



Commercial Cooking Operations

March 2015

Scope

This document is intended to help fire inspectors understand and apply the regulations governing ventilation and fire protection measures in commercial cooking applications. A suggested safety checklist is included in Appendix A.

Introduction

The National Fire Code¹ (NFC) adopts National Fire Protection Association (NFPA) Standard 96 - Ventilation Control and Fire Protection of Commercial Cooking Operations. NFPA 96 is a technical standard which addresses the design, installation and operation of ventilation systems in commercial kitchens. The standard also covers inspection requirements for these systems. The measures contained in NFPA 96 are the minimum requirements which must be met. Operators may exceed these minimum requirements as long as any additional measures taken do not compromise compliance with NFPA 96.

A growing number of insurance companies are mandating measures including upgrading existing systems to a point exceeding NFPA 96 before they will issue coverage. These arrangements are strictly part of the contract between the company and its client(s). In some cases, insurers are asking local inspectors to evaluate these additional measures and report their findings. Fire inspectors must avoid becoming involved in this type of reporting. Inspections, recommendations for system improvements and Orders to Remedy a Contravention² can only be based on the requirements in NFPA 96 - not on the requirements of an insurance company. Inspectors should keep in mind that if they do comply with a request to report directly to an insurance company they are exceeding their authority as granted in *The Fire Prevention Act, 1992*, as well as placing themselves in a direct conflict-of-interest.

Local inspectors are sometimes asked to approve unconventional arrangements for commercial cooking ventilation and fire protection. The local authority having jurisdiction³ (AHJ) may accept measures that are not in strict accordance with the requirements of NFPA 96, but only if those alternate measures provide an equal or greater level of fire protection⁴. Given the complex technical requirements of NFPA 96, most inspectors find they are not qualified to evaluate alternate measures. The services of a qualified designer or engineer should be sought in these cases.

Application

There are some common misconceptions about when and where the requirements of NFPA 96 should be applied. The purpose of NFPA 96 is to reduce the potential fire and life safety hazards associated with commercial cooking operations regardless of the equipment used. This includes residential cooking equipment being used in a commercial operation.

There are certain exceptions. NFPA 96 does not apply in the following circumstances:

- When cooking equipment is located in a single family dwelling and when the following conditions are met:
 - Only residential cooking equipment is in use;

¹ The National Fire Code has been adopted as the primary set of fire code regulations and has the force of legislation in Saskatchewan.

² As provided for in *The Fire Prevention Act, 1992*.

³ *Authority having jurisdiction (AHJ)* means the municipal authority responsible for enforcing fire safety regulations and/or fire suppression response. In communities with a fire department the Fire Chief is delegated to act as the *AHJ*. In communities with no fire department the administrator most often assumes the duties of the local authority having jurisdiction.

⁴ Article 1.1.2.3 - *Alternates - National Fire Code of Canada*.

- Fire extinguishers are located in kitchen areas in accordance with provincial fire safety regulations;
 - The facility is not an assembly occupancy;⁵
 - The cooking equipment is used only by residents;
 - In situations where the authority having jurisdiction approves the installation; and
 - When cooking equipment located in a business for use by employees. For example, an industrial facility that has residential-type cooking equipment for use strictly by employees to cook a meal or heat food for their own consumption.
- NFPA 96 does apply in cases where occupancy has cooking equipment that is used to prepare meals to be served to employees, regardless of the type of cooking equipment used - commercial or residential. This type of operation would be classed as a cafeteria, even if members of the public are not being served.

There are situations in which AHJ may determine adequate fire and life safety can be established without applying all the requirements of NFPA 96. Examples include:

- Where a motel has a small cafeteria that offers a continental breakfast (coffee, juice, toast, muffins, etc.). When the only “cooking” that takes place involves toasting bread or re-heating buns and pastries the risk of fire is not substantial. In this case, the requirements of NFPA 96 could be waived. Although commercial cooking is taking place in the strictest of terms the hazard is quite limited; and
- Dormitories where cooking equipment is provided in a common room for the exclusive use of residents and the equipment is not used for the regular preparation of meals to be served to all the occupants.

