

# BUILDING BULLETIN

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## Building Services

<b>Subject:</b>	<b>Commercial Cooking Systems</b>
<b>Building Bulletin No:</b>	<b>BD.BB.18.09</b>
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<b>Reference:</b>	s. 1.1(6) <i>Building Code Act</i>

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### A. Purpose

The purpose of this Building Bulletin is to provide:

- an overview and an understanding when applying the regulations governing the ventilation and fire protection systems in commercial cooking operations and
- to clarify when compliance with NFPA 96, the “*Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*” is required.

### B. Background and Definitions

The Ontario Building Code states the following:

#### 6.2.2.6. Commercial Cooking Equipment

- (1) All commercial cooking equipment shall be provided with ventilation systems designed, constructed and installed to conform to NFPA 96, “*Ventilation Control and Fire Protection of Commercial Cooking Operations*”, except as required by Sentence 3.6.3.1.(1) and Article 3.6.4.2.
- (2) Fire protection systems for high efficiency, high temperature commercial cooking equipment using vegetable oil or animal fat shall conform to,
  - (a) ANSI/UL 300, “*Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*”, or

(b) ULC/ORD-C1254.6, “Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units”.

The following definitions are referenced from the Ontario Building Code and the corresponding NFPA Standards:

**“Class 1 Cooking Operation”** is defined as any cooking process which produces significant smoke or grease-laden vapours, and includes any equipment which has been designed by the manufacturer to be able to produce significant smoke or grease-laden vapours, except where specifically approved under another Class.

**“Class 2 Cooking Operation”** is defined as any cooking equipment or process which produces significant steam or heat but does not produce grease-laden vapours.

**“Ecology Unit”** means a device used for the cleaning of exhaust air and is listed in conformance with ULC-S647-05, *“Standard for Exhaust Cleaning and Recirculation Assemblies for Commercial and Institutional Kitchen Exhaust Systems”*. Other terms used for an ecology unit in the industry are ecologizer, Air Purification Unit (“APU”), Pollution Control Unit (“PCU”), “air pollution control device” (NFPA 963, 3.3.3) and proprietary names such as Halton’s (previously known as Vent Master) Ecolair, Spring Air’s Enviro Unit, Carroll’s EnvironAir, and Quiet-Aire’s Ecology APU. An ecology unit typically has a large metal box in the exhaust path. Generally, the metal box includes 3 large filters plus an exhaust fan, with the fan and sensors controlled by a panel typically mounted in the kitchen area (refer to the diagram in Section II b).

**“NFPA 17A”** is the *“Standard for Wet Chemical Extinguishing Systems”*, where provisions apply to pre-engineered wet chemical fire extinguishing systems that discharge wet chemical from fixed nozzles and piping by means of expellant gas. Requirements are specified for restaurant, commercial, and institutional hoods, plenums, ducts, and associated cooking appliances.

