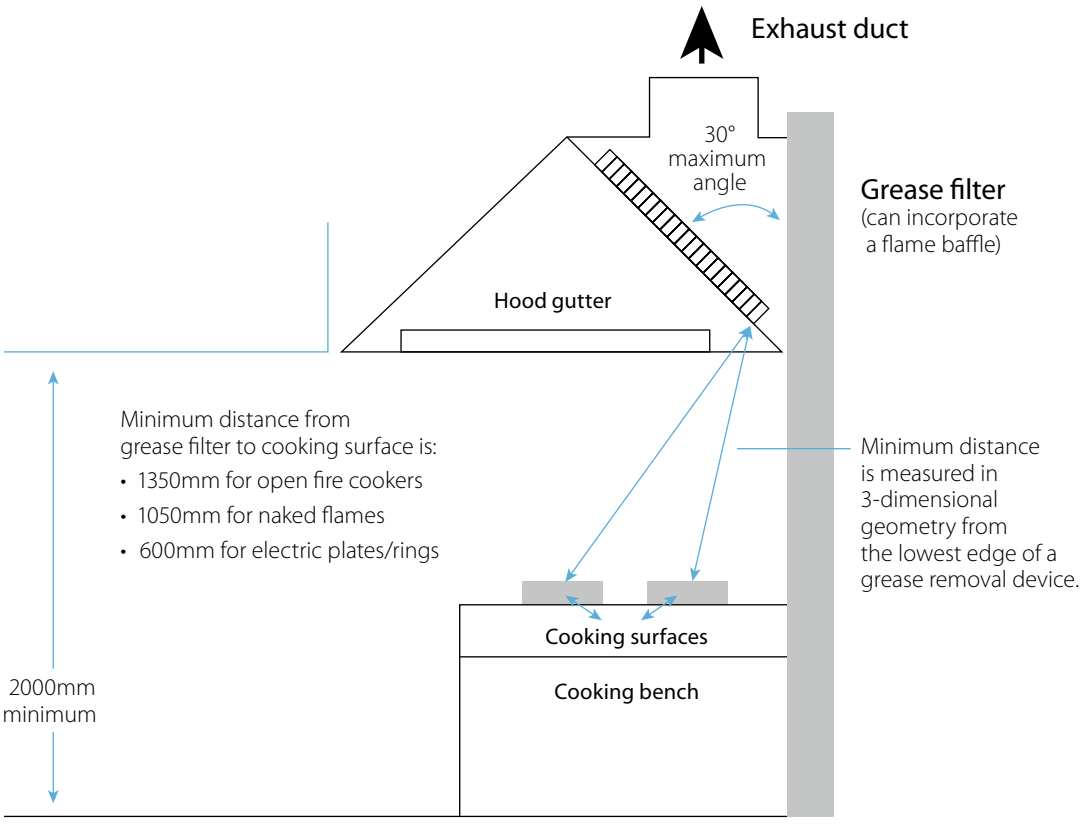

Figure 7: Location and separation distance of grease filters.

5. Seven deadly sins

Correcting common problems for existing systems

The following commonly recurring safety faults are often discovered in commercial kitchen exhaust ventilation systems:

1 Grease removal device too close to the heat source

Unintentional flare-ups from kitchen cooking equipment is the dominant cause of fires in kitchen exhaust hoods and ducts. The further that the grease removal device is installed away from the ignition source, the lower the likelihood that a cooking flare-up will cause ignition within the hood.

AS 1668.2 specifies the minimum distances allowed.

Figure 8: Burnt grease filters.

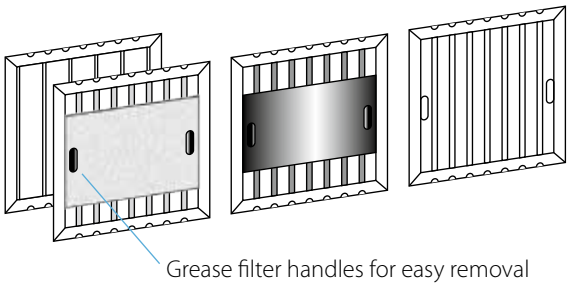

Figure 9: Typical filters and baffles.

