

Fixed Fire Suppression & Exhaust Systems – Cooking

ISSUE:

A number of queries from owners, designers and safety codes officers have been received regarding fire suppression and exhaust systems for non-residential cooking installations. These questions have included:

- When is a kitchen exhaust system required in a commercial setting?
- Does a commercial kitchen exhaust system always require a fixed fire suppression system?
- What cooking appliances/processes require the coverage of a fixed fire suppression system?
- What standards apply to fire suppression and exhaust systems?
- Why are older systems no longer acceptable for use?
- What are the maintenance requirements for fixed fire suppression systems and kitchen exhaust systems?
- Are there allowances in codes and/or standards for limited usage facilities?

CODE REQUIREMENTS:

As opposed to copying verbatim the relevant portions of the Alberta Fire and Building Codes the reader is encouraged to utilise the noted references to look up these portions of each code.

Alberta Building Code Requirements:¹

The installation of fire suppression systems and exhaust systems is under the jurisdiction of the Alberta Building Code (ABC). A Building Safety Codes Officer should be consulted for building permit and professional involvement requirements.

- **3.3.1.2.(2) Hazardous Substances, Equipment and Processes**
- **A-3.3.1.2.(2) Cooking Equipment Ventilation**
- **6.2.2.6.(1 through 6) Commercial Cooking Equipment**
- **9.10.1.3. Items under Part 6 Jurisdiction**
- **A-9.10.1.3.(1) Commercial Cooking Equipment.**

Items from Part 10 only apply to Relocatable Industrial Accommodation

- **10.6.4.1. Cooking Equipment Ventilation System**
- **10.6.4.3. Exception for Existing Modules**

Alberta Fire Code Requirements:¹

The use, inspection and maintenance of suppression systems and exhaust systems are under the jurisdiction of the Alberta Fire Code (AFC). A Fire Safety Codes Officer should be consulted regarding verification of the use, inspection and maintenance.

- **2.6.1.9. (1 through 7) Commercial Cooking Equipment**
- **A-2.6.1.9.(3)**
- **Division C 2.2.4.1. Qualifications**
- **A-2.2.4.1.(1)(a)**
- **A-2.2.4.1.(2)**

CONSIDERATIONS:When is a kitchen exhaust system required in a commercial setting?

The answer is . . . almost always. As noted in Sentences 3.3.1.2.(2), 6.2.2.6.(6) and 9.10.1.3.(1) of the ABC 06 any food preparation that creates grease laden vapours, odours, smoke, steam or heat in any facility for the cooking of food, other than in an individual residential dwelling unit for the use by the occupants, will require a ventilation system for that facility where the potential for the production of smoke and grease-laden vapours exceeds that expected from normal residential family use.

Where grease laden vapours or smoke, are generated, outside an enclosed appliance, then the exhaust system must meet the requirements of NFPA 96. This will include a hood meeting the requirements of the referenced standards and welded seamless ductwork and all required labelled access panels. (A listing of appliances/processes automatically deemed to create grease laden vapours is provided later in this document). In addition these systems will require a fire suppression system which complies to the requirements of the ABC 06 and AFC 06.

Where the process or facility for the cooking of food does not create grease laden vapours or smoke but does create odours, steam or heat will require a stainless steel hood and ventilation system for that facility which meets the requirements of Sentences 6.2.2.6.(3) to (6) of the ABC 06.

Does a commercial kitchen exhaust system always require a fixed fire suppression system?

The deciding factor as to whether or not a fire suppression system is required is whether the potential for the production of smoke and grease-laden vapours exceeds that for normal residential family use. As noted above there are many appliances that automatically require that they be covered by an NFPA 96 compliant hood with a wet chemical fixed suppression system properly protecting all the appliances.

In addition, where a fire suppression system is installed, a K Class extinguisher is required to be installed within 9.15 m of the appliances.

What cooking appliances/processes require the coverage of a fixed fire suppression system?

(While all appliances used in Alberta are required to be certified for use under the terms of the *Safety Codes Act* commercial appliances may also have been tested/listed to quantify needs for fire suppression system protection).

