NFPA 96


2001 Edition

Copyright © 2001, National Fire Protection Association, All Rights Reserved

Presented with permission by, Tom Johnson

Chairman, JDP, Inc.  651-686-8499 x101  tomj@jdpinc.com
Introduction to NFPA 96

- Began in 1955, first elements of standard published in 1961
- 1987 technical committee on venting systems for cooking appliances
- Industry consensus standards committee approved by ANSI
- An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.
1.1 Scope

1.1.1* This standard shall provide the minimum fire safety requirements (preventative and operative) related to the design, installation, operation, inspection, and maintenance of all public and private cooking operations.

1.1.2 This standard shall apply to residential cooking equipment used for commercial cooking operations

1.1.3 This standard shall not apply to cooking equipment located in a single dwelling unit.

Note: This is violation of MN Food Code, MR4626, and requires a rider on commercial insurance policy
Annex A

The following are types of hoods:
(1) *Type I*. Hoods designed for grease exhaust applications
(2) *Type II*. Hoods designed for heat and steam removal and other non-grease applications. These hoods are not applicable to the standard 96, but are covered by: IMC 507.2, Type II or Type I - shall be installed above all food heat processing appliances that produce fumes, steam, odor or heat. (*within reason, of course*)

The following are styles of hoods:
(1) Wall-mounted, all cooking/warming
(2) Single island, all cooking/warming
(3) Double island, all cooking/ warming
(4) Backshelf, surface cooking, frying, broiling , braising, broiling
(5) Eyebrow; for chamber cooking/baking or toasting
Chapter 2 Referenced Publications
(aside from other NFPA Stds)

- 2.1.2.1 EPA Publication. Environmental Protection Agency (EPA), Crystal Station, 2800 Crystal Drive, Arlington, VA 22202.

- 2.1.2.2 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.
  - And now, UL197B for limited emissions of condensable particulate
4.1 General.

4.1.1 Cooking equipment used in processes producing smoke or grease-laden vapors shall be equipped with an exhaust system that complies with all the equipment and performance requirements of this standard.

Note: Equipment/process certified to EPA 202 and UL KNLZ do not require said systems.
What Comprise “Grease Laden Vapor” or Smoke?

- Reference is made in chapter 13 to EPA 202, the test method for condensable particulate; UL reference to std 197 SB which was moved to UL 710B
- Identifies a TLV concentration of 5mg/m3 at 500 CFM rate of exhaust
- Equates to total condensable particulate (grease)/hour of .01mg
UL 197SB moved to UL 710B

UL 710B-2004  Recirculating Systems . . . . . . . 904.11

Reason: Recirculating hood systems were previously tested and listed to Supplement B of UL 197. Supplement B was subsequently removed from UL 197 and incorporated into the Standard for Recirculating Systems, UL 710B. The Code needs to be updated to properly reflect the standard against which these products are being tested. No substantive changes were made to the test protocol as a result of these changes.

Analysis: Staff had not reviewed the proposed referenced standard for compliance with Section 3.6 of the ICC Code Development Process for the International Codes prior to the printing of the monograph. Staff will review it and post the results at the ICC website prior to the code change hearings.

Cost Impact: None

Public Hearing:  Committee:  AS  AM  D
Assembly:  ASF  AMF  DF
New Tech; New UL Category

KNLZ

KNLZ.E151487

Commercial, with Integral Systems for Limiting the Emission of Grease-laden Air

Guide Information

TURBOCHEF INC
SUITE 128
10500 METRIC DR
DALLAS, TX 75243 USA

Commercial microwave/convection ovens, Models C3/C, NGC.
Where Applicable

4.1.9* Cooking equipment used in fixed, mobile, or temporary concessions, such as trucks, buses, trailers, pavilions, tents, or any form of roofed enclosure, shall comply with this standard unless all or part of the installation is exempted by the authority having jurisdiction.

Note: MN Mechanical Code only pertains to Mechanical Systems installed in permanent structures
4.2* Clearance.

- **4.2.1** where enclosures are not required, hoods, grease removal devices, exhaust fans, and ducts shall have a clearance of at least
  - 457 mm (18 in.) To combustible material,
  - 76 mm (3 in.) To limited-combustible material, and
  - 0 mm (0 in.) To noncombustible material.

- **4.2.2** where a hood, duct, or grease removal device is listed for clearances less than those required in 4.2.1 the listing requirements shall be permitted.
Shafts

- Unless fire rated ceiling is required, rated shafts are not!

Note: See 14.4 for solid fuel operations.
Listed Ducts and Devices

- **5.1.11** Penetrations shall be sealed with listed devices in accordance with the requirements of 5.1.12.