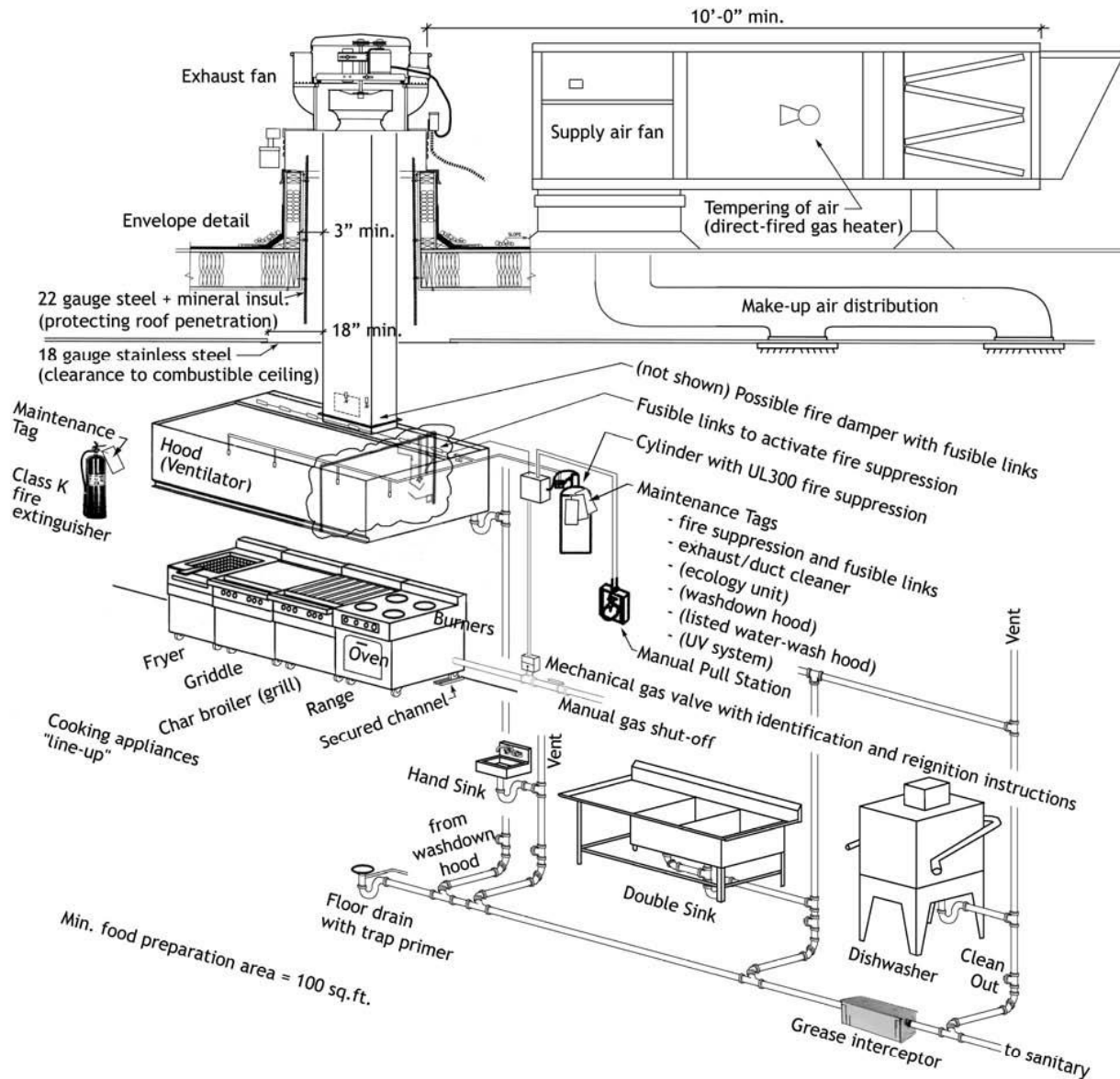
**“NFPA 96”** is the *“Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations”*. Kitchen systems complying with this standard typically have welded steel ductwork, a heavy duty exhaust hood (Type I Hood), fire suppression underneath the hood and a make-up air system.

**“Type I Hood”** means a hood designed in conformance with NFPA 96 [NFPA 96, A.3.3.31] and constructed per NFPA 96, Chapter 5. Typically, the hood is externally welded so that it is liquid-tight and is of 18 gauge steel or 20 gauge stainless steel [NFPA 96, 5.1.1 and 5.1.2].

**“Type II Hood”** means a hood designed for heat and steam removal and other non-grease applications. It is generally seamed. A condensate hood with an exhaust is a Type II hood.