In most cases the requirement for the installation of ventilation equipment and fire protection for cooking operations will be obvious. In other situations, the local authority having jurisdiction must evaluate the hazards created by the operation. Where an unacceptable condition exists, compliance with NFPA 96 should be required.

Enforcement

NFPA 96 was adopted as part of the National Building and Fire Codes in 1990 and hence became part of Saskatchewan’s building and fire safety regulations. As a result, a number of existing commercial cooking operations do not meet the requirements of NFPA 96 for ventilation control and fire protection. Owners and operators, often prompted by concerns over insurance coverage, may turn to local fire inspectors for direction. Local authorities are then faced with determining if those existing systems are acceptable as is or require updating or need replacing. To enable effective evaluation of existing installations a clear understanding of the approach taken by NFPA 96 for reducing the hazards associated with commercial cooking is needed.

The systems covered by NFPA 96 are made up of both ventilation and fire detection/suppression components. These components work together to reduce the risk of fire and provide safe and rapid suppression in the event of ignition.

Ventilation

The primary function of ventilation is to remove the grease-laden vapours, heat, smoke and fumes produced by cooking. A properly functioning ventilation system safely exhausts these products of cooking to the exterior of the building.

⁵ An assembly occupancy is any building or part of a building used for a gathering of persons for civic, political, travel, religious, social, educational, recreational or similar purposes - including the consumption of food or drink. Examples include community halls, arenas, restaurants, auditoriums, theatres, licensed beverage rooms and schools. (see Article 1.2.1.2 - *Defined Terms* in the

Without proper ventilation, grease, smoke and residue collect on the walls, ceiling and surfaces in the kitchen - creating a serious fire hazard.

A typical ventilation system includes an exhaust hood, filters, ductwork, a fan and a means of providing a flow of fresh air. Fumes generated by cooking operations are drawn into the hood, travel through the filters into the duct system and then are exhausted out of the building through the fan system. Systems also provide fresh air, known as make-up air, from the outside to replace the air pulled out of the kitchen by the system's exhaust fans.

The hood and duct system must be capable of containing the grease and contaminated air drawn from the cooking operation. The hood and duct system must also be a fire-safe assembly that is strong enough to contain a fire. The hood and duct components must be made of steel and must be formed by welding. NFPA 96 describes "seamless welds." This method of construction avoids any gaps or joints in the hood or duct that can trap grease or prevent easy cleaning. Each section of duct must be seamlessly welded together and to the vent hood. The standard also enables Individual welded components to be attached to each other and the vent hood by mechanical fasteners and high temperature gaskets. The hood and duct system must form a continuous airtight and liquid tight system that prevents any leakage of air or grease into the building. The system must function in a manner that ensures vapours produced by cooking are exhausted to the exterior. Non-combustible bracing and supports, designed to carry the weight of the hood and ducts, must support the assembly in such a way that no fasteners penetrate the hood or ducts.

Unless ventilation is directly to the exterior of the building from the hood, ducts are often run to the exterior through a shaft or other enclosure. The enclosure is typically constructed of gypsum board, plaster, concrete or ceramic tiles and must be a continuous fire-rated enclosure. Because the hood and ducts must contain a fire, the system must be installed with adequate clearances from combustible materials and building assemblies. The separations reduce the potential for the heat of a fire in the ducts igniting combustible material by radiation or conduction.

All exhaust fan components must be accessible or have removable access panels for cleaning and inspection. The assembly must also be designed to contain and safely drain any excess grease. Exhaust fans must be located so the exhausted grease-laden air does not create a hazard on the exterior of the building or to nearby buildings.

In order for the exhaust system to work properly, make-up air is required to replace air equal to the amount removed. Make-up air can be provided via an independent system or in combination with the building's heating, ventilating and air cooling (HVAC) system. The need for make-up air is often overlooked. Make-up air is critical to the proper operation of the ventilation system. If sufficient air is not entering the building, the ventilation system cannot properly exhaust the grease and smoke - and air from the building.