Appliances & devices, (hoods and ducts) that have been tested and shall be protected:

- Fryers
- Pressure Fryers, (with lids)
- Ranges – (including residential ranges if they are used in a commercial/ institutional cooking operation)
- Griddles – (flat top cast iron cooking surface)
- Open top chain broilers
- Closed top chain broilers
- Char Broilers, gas radiant, electric, lava rock, charcoal, mesquite, wood - CAUTION – Solid fuel fired or supplemented appliances are required to be under a separate exhaust/hood system, other requirements regarding fire hoses also exist
- Upright Broilers/Salamander Broilers
- Woks
- Tilt Skillets/braising pans – (DO NOT Confuse with Tilting Kettles)
- Exhaust Canopies, (plenums, all ducts, behind filters)

Cautions:

- No Water Wash Canopies with a fire cycle have been tested to ULC ORD 1254.6-1995 therefore they must have a suppression system.
- No CO2 system has been tested to ULC ORD 1254.6-1995 therefore they do not meet the requirements of the ABC or AFC.
- No Sprinkler System has been tested to ULC ORD 1254.6-1995 therefore they do not meet the requirements of the ABC or AFC.
- Exhaust Ducts:
 - Where there is a damper at the duct interface with the hood the 1st duct nozzle must be installed immediately above the damper and an access door for installation and servicing the nozzle(s) SHALL be provided within 18 inches of the damper.
 - Nozzle must not interfere with the operation of the damper – on many occasions the connection between the duct collar and the duct is distorted by the installer of the duct and the damper will not close.

Appliances that have not been tested/listed for fire suppression coverage but require protection based upon the production of grease laden vapours

- Horizontal Rotisserie (without enclosing doors)
- Vertical Rotisserie (shawarma, donair, gyro) Machines
- Induction Cookers when used to sauté or fry

Additional Requirements:

- Type B gas type extinguishers are not permitted in a kitchen.
- Since the adoption of the ABC 1997, where there is a kitchen fire suppression system installed in a building with a fire alarm system the suppression system SHALL be tied into the building fire alarm so that if there is a system discharge the building fire alarm SHALL sound.

What cooking appliances/processes do NOT require the coverage of a fixed fire suppression system?

Enclosed appliances

- Ovens, including cook and hold ovens, warming ovens and steam ovens
- Pizza Ovens (pizza decks)
- Masonry or Cement Pizza Ovens,
- Chicken Rotisseries with doors

Other appliances

- Steamers,
- Rice Cookers,
- Soup kettles,
- Proofers,

What standards apply to kitchen fire suppression and exhaust systems?

The ABC and AFC dictate the requirements and standards for these systems. From those documents comes the need for systems to either meet the requirements of:

- ABC Sentences 6.2.2.6.(3 to 6) for those smaller installations where the activity involves minimal cooking (such as the preparation of soup and sandwiches or warming of food cooked elsewhere served by an outside caterer, typically using "residential" appliances) with no production of smoke or grease laden vapours, or
- NFPA 96, NFPA 17A, UL 300 and ULC/ORD-C1254.6, "Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units." (Each of these references additional standards which will need to be met regarding the equipment and installation methods used and the ongoing maintenance and cleaning of the systems).

In both cases the requirements of NFPA 96 related to the regular cleaning and maintenance of the ventilation system by qualified persons will also apply.

Why are older systems no longer acceptable for use?

In the 1980s and 1990s health concerns prompted the use of liquid vegetable oils rather than shortening to fry in commercial cooking operations. This resulted in an ability to increase the cooking temperatures to speed up frying processes. At these higher temperatures the fire protection systems previously used (dry chemical powder and early wet chemical systems) proved to be ineffective in both extinguishing and preventing the re-ignition of the vegetable oils.

Previous kitchen suppression systems fire testing standard UL 300(ULC/ORD 1254.6) used mock ups of appliances with limited or no pre-burn time. Under the new (current) UL 300 (ULC/ORD 1254.6) standards, actual appliances are used with fire burning times that actually activate the auto suppression system. These tests resulted in the development of newer wet chemical (NFPA 17A/UL 300) systems and lead to the withdrawal of manufacturer service support, replacement parts and extinguishing agent for the older wet and dry chemical systems used in cooking applications.

The new UL300 Standard "Fire Extinguishing Systems for Protection of Restaurant Cooking Areas" came into effect on November 21, 1994 and the ULC/ORD-1254.6 "Fire Testing of Restaurant Cooking Area Fire Extinguishing Systems Units" effective date was July 1, 1995.

What are the maintenance requirements for fixed fire suppression systems and kitchen exhaust systems?

- Semi-annual maintenance of the suppression system by a qualified person, and
- Exhaust/hood cleaning at least annually by a qualified person.