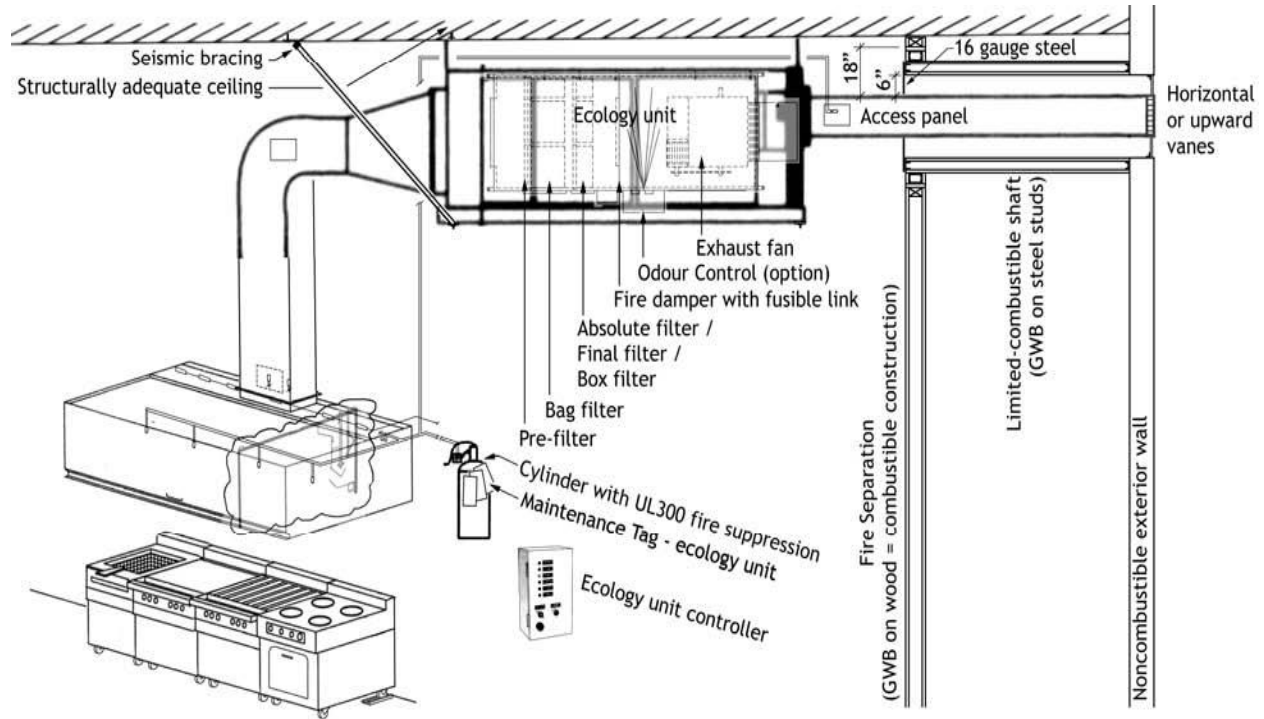
### Commercial Kitchen Terminology

**Standard set-up** - Typical terminology used for a standard set-up kitchen ventilation system is shown in the figure below:



The information in this bulletin is the interpretation and standard practice in the administration of the Town's Ontario Building Code Program and is provided for convenience only. Existing or proposed construction or other works shall comply with all applicable bylaws, codes and applicable law.

**Ecology Unit** - Typical terminology used for a kitchen ventilation system with an *ecology unit* is shown in the figure below:



## C. General Interpretation and Requirements

The term “commercial” used in the above OBC definition may be misleading. NFPA 96, the “*Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*”, is required for grease-laden cooking, even though the cooking operation may be non-commercial, non-profit or private (non-public).

Conversely, NFPA 96 may not be required for a commercial (“business for profit”) food outlet or part of a commercial cooking operation, if for example the cooking equipment is designed for creating steam and heat only.

### C.1. General Provisions

1. Where the menu, style of cooking or cooking equipment changes from what was originally designed and approved, it is the property *owner's* and kitchen operator's responsibility to obtain a Building Permit to upgrade the kitchen ventilation and fire suppression systems, as required.
2. Where complaints of objectionable odours are received by the public, they will be investigated and where operations are found to be in non-compliance including where the premises are found to have interior build-up of grease or smoke residue, the owner or manager is responsible to make the required corrections, such as changing the type of cooking (menu change) or changing the equipment to comply with the appropriate Class of Cooking Operation.
3. Where the Chief Building Official deems it necessary, a letter from a competent person (Mechanical Engineer) and the owner may be required to confirm that the proposal complies with one of the Classes of Cooking Operation prior to issuance of the Building Permit. A sign may also be required to be visibly displayed in the kitchen to describe the Class of Cooking Operation.

### **C.1.2. Firestopping**

1. Firestopping shall be in accordance with the Ontario Building Code.
2. Where the grease duct assembly penetrates a fire-rated assembly, the resulting opening around the grease duct system shall be fire stopped with an approved firestop system.
3. The F and T rating of the firestop system shall be equal to or greater than the fire resistance rating of the assembly being penetrated

### **C.1.3. Field Applied Insulation Wraps**

Welded code-prescribed exhaust duct systems with field applied fire-rated insulation enclosure system (i.e. "*FireMaster*"), or a factory manufactured commercial grease duct with field applied fire-rated insulation enclosure system shall have a flame spread rating of not more than 25 and smoke developed rating of not more than 50 in accordance with the Ontario Building Code

### **C.1.4. Fire Suppression System**

NFPA 96, 10.2.3\* Automatic fire-extinguishing systems shall comply with UL 300 or other equivalent standards and shall be installed in accordance with the requirements of the listing:

1. UL300 Standard "Fire Extinguishing Systems for Protection of Restaurant Cooking Areas" (effective November 21, 1994 in U.S.); or

2. ULC/ORD-1254.6 “Fire Testing of Restaurant Cooking Area Fire Extinguishing Systems Units”: (effective July 1, 1995 in Canada)

## **C.2. Classes of Cooking Operation: NFPA 96**

To clarify when compliance with NFPA 96 is required, the Town of Collingwood has identified the following separate Classes of Cooking Operation:

### **C.2.1. Class 1 Cooking Operation: Grease-laden Vapours**

1. A Class 1 Cooking Operation is defined as any cooking process which produces significant smoke or grease-laden vapours, and includes any equipment which has been designed by the manufacturer to be able to produce significant smoke or grease-laden vapours, except where specifically approved under another Class.
2. Full compliance with NFPA 96 (*Type I hood*); and
3. Mesh filters are not permitted in new installations [NFPA 96, 6.1.3]. It is recommended that mesh filters in existing systems be replaced due to increased fire risk.