2 Poor maintenance/ poor access

Systems that are not periodically inspected, maintained or cleaned will be subject to a build-up of oil, grease and other inflammable materials within the duct, filters, gutters, and on the internal surfaces of the hood. Systems that are not properly maintained present a higher risk of a significant fire event. Systems cannot be adequately inspected or maintained if the cleaning contractor cannot access and clean the internal duct surfaces. AS 1668.2 requires that access panels "large enough to enable cleaning of ducts" are provided in the ductwork at every change in duct direction and at least every 3m for horizontal duct runs.

If access cannot be achieved, the duct cannot be cleaned, and this will generate a significant and ongoing fire hazard.

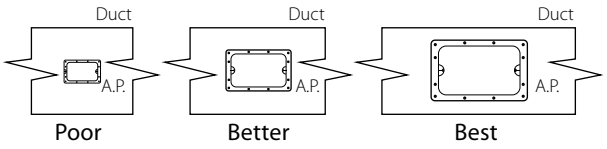

Figure 10: Fire rated access panel must be large enough to facilitate cleaning.

3 Split maintenance responsibilities

In some cases a building owner and a building tenant will have split responsibilities for system maintenance and cleaning, because the hood and filter are located within the tenancy, and the exhaust duct and fan are located in a common or core building area. In these circumstances the scheduled maintenance programs should be coordinated and the individual responsibilities made explicitly clear. Ultimately it is the building owner that holds the regulatory responsibility for fire safety at the premises.

Figure 11: Multi-tenant mixed-use building.

4 Ducts too close to inappropriate materials

Fire insulation must be provided between the exhaust duct and any surrounding combustible materials. Failing to use fire-resistant construction materials or not providing the correct fire separation distances represents a significant fire hazard. Ductwork must be installed at least 300mm away from any combustible material or be insulated to achieve a fire-resistance level (FRL) of –/30/30. Ducts penetrating any fire-rated floors, walls, and ceiling/floor or ceiling/roof systems must be installed so that the required FRL of the building element is not compromised. This generally means that the duct has to be enclosed in a fire rated enclosure or in fire-rated construction.

Other trades or kitchen staff, who are not aware of the danger of locating combustible materials near or on kitchen exhaust ducts, also need to be considered. Hoods and ducts should never be used as storage or shelving space. Signs can be used to educate staff.

Figure 10: Scorched fan.

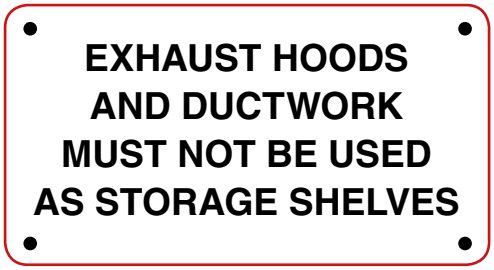

Figure 12: Educational signage.

5 Multiple ducts from multiple compartments

Over time, as a building's configuration or usage changes, kitchen exhaust systems are often extended or added. AS/NZS 1668.1 does not allow kitchens within different fire compartments to share the same exhaust ductwork or fan.

Kitchens in separate compartments must have separate systems with separate fire-isolated shafts, ducts and fans.