- **5.1.12** Devices that require penetration of the hood, such as pipe and conduit penetration fittings and fasteners, shall be listed in accordance with UL 1978, *Standard for Safety Grease Ducts*. 
All New Sizing Criteria

- **5.2 Hood Size.** Hoods shall be sized and configured to provide for the capture and removal of grease-laden vapors. *(See 8.2.2.)*
- **8.2.2 Air Volume.**
- **8.2.2.1 Exhaust air volumes for hoods shall be of a sufficient level to provide for capture and removal of grease-laden cooking vapors.*
Define “cooking”

- No definition provided in any model mechanical or building code
- FDA Food Code
  - 135F is minimum safe hot food hold temp., (After Food has been “cooked” per below)
  - 145F for 15 sec at core of fish and plant foods or,
  - 155F for 15sec at core for ground beef/pork or,
  - 165F for poultry
Chapter 6 Grease Removal Devices in Hoods

6.1 grease removal devices.

6.1.1 listed grease filters, listed baffles, or other listed grease removal devices for use with commercial cooking equipment shall be provided.

6.1.2 listed grease filters shall be tested in accordance with UL 1046, *standard for grease filters for exhaust ducts*.

6.1.3 mesh filters shall not be used.

Note: MN revised this section to be specific to volume per lineal foot of cooking equipment.
6.2 Installation.

6.2.1 Separation Distance

6.2.1.1 The distance between the grease removal device and the cooking surface shall be as great as possible but not less than 457.2 mm (18 in.).

6.2.1.2 Where grease removal devices are used in conjunction with charcoal or charcoal-type broilers, including gas or electrically heated char-broilers, a minimum vertical distance of 1.22 m (4 ft) shall be maintained between the lower edge of the grease removal device and the cooking surface.

6.2.1.3 For cooking equipment without exposed flame and where flue gases bypass grease removal devices, the minimum vertical distance shall be permitted to be reduced to not less than 152.4 mm (6 in.).

6.2.1.4 Grease removal devices supplied as part of listed hood assemblies shall be installed in accordance with the terms of the listing and the manufacturer’s instructions.
..\Materials\oph1.MPG
7.1 General.

7.1.1 Ducts shall not pass through fire walls.

7.1.2* All ducts shall lead directly to the exterior of the building, so as not to unduly increase any fire hazard.

7.1.3 Duct systems shall not be interconnected with any other building ventilation or exhaust system.

7.1.4 All ducts shall be installed without forming dips or traps that might collect residues. In manifold (common duct) systems, the lowest end of the main duct shall be connected flush on the bottom with the branch duct, duct or welded seams.
Workmanship

Installed by local contractor in 1997, Metro Area

Sprinkler contractors responsible to “make system work”

- Sloppy install voided UL
- Wrong; nozzle & elevation
- *Upside Down?!!*
Disastrous Type I Ducts

- Cool side walls
- Condensation
- Precipitation
- Accumulation
- Variable cleaning
- FIRE!
Spot any fire hazards?
Permit holder responsibility
7.3 Openings.

7.3.1 Openings shall be provided at the sides or at the top of the duct, whichever is more accessible, and at changes of direction as the duct.
7.4.1 Horizontal Ducts.

7.4.1.1 Horizontal ducting support systems for nonlisted grease duct systems 24 in. and larger than 609 mm in any cross-sectional dimension shall be designed for the weight of the ductwork plus 363 kg (800 lbs) at any point in the duct systems.

7.4.1.2 On non-listed ductwork, the edge of the opening shall be not less than 38.1 mm (1 1/2 in.) from all outside edges of the duct or welded seams.
7.4.2 Vertical Ducts.

- **7.4.2.1** On vertical ductwork where personnel entry is possible, access shall be provided at the top of the vertical riser to accommodate descent.

- **7.4.2.2** Where personnel entry is not possible, adequate access for cleaning shall be provided on each floor.

- **7.4.2.3** On non-listed ductwork, the edge of the opening shall be not less than 38.1 mm (1 1/2 in.) from all outside edges of the duct or welded seams.
7.4.3 Access Panels.

- **7.4.3.1** Access panels shall be of the same material and thickness as the duct. *(unless listed otherwise)*

- **7.4.3.2** Access panels shall have a gasket or sealant that is rated for 815.6°C (1500°F) and shall be grease-tight.

- **7.4.3.3** Fasteners, such as bolts, weld studs, latches, or wing nuts, used to secure the access panels shall be carbon steel or stainless steel and shall not penetrate duct walls.

- **7.4.3.4** Listed grease duct access door assemblies (access panels) shall be installed in accordance with the terms of the listing and the manufacturers’ instructions.
7.5.2 Installation.

Note: MN revisions require pressure testing ducts to assure hermetic seal to 0.10” W.C. for 20 min for concealed location

- **7.5.2.1** All seams, joints, penetrations, and duct-to-hood collar connections shall have a liquid-tight continuous external weld.