#### **Examples of Class 1 Cooking Operation:**

1. Cooking operations outside the scope of Classes 2 through 5,
2. The following commercial-type equipment or, domestic-type equipment used in a commercial-like food-processing establishment:
  - range (burners or hot top), stove, hot plate (gas burner, electric coil or flat top), induction cooker, electric frying pan,
  - conveyor convection oven if used for cooking chicken wings or other bulk meat,
  - oven used for cooking meat, char broiler, wok, fry grill, griddle, salamander, deep fat fryer, pan frying, barbecue, rotisserie, Donair vertical broiler, tilting skillet, braising pan,
  - any equipment recommended to have fire suppression by the manufacturer,
  - any equipment which produces or has been designed by the manufacturer to have the potential to produce comparable amounts of smoke or grease. [NFPA 96, A.10.1.2]
  - cooking operations which receive complaints of producing objectionable odours or are found to cause interior buildup of grease or smoke residue [Provincial Health Act].

### **C.2.2. Class 2 Cooking Operation: Steam and Heat Removal**

1. A Class 2 Cooking Operation is defined as any cooking equipment or process which produces significant steam or heat but does not produce grease-laden vapours.
2. The following requirements apply to a Class 2 Cooking Operation:
  - a) Type II hood and exhaust with general HVAC ducting
  - b) Where the ductwork is combined with ductwork serving a Class 1 Cooking Operation, then the ventilation for the Class 2 Cooking Operation is required to comply with NFPA 96 except that the air flow volume may be designed for heat and steam removal only. [NFPA 96, 7.1.3]
  - c) Where the appliance is designed with the potential for Class 1 Cooking, and will only be used for Class 2 Cooking, then the following are additional requirements:
    - i. A completed, "*Commitment Not to Create Grease-laden Vapours*" form, and
    - ii. A metal sign securely mounted to the front of the hood embossed with the following words sized and coloured so that they can be easily read and understood:

**COOKING CAUSING GREASE-LADEN VAPOURS IS NOT ALLOWED.**

**EXHAUST SYSTEM IS DESIGNED FOR STEAM AND HEAT REMOVAL ONLY**

The objective of the sign is to advise and remind staff in the kitchen not to create grease vapours, identify the cooking operation for inspectors, and identify the system's limitations for future buyers of the operation.

**Examples of Class 2 Cooking Operation:**

1. Any of the following if they are > 6 kW (20,478 BTU/h) 1 kW = 3,413 Btu/h:
  - closed pizza oven, conveyor pizza oven if used only for pizza or bread, baking oven,
  - coffee maker, coffee roaster,
  - hot dog display heater, pastry oven, popcorn maker, roll warmer,
  - steam reconstitution device, steamer, toaster, warming oven
2. An open Bain Marie
3. The following would be considered appliances designed with the potential of Class 1 Cooking but used only for Class 2 Cooking:

- an electric domestic range, hot plate or induction cooker in a commercial cooking establishment used only for non-grease applications such as boiling water (e.g., potatoes, pasta, rice), or
- reheating pre-made soups, heating beverages (e.g., hot chocolate) or melting chocolate. (See additional requirements above.)

### **C.3. Required Inspections & Performance Evaluation (Testing)**

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

#### **C.3.1. Ventilation System**

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. 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 for 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 manufactured to contain the grease and contaminated air drawn from the cooking operation. The system must also be a fire-safe assembly, capable of containing a fire in the ducting without allowing it to spread to rest of the structure. The hood and ducting must be sufficiently strong to contain a fire.

#### **C.3.2. Inspection & Testing of Field Assembled Ductwork**

NFPA 96, 7.5.2.1: *All seams, joints, penetrations, and duct-to-hood collar connections shall have a liquidtight continuous external weld.*

NFPA 96 describes "seamless welds." 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.