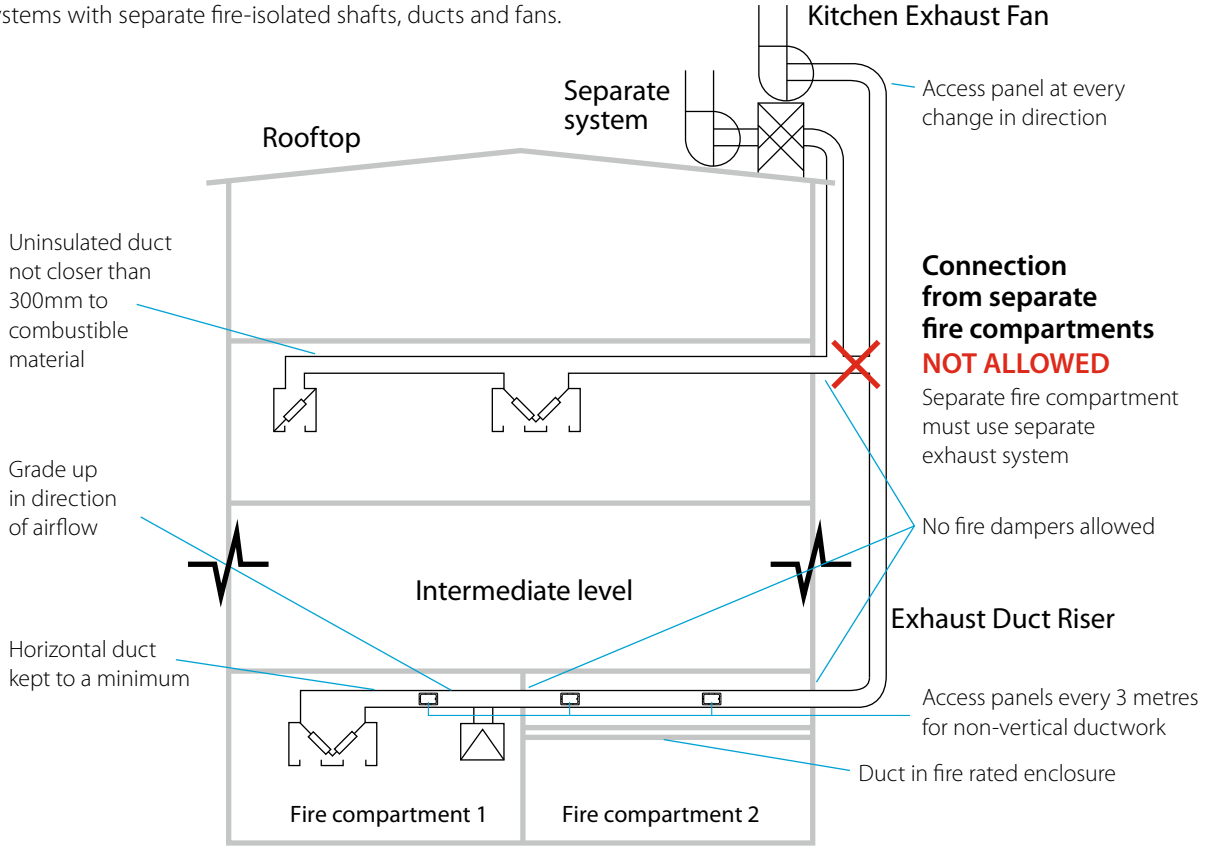

Figure 13: Rules for kitchen exhaust ductwork.

6 Wood-fired ovens and charcoal heaters

Because of the increased ignition risk imposed by solid fuel (wood and charcoal-based cooking fuels), these types of cooking appliances must now be provided with separate, independent ventilation systems and spark arrestors. Existing older systems may combine spark-producing and grease producing cooking appliances within a single system. This high-fire-risk practice should be reviewed and mitigated by installing scrubbers or water sprays in the duct, separating the exhaust systems, or installing a pre-engineered fire-protection system.

Figure 14: Spark arrestor and scrubber.

7 Incorrect installation

Systems may have been incorrectly designed and installed from day one. Ducts should be installed vertically or near-vertically, with horizontal runs graded towards a drain and provided with access/cleanout hatches. Standard-gauge ductwork must not be used; bracing should not promote excessive grease build-up.

Ductwork seams must be grease-tight, otherwise grease will leak out onto ceilings and roofs, generating a secondary fire hazard. Exhaust fan(s) must be able to handle grease build-up, must have the motor and drive located out of the airstream, and be capable of withstanding 1000°C without melting or burning.