NFPA 96 – 2004 - Table 11.3 Schedule of Inspection for Grease Buildup	
Systems serving solid fuel cooking operations ^a	Monthly
Systems serving high-volume cooking operations, such as 24-hour cooking, charbroiling, or wok cooking ^a	Quarterly
Type and/or Volume of Cooking Frequency	Frequency
Systems serving moderate-volume cooking operations ^a	Semiannually
Systems serving low-volume cooking operations, such as churches, day camps, seasonal businesses, or senior centers ^b	Annually

- a) These are minimum cleaning cycles
- b) These MAY be extended if, in the opinion of the owner and the Authority Having Jurisdiction (AHJ) in the Fire Discipline, and physical inspection supports this opinion, there is no appreciable or noticeable accumulation of grease, dust or other residue throughout the hood and duct system.

For additional information on the requirements for kitchen exhaust cleaning, including training and record keeping in Alberta see STANDATA FCI-09-04 Maintenance of Commercial Cooking Equipment at:

www.municipalaffairs.alberta.ca/documents/ss/STANDATA/fire/fci/FCI-09-04.pdf

Are there allowances in codes and/or standards for limited usage facilities?

Possibly through the acceptance by the AHJ of an Alternative Solution. Many community halls and similar facilities may only use the kitchen and appliances to cook food very infrequently and in many instances these kitchens will be used only to warm or heat previously cooked food for events in the building and a stove may be used to create sauces or a grill may only be used to cook pancakes.

In these instances a frank discussion between the owner and fire and building officials is required, preferably prior to construction/installation, to evaluate the proposed activities, plans and procedures and to determine the requirements for exhaust and suppression. If, through the consultation, the owner determines that they may be able to achieve an equivalent or higher level of safety through alternative methods to those in the building or fire codes, they may request acceptance of an Alternative Solution submitted to the appropriate discipline SCO. If accepted the Alternative Solution will be registered with the Safety Codes Council.

Are there requirements for interconnection of exhaust, suppression, fuel/energy and fire alarm systems?

Exhaust fans in the ventilating system must continue to function upon activation of the suppression system. The forced draft of these fans assists the movement of the fire suppression

agent through the ventilating system, thus aiding with fire suppression within the duct system. These fans also remove smoke and provide a cooling effect in the plenum and duct after the fire suppression system has been discharged. The system is UL listed with or without fan operation.

Where multiple hoods use an interconnected or common duct then all ductwork must be protected, even where one of the hoods has no appliances requiring protection.

All fuels or energy used to heat appliances must automatically disconnect upon activation of the suppression system. In addition in buildings built, or which have had the fire alarm system upgraded, since the adoption of the 1997 ABC the activation of the suppression system must also put the fire alarm system, when present, into alarm.

Are there requirements for kitchen suppressions systems to be engineered?

Yes. Systems consist of components which are listed and pre-engineered for a specified size, type and location of hazard by the manufacturer and this engineering should be sufficient. Where this engineering has not been provided by the manufacturer for use by the installer additional engineering will be required by the permitting authority. The verification process can then be completed by the installing technician who would provide documentation to the coordinating professional where required.

If a suppression system is used to protect an appliance that has not been fire tested by a Listing Agency, (protection specified in the Manufacturer's Listed Manual), then the system is no longer Pre-Engineered – it now becomes a non-Engineered System requiring site specific drawings and the stamp of a professional engineer.

What about when appliances are changed or moved. Does this require re-engineering?

Movement of appliances under the same hood, and the movement or switching of nozzles by a qualified technician, would not require additional engineering provided there is no addition of new appliances in both number and type. If this involves changes to energy supplies (new wire, new piping) then there will be a need for a gas and/or electrical permit.

Once additional appliances are added the capacity of both the ventilation (hood) system and the suppression system will need to be evaluated. As such, in addition to required gas and/or electrical permits, a building permit will be required to ensure that the systems remain appropriate to the hazard presented. This will involve a need for additional engineering in most instances as well.

What is required when used hoods or appliances are placed into a facility?

In all cases permits for building, electrical and likely gas will be required. SCOs have the discretion to accept previously installed equipment provided it continues to meet the requirements of the codes and standards under the *Safety Codes Act*. As such fire suppression systems which have not been certified to UL 300 (ULC/ORD 1254.6) are not acceptable.

This Interpretation applies throughout the Province of Alberta

¹ All references are to Division B of the respective Code unless otherwise stated.