Fire Protection Systems

The fire protection systems used in commercial cooking operations are designed to detect and automatically suppress fires in cooking equipment, the exhaust hood and duct work. Ventilation systems come in a range of standard sizes based on the number and type of grills, deep-fryers and other cooking equipment installed in the kitchen. Subsequently, most fire protection systems are pre-engineered to match those standard sizes.

Fire protection systems consist of a tank (usually pressurized) holding the fire suppression agent, an initiating device (attached to the tank) that is connected to both fusible links in the hood and duct assemblies, as well as piping to connect the components.

Fire protection systems will likely be wet chemical fire suppression systems meeting ULC or UL

standards.⁶ However, NFPA 96 still recognizes other fire suppression systems including sprinkler systems and dry chemical systems as being acceptable for use in cooking operations. Due to revisions⁷ to the test standards most pre-engineered dry chemical fire suppression systems are no longer manufactured and parts and service for these systems are rapidly becoming unavailable. Whatever system is in place must be inspected, tested and maintained according to the manufacturer's instructions and/or the NFPA standard for the suppression system. As long as the system is operable it is acceptable under provincial fire safety regulations. If the system cannot be inspected, tested and maintained according to the manufacturer's instructions or the NFPA Standard, the system must be replaced.

If the building is equipped with a building-wide fire alarm system the kitchen fire suppression system must be connected to that building-wide system. Should the kitchen suppression system discharge the building fire alarms must sound automatically. If the building does not have a building-wide fire alarm system the activation of the fire suppression system must sound an audible alarm or provide a visual signal in the immediate area. The kitchen/cooking area fire protection system must have nozzles that discharge onto the cooking appliances, into the hood area, behind the filters and up into the duct system.

The automatic activation system on the kitchen fire protection system will generally be a fusible link. However, there are systems that use a heat sensing device. The fusible link system will consist of fusible links located within the hood and connected to a cable system which is under tension. A fire will melt the link releasing the cable tension allowing the fire suppression system to discharge. The fusible link system is a secondary system in case staff in the kitchen do not operate the manual activation system (pull station) when a fire occurs. The preference is to have persons in the kitchen operate the manual pull station should a fire occur. The pull station must in a readily accessible location. The best location is near an exit or means of egress from the kitchen. The pull station must be clearly marked with a sign identifying what it is for and how to use it.

Fire protection systems must be installed, inspected and maintained by persons who are trained and qualified to perform such service. Systems require inspection, testing and maintenance at least twice per year (every six months) to ensure the system will function as designed.

Inspection of Hood and Ducts

The schedule of inspections for grease and residue build-up depends on the type of cooking equipment and how much it is used. Whenever a build-up is found the system must be cleaned. Every owner or operator should do a visual inspection, at least once a week, of those parts of the system readily accessible, including removing filters. A qualified company or individual must complete a thorough inspection of all components, ducting and fans following the schedule laid out in NFPA 96:

- Monthly - For cooking appliances using solid fuel - charcoal grills, for example.
- Quarterly - High-volume operations such as 24-hour kitchens, charbroiling or wok cooking.
- Semi-annually - Systems used in moderate-volume cooking operations such as restaurants open during normal business hours.
- Annually - Systems used in low-volume cooking operations such as churches, day camps or seasonal businesses.

The local authority having jurisdiction may require inspections be completed more often than indicated by this schedule.

⁶ The standards used are ULC Standard *ULC/ORD-C1254.6 - Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units* or UL Standard *UL 300 - Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*.

⁷ Historically, commercial kitchens used fat or lard for deep-frying. Dry chemical extinguishing agents work well to suppress fires in animal fats. Over the past 20 years most kitchens have converted to using vegetable oil for deep-frying. Using a dry chemical agent on vegetable oil fires can lead to a dangerous spattering of the burning oil. Liquid extinguishing agents (K-Class) are now the accepted standard for use on vegetable oil fires. UCL, UL and CSA standards have changed to reflect the use of liquid extinguishing agents.

