MELBOURNE AIRPORT - FIRE SAFETY GUIDELINE FSG04

COMMERICAL KITCHEN HOOD & EXHAUST SYSTEMS

1.0 Introduction

This document sets out guidance for the design and installation of commercial kitchen hood exhaust systems which are installed to remove cooking effluent from commercial kitchens. The fire risk associated with kitchen hood exhaust systems can be significant, and a number of fires have occurred in airports and other similar complexes either resulting from or with contribution by commercial kitchen hood exhaust systems. Detailed fire engineering and risk assessment of kitchen hood exhaust systems at Melbourne Airport was undertaken to determine appropriate fire safety provisions to mitigate the risks to an acceptable level. The fire safety provisions identified in this guideline are the prescriptive recommendations resulting from that process.

This Guideline FSG04 includes additional precautions to that prescribed in the BCA; sole compliance with the BCA does not meet Melbourne Airport fire risk guidelines and will not be approved.

2.0 General

All commercial kitchen equipment must be provided with a kitchen hood and exhaust system complying with this Guideline unless otherwise approved by the Fire & Life Safety Manager.

The requirement for kitchen hood exhaust systems in compliance with this Guideline FSG04 applies to all food and beverage outlets, lounges, function areas, etc. containing a hood and cooking process type described in AS1668.2 Clause 3.4.2.

Exhaust hoods located over and serving only non-grease producing equipment, dishwasher, oven or other item, need not be provided with grease filtration.

Any proposal associated with charcoal or solid fuel appliances is outside the scope of this Guideline FSG04 and requires a specific fire risk assessment and approval process.

3.0 References

The following documents are relevant to this Guideline:

- AS 1668.1 – 2015; The use of ventilation and air conditioning in buildings, Part 1: Fire and smoke control in buildings.
- AS 1668.2 – 2012; The use of ventilation and air conditioning in buildings, Part 2: Mechanical Ventilation in Buildings.
- AS 4254.2 – Ductwork for air-handling systems in buildings, Part 2: Rigid Duct.
- NFPA 96 – Ventilation control and fire protection.
- NFPA 17A – Wet chemical extinguishing systems.
- Melbourne Airport Standard MAS-FPR-001 – Maintenance Standards for Kitchen Extract Ventilation Systems
- Melbourne Airport Precinct Fire Safety Strategy;

4.0 Fire Safety Objectives

The fire safety objectives of this standard are:

- To reduce the likelihood and severity of fire within kitchen hood & exhaust duct systems.
- To minimise the likelihood of fire spread to other parts of the building through the ducting.
- To create easily managed systems that allow internal cleaning to be carried out frequently with minimal disruption.
- To specify a ductwork system that does not support the build-up of grease.

5.0 Design Approval

All proposed kitchen hood & exhaust systems shall be submitted to Melbourne Airport Fire & Life Safety Manager for review. The documentation required in the submission for approval shall include drawings and specifications identifying:

- Kitchen hood type, cooking process type and electrical/gas power input capacities for each unit and combined.
- Exhaust hood, ducting, fan & ancillary equipment details.
- Ductwork construction, layout and slope with access provisions, penetrations through any walls or floors, duct construction and material details and any fire barrier / shaft construction details.
- Locations of automatic fire sprinklers and wet chemical suppression systems.
- Filter types and efficiency.
- Operational features, shut-off, relays and interfaces, etc.
- Design certification by the mechanical and fire consultant in accordance with this FSG (refer form of certification in this FSG).

6.0 Design Features

Compliance with AS 1668.1 & AS 1668.2 is mandatory unless varied below:

Configuration

A kitchen exhaust system may only serve a single tenancy, food & beverage outlet or lounge; i.e. multiple tenancies cannot be served by the same kitchen exhaust ducting.

A kitchen exhaust system may serve multiple kitchen appliances/equipment from within the same tenancy i.e. Dishwasher exhaust.

Kitchen Hoods Operation

An indicator light top show the exhaust fan is operating shall be located on the external face of or adjacent to the hood. Kitchen hood and exhaust performance shall be in accordance with AS 1668.2.

Any moveable cooking appliance shall be provided with means of ensuring correct positioning beneath the hood when operational.

Cooking appliances are not permitted to be used while the fire extinguishing system or exhaust system is non-operational, isolated or otherwise impaired. Kitchen exhaust systems shall be operated whenever cooking appliances are turned on.

Kitchen exhaust systems will continue to operate in the event of a fire alarm.

Grease filters in kitchen hoods

Filters shall be provided with an interlock to prevent kitchen cooking system operation if the filters have been removed from the hood.