Figure 15: Grease leaking from ducts and pooling on roof.

Making systems safe: Pre-engineered fire-suppression systems can be installed in the kitchen hood to provide added protection. Hood filters can be re-designed as fire baffles to reduce flame penetration into the duct. Ducts can be sealed to prevent leaks, and access improved to facilitate cleaning. Fire wrapping new or existing kitchen exhaust ductwork with fire-retardant blanket materials, specially designed for the purpose, can improve fire safety; ensure the duct is fully sealed and airtight prior to wrapping.

These additions or modifications can provide the gold standard in kitchen exhaust safety or be used to help make an unsafe system safe again.

Figure 16: Fire wrapping.

Figure 17: Insulation prevented fire breaking out of this exhaust duct.

6. Ongoing inspection and maintenance

Most Australian states have legislation requiring building owners to maintain fire-safety systems and submit a performance assessment to the relevant authorities each year. Kitchen hoods and associated ductwork are considered fire-safety systems in some states. Owners and operators also have a duty to keep systems clean and safe under work health and safety (WHS) regulations and under the food safety standards for commercial kitchens.

AS 1851-2012 outlines a series of minimum inspection, maintenance and record-keeping activities for the fire and smoke-control features of air-handling systems. It includes protocols for kitchen exhaust systems and any associated fire-protection sprinkler systems.

Manufacturers of kitchen exhaust systems often provide their own inspection and cleaning programs, which may be more stringent or frequent than those in AS 1851. In the event of a fire, failure to comply with these may be deemed as negligent or a failure of duty.

Kitchen operators need to provide access, and in particular system (cooking) shut-down times, to allow these important inspection and cleaning procedures to take place.

DID YOU KNOW?

The US standard ANSI/IKECA C10 and the UK Guide HVCA TR19 Section 7 both provide a publically available standard for cleaning of commercial kitchen exhaust systems. This can be used in maintenance procurement and validation. As well as specifying quantified system inspection procedures, these documents define acceptable cleaning methods for system components, and set post-cleaning acceptance standards.

Scheduled maintenance – keeping systems clean and safe

State regulatory authorities, local council permits, insurance companies, building owners, facilities managers, and landlords all impose maintenance responsibilities on the owners and operators of kitchen exhaust systems. State regulations generally require that the building owner must not fail to maintain fire safety related systems.

The maintenance routines for the exhaust systems and fire sprinklers of a commercial kitchen should at least meet the minimum requirements set out in AS 1851. All of the exhaust system should be inspected during this process including the hoods, all ductwork, all fans, connections and discharge cowls or grilles. AS 1851 does not make provisions for partial system inspection or for cleaning only those system components that are easily (or readily) accessible. Scheduled maintenance should, as a minimum, incorporate the following activities:

Figure 18: Fire rapidly spreading up a vertical kitchen exhaust duct.

Scheduled maintenance routine

Every month:

Perform the following monthly maintenance routine:

- Check grease-arresting filters for excessive grease accumulation. Clean grease filters where required.

  Note: Grease filters can be cleaned in dishwashers or cleaned off-site to manage grease waste disposal.

- Check grease gutters for any excessive grease accumulation.
- Check that grease-arresting filters are secured in position and free of damage.
- Check the internal surfaces of the exhaust plenum behind the filters for excessive grease accumulation. If there is grease accumulations, ensure that air is not bypassing around the filters.

  Note: Filters are the first defence against grease spread. Depending on the type of cooking and the volume of usage the cleaning of grease filters could be required more frequently than monthly, including weekly or even daily.

Figure 19: Checking and cleaning ductwork.

Every 12 months:

Perform the monthly maintenance routine, and the following additional tasks (see note):

- Clean the hood and its exhaust plenum.
- Check for excessive air leaks at grease-arresting filters and replace filters if necessary.
- Check the entire exhaust duct for accumulated grease and clean it where necessary.