Cleaning of the Hood and Ducts

Ventilation systems must be cleaned as required in Chapter 11 of NFPA 96. The use of a cleaning company or contractor is recommended. There are two primary methods of cleaning kitchen exhaust ductwork. The first is by manually scraping and removing build-up. The second is pressure washing or steam-cleaning. Regardless of which method is used the ventilation system must be cleaned in order to ensure all grease, oil and combustible residue is removed from the hood, filters, ducting and exhaust fans.

Cooking appliances should be inspected and cleaned at least as frequently as the hood and duct system. Appliances should also be visually inspected at least once a week and cleaned as required. Chapter 11 of NFPA 96 sets out procedures and conditions for cleaning exhaust systems.

- When grease and residue build-up is found the complete system must be cleaned by a properly trained, qualified and certified company or person(s) acceptable to the authority having jurisdiction.
- Before inspection and cleaning starts, electrical safety must be ensured. The safest approach is locking-out circuit breakers on the main electrical panel.
- The fire suppression system must remain in working order during the cleaning except when the extinguishing system is being serviced.
- No flammable cleaning solvents or cleaning fluids may be used.
- No cleaning chemicals of any kind may be used on any of the fusible links or other detection devices.
- No coatings, powders or other substances may be applied to any part of the exhaust system after cleaning.
- All access panels, doors and/or cover plates must be properly re-installed after cleaning and before the system is put back into service.
- Dampers, diffusers and other air handling devices must be properly re-installed after cleaning and before the system is put back into service.
- Electrical switches and system components must be returned to their normal operating state.
- When a vent cleaning service is used a certificate showing the date of inspection or cleaning must be kept on the premises by the owner/operator.
- The cleaning contractor must post a label in the kitchen area showing the date of the cleaning, the name of the service company and a note detailing areas of the system that were not cleaned.
- Where required, certificates of inspection and cleaning shall be submitted to the authority having jurisdiction.

General Inspection Requirements

The key to fire safety in commercial cooking operations is the regular inspection, maintenance and cleaning of the exhaust system, fire detection and suppression equipment and the cooking appliances. Fire inspectors should check commercial cooking operations regularly in order to ensure the safe operation of the systems and to familiarize themselves with the facilities for fire pre- planning purposes.

Inspectors should complete the following:

Hoods, Filters, Ducts and Fans

- Inspect the hood, duct and filters for grease build up. If accumulations are present the hood, duct and filters must be cleaned.
- Look for the label from the cleaning company identifying the last time the system was cleaned or ask the owner for the last cleaning company report. Cleaning should have taken place within the past 12 months or less, depending on the type of cooking equipment used.
- Check all appliances to ensure that they are in the proper place; have not been moved since the last inspection; and are fully covered by the hood.
- Ensure the proper placement of all appliances under the hood and the fire suppression system nozzles.
- Inspect the appliances for accumulations of grease. If accumulations are found appliances must be cleaned.

- Ensure that there have been no alterations or changes to the hood, ducts or appliances. Only alterations permitted by NFPA 96 may be made to the exhaust system.
- Ensure the hood and duct have not been damaged and that there are no breaches. Also ensure that pipes or other penetrations of the hood or duct openings which are part of the system design are in good condition and remain tightly fitted.
- Check all lights located in the hood to ensure that they are properly protected. Lights should be rated for use in hazardous locations and enclosed to prevent grease from entering or contacting hot parts or wiring.
- Check make-up air to determine if an adequate supply is available to enable the ventilation system to operate properly.

Fire Detection and Suppression

- Check the pressure gauge on the fire suppression system to ensure that the indicator needle is in the green or “OK,” section of the dial.
- Check the fire suppression system storage tank for signs of damage or tampering.
- Check the fire suppression system cylinder for last hydrostatic test. The test should have occurred within the past 12 years.
- Check the manual pull station to ensure that it is easily accessible to all employees and that it is not obstructed or blocked in anyway.
- Check to ensure that operating instructions for the fire suppression system are posted, visible and easy to read.
- Look for the last inspection tag on the fire suppression system or ask the owner for the last inspection report. The last inspection must be within the past six months.
- Check that the automatic gas and electrical shut-off device is in place and properly connected.
- Ensure that all kitchen staff are familiar with the proper operation of the fire suppression system.
- Check the required kitchen portable fire extinguisher. Make sure the extinguisher is properly mounted and is clearly visible and accessible. Ensure the extinguisher is the proper type - K Class (alkali base) and that the last monthly inspection is noted and that the unit has been serviced within the previous 12 months.