Grease filters shall be one of the following (mesh type filters are not permitted):

- Dry baffle filters with a tested and proven grease extraction efficiency of at least 75%.
- Water wash baffle filters with tested and proven grease extraction efficiency in the range of 90-95%.
- Water mist baffle filters with tested and proven grease extraction efficiency in the range of 90-98%.

Sprinkler protection

Sprinkler protection within the kitchen hood is not required. Sprinkler protection to the **exhaust ducting** must be installed in accordance with AS 2118.1-2006 Clause 5.7.14.

Automatic wet chemical suppression system

A specifically designed, fixed, automatic wet chemical suppression system shall be installed to protect cooking appliances beneath the kitchen hood / canopy and grease filters.

The system shall be activated automatically by fixed fusible links within the hood, with provision for manual activation from a release point in proximity to the cooking area. Both means of activation shall be separate and independent of each other so that a failure of one does not impede operation of the other. Where multiple release points are provided for multiple suppression systems within the same tenancy, these shall be logically arranged or suitably referenced to avoid confusion.

The fire suppression systems shall comply with standard UL 300 – Standard for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas, and shall be installed fully in accordance with the requirements of its listing, the manufacturer's instructions and the National Fire Protection Standard NFPA 17A – Standard for Wet Chemical Extinguishing Systems.

An interlock shall be provided on the wet chemical suppression system to automatically shut off sources of gas and electricity supply to all cooking appliances upon activation. These interlocks shall be configured for manual reset only.

The installer shall provide certification confirming that the installation is fully in accordance with the terms of the UL 300 listing, the NFPA 17A, the manufacturer's instructions and this Guideline.

Kitchen Exhaust Ducting

Ducts shall be constructed in accordance with AS 4254.2 Clauses 2.3.1 & 2.3.2 using minimum 1.2mm thick galvanized steel or minimum 0.9mm thick stainless steel. Ducts used for exhaust of any steam generating equipment shall be stainless steel throughout. Flexible connections shall be fire resistant material with supporting fire test data for use in kitchen exhaust systems.

Horizontal duct lengths shall be minimised with vertical ducts installed as far as possible.

Readily accessible duct hatches/doors (minimum 300 mm x 300 mm) shall be provided for cleaning purposes every 3 m, at the bottom of every vertical duct rise and at each change in direction.

Every access door must have indelible signs attached "KITCHEN EXTRACT DUCT – ACCESS FOR CLEANING – DO NOT OBSTRUCT" & "DO NOT OPEN WITHOUT ISOLATING FAN" in minimum 50mm UPPER CASE lettering in a colour contrasting to that of the background. Access hatches installed within the tenancy ceiling must provide clear and safe access to duct cleaning hatches.

Ductwork need not be installed in fire rated ducts or shafts. However ducting shall not be installed closer than 300 mm to any combustible material or services unless it is wrapped in a non-combustible material to achieve 30 minute fire insulation in accordance with AS 1530.4 for a fire within the duct.

Kitchen exhaust discharge

Each kitchen exhaust discharge shall be on a horizontal roof surface such that exhaust is directed vertically, and positioned at least 6 m from any outside air inlets or other ventilation openings and at least 2 m from any combustible cladding or other materials.

Every kitchen exhaust discharge shall have an indelible sign: "KITCHEN EXTRACT SYSTEM – DO NOT INSTALL ANY COMBUSTIBLE MATERIALS, SERVICES, EQUIPMENT OR PLANT WITHIN 6 METRES" in minimum 50mm UPPER CASE lettering in a colour contrasting to that of the background.

Fans shall be located at the discharge end of the system at roof level to ensure that the ductwork is under negative pressure and the fan readily serviceable.

Fire Mode Operation

Refer fire matrices in Attachment 1.

- Kitchen exhaust fans shall continue to operate (AUTO) in fire mode for a zone fire alarm.
- Kitchen exhaust fans have specific fire matrix modes for a tenancy fire alarm.

Commissioning, Maintenance and Cleaning

No modifications or changes of location of cooking appliances protected by the fire suppression system shall be carried out without re-design, re-certification and Melbourne Airport's approval.

Testing, commissioning and maintenance of every fire suppression system shall be in accordance with manufacturer's requirements and the applicable NFPA standard. Design approval submissions shall include proposed commissioning tests and maintenance schedules.

Maintenance of the suppression system shall include monthly inspections by a qualified contractor for an initial period of at least six months after the facility has been in operation and thereafter determined following evaluation of the effectiveness of ductwork cleaning regime. The established cleaning regime shall not be altered without approval and shall include routine replacement of fusible links and nozzles. The fusible links shall be replaced at least annually.