Fire protection or suppression systems installed within kitchen exhaust systems may have special requirements requiring additional mandatory maintenance. Only properly trained and qualified personnel should perform this maintenance.

Note: The frequency of the entire exhaust duct system inspection should relate to the usage of the facilities.

HVAC hygiene: Keeping kitchen exhaust systems free from grease build-up also ensures that high HVAC hygiene standards are maintained, which is important in food preparation areas and required by food safety standards and local council regulations. Duct cleaning helps operators meet two regulatory responsibilities: #fire safety and #food hygiene

Apart from the safety and health benefits, improved productivity through more comfortable staff – and reduced energy bills from clean fans and ducts – can also contribute to the bottom line.

BURNING TRUTHS

Fires in kitchens: In Australia, kitchens are reported as the No.1 source of fires in buildings, identified as the source of 25 per cent of all structural fires (up to 50 per cent in commercial buildings). Unattended cooking is the No.1 source of fires in kitchens, and these typically occur directly below the kitchen exhaust hood.

Grease leaks through duct seams: Where horizontal exhaust ducts are incorrectly sealed grease can leak through the seams and soak into false ceiling, bulkhead and roofing materials. This increases the fire hazard and reduces the visual amenity of the kitchen. A grease-soaked kitchen ceiling space contributed to the deaths of two attending fire fighters in a commercial kitchen fire in the USA in 2007. Grease in the ceiling space burned undetected for an hour prior to flashing over violently causing a ceiling to collapse on the fire fighters below.

7. Beyond the minimum standards – Towards best practice

AS 1851 outlines, an agreed inspect/repair/report scheduled maintenance protocol that can be applied to commercial kitchen exhaust systems generally. An owner or facilities manager who uses competent staff who comply with or exceed the AS 1851 routines, is generally regarded as meeting the regulated maintenance requirements and WHS duty. A record of the maintenance process and the inspection results must be kept in case of fire or for insurance purposes.

A better and safer (and indeed best-practice) approach is to tailor the maintenance procedures to reflect both the cooking process in use, as well as the actual usage levels of the kitchen.

Kitchen exhaust systems – best-practice inspection and cleaning means it is OK to exceed the AS 1851 minimum requirements

When to inspect: The frequency of system inspections should relate to the usage of the cooking facilities which the exhaust system serves. For heavy use (12 to 16 hours per day) three-monthly inspections are recommended, for moderate use (six to 12 hours per day) six-monthly inspections are recommended, and for light use (two to six hours per day) 12-monthly inspections may be appropriate.

When to clean: Use a depth gauge/grease comb to identify if there is an unsafe build-up of grease on internal duct surfaces. Readings of up to 0.05mm depth are regarded as a clean surface, readings of up to 2mm depth are acceptable. However, once over 2mm surfaces should be scheduled for cleaning, and any readings over 3mm indicate that immediate cleaning is required.

A service agreement and service certificate should be supplied by the contractor for all cleaning programs including a description of the work, method statements, photographic evidence, and verification results.

Cleaning contractors should be fully insured and provide "before" and "after" photos of the cleaning work. If 100 per cent of the system is not being cleaned, an owner or operator should ask for a drawing that highlights the areas being cleaned, all areas not able to be cleaned, and any improvements to access that could be made to reduce the percentage not cleaned.

Cleaning method options

There are several methods that can be used depending on the system: wet, dry, manual or robotic.

- Manual scraping and manual washing by hand are the most common methods used in Australia.
- Wet washing – using steam or hot water and detergent – is faster and prevalent in the US, but hardly used in Australia due to the poor sealing of the ducts.
- Robotic systems are common in some overseas countries, variously using compressed air (whip/lance/nozzle), rotating brushes, dry ice, vacuum methods, and pressurised water with detergents or degreasers to internally clean the ductwork.

Careful control of water and chemicals is required. In all cases systems must be shut down for cleaning and kitchen operators need to accommodate this. As you would expect, different methods require varying amounts of time to complete.