Appendix A

Attached is a suggested Inspection Checklist for use when visiting Commercial Cooking Operations.

**Commercial Cooking Operations
Ventilation and Fire Protection System
Inspection Checklist**

Business: _____
Address: _____
Date: _____

Acceptable Unacceptable See remarks n/a Not applicable

Hoods, Filters, Ducts and Fans	Fire Detection and Suppression System
<input type="checkbox"/> Inspect the hood, duct and filters for grease build up. Check nozzles for grease caps and cleanliness. If accumulations are present the hood, duct and filters must be cleaned.	<input type="checkbox"/> Check the pressure gauge on the fire suppression system to ensure that indicator needle is in the green or "OK," section of the dial.
<input type="checkbox"/> Look for a cleaning company label identifying the last time the system was cleaned or ask the owner for the last cleaning company report. Cleaning should have taken place within the past 12 months or less, depending on the type of cooking equipment used.	<input type="checkbox"/> Check the fire suppression system tank for signs of damage, leaks or tampering.
<input type="checkbox"/> Check all appliances to ensure that they are in the proper place, have not been moved since the last inspection and are fully covered by the hood.	<input type="checkbox"/> Check fire suppression system cylinder for the last hydrostatic test – within the past 12 years. The most recent test date will be stamped into the metal of the cylinder - usually near the valve assembly. Cylinders older than 12 years or those without a date stamp must be replaced.
<input type="checkbox"/> Ensure the proper placement of all appliances under the hood and the fire suppression system nozzles.	<input type="checkbox"/> Check the manual pull station to ensure that it is easily accessible to all employees and that it is not obstructed or blocked in anyway.
<input type="checkbox"/> Inspect appliances for accumulation of grease. If accumulations are found, the appliances must be cleaned.	<input type="checkbox"/> Check to ensure that operating instructions for the fire suppression system are posted, visible and easy to read.
<input type="checkbox"/> Ensure that there have been no alterations or changes to the hood, ducts or appliances. Only alterations permitted by NFPA 96 may be made to the exhaust system.	<input type="checkbox"/> Look for the last inspection tag on the fire suppression system or ask the owner for the last inspection report (must be within the last 6 months).
<input type="checkbox"/> Ensure the hood and duct have not been damaged and that there are no breaches. Also ensure that pipes or other penetrations of the hood or duct openings which are part of the system design, are in good condition and remain tightly fitted.	<input type="checkbox"/> Check that the automatic gas and electrical shut-off device is in place and properly connected.
<input type="checkbox"/> Check all lights located in the hood to ensure that they are properly protected. Lights should be rated for hazardous locations and enclosed to prevent grease from entering or contacting hot parts or wiring.	<input type="checkbox"/> Ensure that all kitchen staff are familiar with the proper operation of the fire suppression system.
<input type="checkbox"/> Check make-up air to determine if an adequate supply is available to allow the ventilation system to operate properly.	<input type="checkbox"/> Check the required kitchen portable fire extinguisher. Make sure that extinguisher is properly mounted and is clearly visible and accessible. Ensure the extinguisher is the proper type – K Class (alkali base), that the last monthly inspection is noted and that the unit has been serviced within the previous 12 months.

Page 2

Business:


Address:

Date:

**Commercial Cooking Operations
Ventilation and Fire Protection System**

Remarks:

Use additional sheets as required.

A large, empty rectangular box with a thin black border, intended for recording inspection remarks. It occupies the central portion of the page below the 'Remarks:' heading.

This form is an inspection aid only and should not be used as an Order to Remedy a Contravention.