Instructions for operating the extinguishing system shall be provided adjacent to the manual activation device within each tenancy and included in management and emergency procedures.

'As installed' details of the system shall be presented on a laminated block plan and mounted on the wall of cooking area or within the enclosure containing the fire protection equipment. The details shall include the type, location and a unique reference number of each appliance protected by the suppression system.

Any queries should be referred to the relevant APAM Project Manager, who will consult the Melbourne Airport Fire & Life Safety Manager.

Attachment 1: General / Tenancy Fire Matrices & Checklist Schedule

General Zone Fire System Matrix (for kitchen exhaust system)

General Zone Fire System Matrix	FIP Alarm	Brigade Call	EWIS - Zone of Alarm (specify)	Tenancy - Sound System Mute	Fire Graphics	Tenancy - MSSB Zone Interface	Kitchen Exhaust Fan (KEF)	FIP Zone No. & Sprinkler Control Valve Installation	As-Built Drawings provided	Contractor Commission Pass/Fail	Certification Pass/Fail	APAM Witness Test Pass/Fail
Smoke Detector (On Ceiling)	Yes	Yes	Yes	Yes	Yes	Yes	Auto					
Smoke Detector (Concealed space)	Yes	Yes	Yes	Yes	Yes	Yes	Auto					
Sprinkler System (pressure switch)	Yes	Yes	Yes	Yes	Yes	Yes	Auto					
Tenancy Sprinkler Monitor Valve	Yes	No	No	No	Yes	No	Auto					

Food & Beverage Cause/Effect Matrix (for kitchen exhaust system)

Tenancy Specific Commercial Kitchen Cause & Effect Matrix	Cooking Facility Gas or Power	Kitchen Exhaust Fan (KEF)	Fire Alarm (FIP)	FIP Zone Numbers	Contractor Commission Pass/Fail	Certification Pass/Fail	APAM Witness Test
Smoke Detector Activation (within tenancy)	Off	Off	Yes				
Thermal Detector Activation (within tenancy)	Off	Off	Yes				
Wet Chemical Suppression Activation (Fusible Link)	Off	Off	Yes				
Wet Chemical Manual Pull Station	Off	Off	Yes				
Manual Emergency Gas Shut Off	Off	Off	No				
Filter Removed	Off	Off	No				
UV Lights Off	Off	Off	No				
Wet Chemical System Block Plan with Zones	N/A	N/A	N/A				
KEF Off	Off	N/A	No				
Exhaust Fan Indicator Light	N/A	On	No				
Fire Graphics	N/A	N/A	Yes				

Kitchen Duct Checklist

Kitchen Exhaust Cleaning & Sprinkler System Inspection	Contractor Commission Pass/Fail	Certification Pass/Fail	APAM Witness Test Pass/Fail
FSG04 Kitchen hood inspection checklist completed			
Kitchen exhaust cleaning access hatches at minimum 3 m spacing			
Access hatches of minimum 300mm x 300mm			
Cleaning access hatches can be accessed safely and without obstructions			
Duct sprinklers installed as per AS2118.1			
Duct sprinklers have access hatches for maintenance			
Duct & ceiling access hatches have permanent labels			

Contractor Inspection Checklist

The following is provided for implementation by the project manager and responsible contractor to ensure the necessary checks are completed for approval of the Kitchen Exhaust System by APAM. This checklist must be completed and signed prior to attendance on site by APAM for final approval.

Item	**Confirm**
Compliance with AS/NZS 1668.1/2 and AS 4254 (installers statement)	☐
As-installed drawings for ductwork layout, hood exhaust, automatic fire sprinklers and wet chemical suppression systems provided	☐
Separate ducting for grease/oil extraction system confirmed	☐
Indicator light for system operation provided	☐
Ducting separated from combustible material by at least 300mm; or Ducting wrapped in 30 minute insulation material	☐
Baffle filters installed – identify type: _____	☐
Filters provided with interlock to prevent operation if filters are removed (check spare filters are available on site)	☐
Duct access hatches are located maximum 3m centres	☐
Duct access hatches labelled	☐
Specify hood extraction fan capacity: _____; & Specify hood capture velocity: _____	☐
Sprinklers in ducting as per AS 2118.1	☐
Wet chemical suppression system complies with UL 300 (certification to UL 300 provided)	☐
Wet chemical suppression system designed and installed to NFPA 17A (certification to NFPA 17A provided)	☐
Automatic and manual release provided	☐
Gas & electric interlock provided	☐
Commissioning tests provided	☐
Maintenance schedules provided	☐
Laminated block plan located in concessionaire	☐
SIGNED: DATE: PRINT NAME: CONTRACTOR:	