8. Going the extra mile

Ozone generators and UV treatments can be installed within the system to oxidise any grease and odours that pass the filters. These systems are designed to break down grease molecules through oxidation, resulting in a sooty powder, which is more readily discharged by the exhaust fan. The effect is to significantly reduce levels of deposited grease within the ductwork and fan. These systems can extend the time interval between kitchen exhaust duct cleaning but they must be designed, installed, operated, and maintained strictly in accordance with the manufacturer's instructions.

For these systems to be effective, they must be maintained on a regular basis, the additional cost of maintenance can be offset by the reduced frequency of duct cleaning required and reduced fire risk.

Figure 20: Ozone generators and UV treatments.

Some hoods are designed as self-cleaning hoods and incorporate internal wash-down facilities to automatically remove any grease build-up, again extending the interval between inspections.

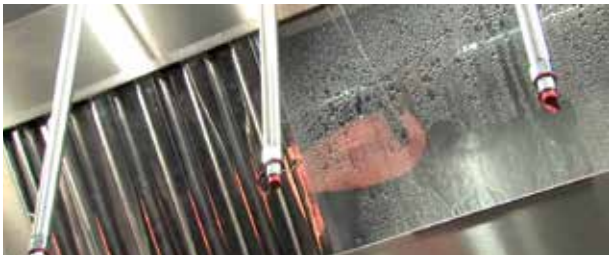

Figure 21: Automatic washdown.

Double skinned, fully welded, fire insulated grease ducts are available and are in common use overseas.

When correctly installed these ducts are:

- safe to locate closer to combustible materials
- can safely contain an internal duct fire
- can facilitate wet washing of internal duct surfaces, either robotically or manually.

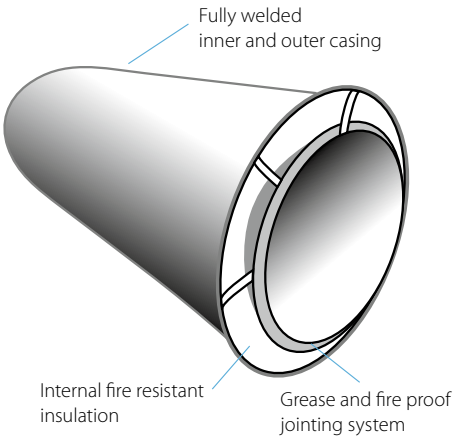

Figure 22: Fire insulated grease duct.

Hinged, roof-mounted exhaust fans can be used. These provide easy access for inspection and maintenance.

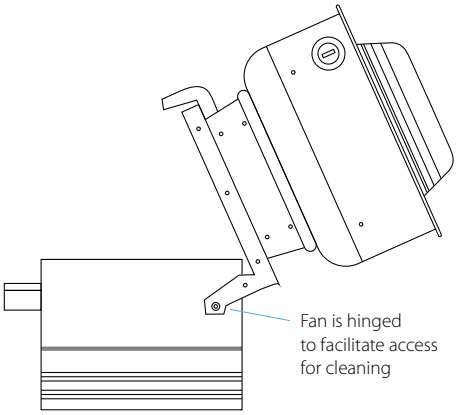

Figure 23: Hinged exhaust fan.

Figure 24: Exhaust fan before and after cleaning.

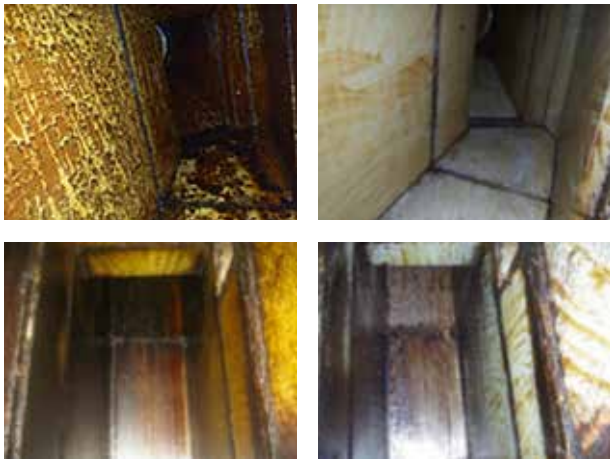

Figure 25: Exhaust ducts before and after cleaning.