A field leakage test shall be performed on the entire duct, including duct joints assembled in the



field:

1. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed in the presence of a Building Inspector.
2. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the duct work from being visually inspected on all sides.
3. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test.
4. The leakage test shall comprise of a smoke test, a light test or an approved equivalent or alternate method to determine that all field assembled joints are liquid tight.
5. **The leakage test shall be conducted on the ground prior to installation.**
6. The Building Inspector shall:
  - a) witness the leakage test, review and inspect the welded seams and the welded connections for any leakage.
  - b) for factory manufactured commercial grease ducts, confirm that that joint sealant used is supplied by the duct manufacturer and listed by an approved agency.
  - c) verify that the fire-rated grease duct insulation enclosures around a factory manufactured grease duct are listed by an approved agency.
  - d) inspect duct passageway to insure it is clear and free of any obstructions;

**Performance Evaluation:** *Acceptable performance, consist of capture of all visible smoke generated. A demonstration is a complete testing of all identified test locations. A complete and thorough ventilation system evaluation will ensure that when the system is properly maintained and operated, it will capture effectively.*

1. While performing a smoke test, consideration shall be taken not to adversely affect the operation of other mechanical equipment installed.
2. A final ventilation balance report shall be submitted prior to the capture and containment test. The ventilation balance report shall agree with the air quantities stipulated on the approved plans and specifications for the installation
3. Building pressure shall be verified, not to exceed 0.02" water column negative. This shall be verified with all equipment in normal operation and with all the windows and doors closed.

### **C.3.3. Final Inspection**

The demonstration of the interlocking between the fire suppression system and electrical power to the appliances, between fire suppression and fans, and the annunciation on fire alarm panel are part of the Trip Test that is to be arranged with the Building Inspector.

#### **C.3.3.1. Prior to activating the manual pull station:**

1. All equipment (exhaust, make-up air, rooftop unit, etc) that may affect the performance of the hood shall be activated and in operation during the test.
2. The cooking equipment shall be turned on and operated in a manner similar to normal usage.
3. Testing of the fire suppression system during the Trip Test may use an alternative method such as air balloons rather than discharging the chemical. NFPA 17A, A7.3.2.3, "Balloon Test".
4. Movement of persons is to be minimized.
5. Interior or exterior doors, windows and roof hatches are to be kept closed.

#### **C.3.3.2. Upon activation of the manual pull station:**

1. All fire suppression nozzles under the exhaust hood activate,
2. Electrical power shuts off to all appliances and outlets underneath the hood,
3. Gas supply valve to the appliances shuts off,
4. The make-up air system shuts off,
5. The exhaust systems continues to run (including an ecology unit's fan) [NFPA 96, 8.2.3.1],
6. An audible alarm or visual indicator activates, e.g., visual indicator on the fire suppression control unit [NFPA 96, 10.6.1] , and

#### **C.3.4. Fire Alarm Annunciator Panel**

Where there is a required fire alarm system, on the fire alarm annunciator,

1. a separate fire alarm zone indicates, or
2. a shared zone indicates (with the shared zone being the one that covers the kitchen), for an existing panel that has no other available zones. NFPA 96, 10.6.2
3. electrical supervision of electrically operated fire suppression (unless there is a mechanical backup, interlocking with the cooking power source, or an electrical connection with a listed fire-actuated waterwash system) by a separate trouble signal on the fire alarm annunciator NFPA 96, 10.7

## **D. Exemptions**

This Building Bulletin and the requirements of NFPA 96 *do not* apply to the following:

1. Non-commercial food operations, such as:
  - Single housekeeping dwelling units
  - a single, four burner domestic range in a Fire Hall

- a single, four burner domestic range in an amenity room in a residential building, care home, congregate housing, employee break room or church where there is no cooking that produces grease-laden vapours, e.g., used for food warming or baking cakes (a microwave is recommended rather than a range where possible) [NFPA 96, A.1.1.4]
  - a home-economics classroom in a high school where only domestic cooking is taught
  - a domestic range in a Licensed Childcare Facility.
  - a single domestic range used in a showroom that sells non-food products, such as a showroom for selling domestic ranges, where the range is used once on the occasional day for a small number of people
2. Self-contained cooking equipment listed by an accredited certification organization such as ULC, cUL or ETL to ventilate into the room. These devices typically have their own fire suppression and grease filtering systems. These systems are required to comply with the manufacturer's installation, operational and listing requirements, for example:
    - Giles Ventless Hood Fryer (previously called Chester Fried Ventless Hood Fryer)
    - Perfect Fryer PFC model series, ventless commercial deep fat fryers
    - Belshaw Donut Robot Fryer with Insider ventless cabinet
  3. 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 an 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.
  4. Situations in which adequate fire and life safety can be established without applying all the requirements of NFPA 96. For example, 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 limited.

## E. Reference Information

- The Ontario Building Code

- NFPA 96, the “*Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*”.

## **F. Review Cycle**

This building bulletin will be reviewed annually by the Chief Building Official.

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