9. What can I do?

If you think your kitchen exhaust ventilation system does not meet current standards or represents a fire risk, you should contact an HVAC professional or kitchen exhaust ventilation company to do a fire risk assessment.

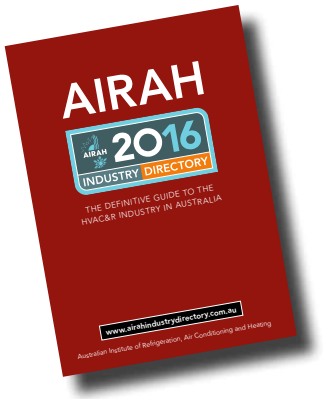

Figure 26: The AIRAH Industry Directory – Australia's definitive HVAC&R industry handbook.

The single most important thing you can do to keep your systems safe is to regularly inspect and keep the system clean.

Make sure you are correctly insured, and discuss with your cleaning contractor any safety hazards or compliance issues in your system.

Safety first: Portable fire extinguishers and fire blankets provide an important first-defence role in kitchen fire safety. Extinguishers should be suitable for use on oil and fat fires, and comply with the Australian Standard applicable to the extinguishing agent used (AS 1841 series).

Never put water on a grease fire. Portable fire extinguishers and fire blankets should be located in accordance with AS 2444-2001. The most popular kitchen extinguisher is dry chemical foam or powder.

Figure 27: Portable fire extinguisher.

10. Further information

AIRAH DA19 HVAC&R Maintenance –
Schedule A18.2 Kitchen Exhaust ducts (and hoods)

Australian Standards AS 1841-2007 series of standards, AS 1668.1-2015 Section 6, AS 1668.2-2012 Section 3 and Appendix E, AS 1851-2012 Section 13, AS 2118.1-1999 or AS 2118.4-2012, AS 3772-2008, and AS 4254.2-2012 Section 2

American National Standards Institute (ANSI) and International Kitchen Exhaust Cleaners Association (IKECA)

ANSI/IKECA C10: Standard for Cleaning of Commercial Kitchen Exhaust Systems

Building & Engineering Services Association Guide to Good Practice TR/19 - Internal Cleanliness of Ventilation Systems

Food Standards Australia and New Zealand the Australia New Zealand Food Standards Code

FPA Australia Good Practice Guide GPG03 Adoption and Use of AS 1851-2012

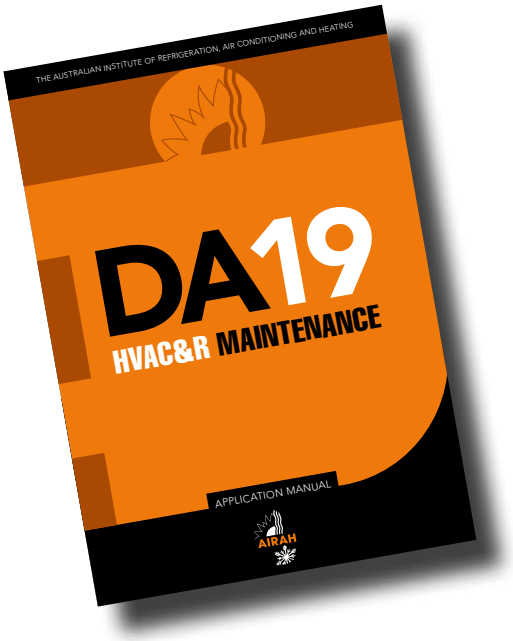

Figure 28: AIRAH DA19 HVAC&R Maintenance manual.