- **7.5.2.2** Duct-to-hood collar connections as shown in Figure 7.5.2.2 shall not require a liquid-tight continuous external weld.

- **7.5.1* Materials.** Ducts shall be constructed of and supported by carbon steel not less than 1.37 mm (0.054 in.) (No. 16 MSG) in thickness or stainless steel not less than 1.09 mm (0.043 in.) (No. 18 MSG) in thickness.
Permitted Mechanical duct connection “equivalent safety” to liquid tight welded connections.

**Figure 7.5.2.2** Permitted duct-to-hood collar connection.
Connections

**Duct to duct**

**Notes:**
1. Duct size stays the same throughout the duct system.
2. Smaller (inside) duct section is always above or uphill (on sloped duct), to be self-draining into larger (outside) duct.

**FIGURE 7.5.5.1(a) Telescoping-type duct connection.**
Break 1

Materials\salmon1.mpg
7.7.1 Duct Enclosures.

7.7.1.1 In all buildings where vertical fire barriers are penetrated, the ducts shall be enclosed in a continuous enclosure extending from the first penetrated fire barrier and any subsequent fire barriers or concealed spaces, to or through the exterior, so as to maintain the fire resistance rating of the highest fire barrier penetrated.

7.7.1.2 In all buildings more than one story in height, and in one-story buildings where the roof–ceiling assembly is required to have a fire resistance rating, the ducts shall be enclosed in a continuous enclosure extending from the lowest fire-rated ceiling or floor above the hood, through any concealed spaces, to or through the roof so as to maintain the integrity of the fire separations required by the applicable building code provisions.
Note: Vented shafts increase the rate of deposition on internal duct surfaces. A better preventative method is duct wrap or better yet, prefabricated insulated ducts listed for grease applications.

- **7.7.1.3** The enclosure shall be sealed around the duct at the point of penetration of the first fire-rated barrier after the hood in order to maintain the fire resistance rating of the enclosure.

- **7.7.1.4** The enclosure shall be vented to the exterior of the building through weather-protected openings.

- **7.7.1.5** The continuous enclosure provisions shall not be required where a field-applied grease duct enclosure or a factory-built grease duct enclosure (*see Section 4.3*) is protected with a listed duct through-penetration protection system equivalent to the fire resistance rating of the assembly being penetrated, and where the materials are installed in accordance with the conditions of the listing and the manufacturers’ instructions.
7.7.2 Enclosure Fire Resistance Rating and Enclosure Clearance.

- **7.7.2.1.1** Buildings less than four stories in height shall have an enclosure with a fire resistance rating of not less than 1 hour.
- **7.7.2.1.2** Buildings four stories or more in height shall have enclosure with a fire resistance rating of not less than 2 hours.
- **7.7.2.2.1** Clearance from the duct or the exhaust fan to the interior surface of enclosures of combustible construction shall be not less than 457.2 mm (18 in.).
- **7.7.2.2.2** Clearance from the duct to the interior surface of enclosures of noncombustible or limited-combustible construction shall be not less than 152.4 mm (6 in.).
- **7.7.2.2.3** Provisions for reducing clearances as described in Section 4.2 shall not be applicable to enclosures.
7.8.2 Rooftop Terminations.

7.8.2.1 Rooftop terminations shall be arranged with or provided with the following:

- (1) A minimum of 3.05 m (10 ft) of horizontal clearance from the outlet to adjacent buildings, property lines and air intakes.
- (2) A minimum of 1.5 m (5 ft) of horizontal clearance from the outlet (fan housing) to any combustible structure.
- (3) A vertical separation of 0.92 m (3 ft) below any exhaust outlets for air intakes within 3.05 m (10 ft) of the exhaust outlet.
- (4) The ability to drain grease out of any traps or low points formed in the fan or duct near the termination of the system into a collection container that is noncombustible, closed, rainproof, structurally sound for the service to which it is applied, and will not sustain combustion.
36 40

7.8.3 Wall Terminations.

Wall terminations shall be arranged with or provided with the following properties:

1. Through a noncombustible wall with a minimum of 3.05 m (10 ft) of clearance from the outlet to adjacent buildings, property lines, grade level, combustible construction, electrical equipment or lines, and the closest point of any air intake or operable door or window at or below the plane of the exhaust termination.

2. The closest point of any air intake or operable door or window above the plane of the exhaust termination shall be a minimum of 3 m (10 ft) in distance, plus 0.076 m (0.25 ft) for each 1 degree from horizontal, the angle of degree being measured from the center of the exhaust termination to the center of the air intake or operable door or window as indicated in Figure 7.8.3.
8.1.1* Upblast Exhaust Fans.

8.1.1.1 Approved upblast fans with motors surrounded by the airstream shall be hinged, supplied with flexible weatherproof electrical cable and service hold-open retainers, and listed for this use.

Note: UL 762 required for fans used for Type I applications

8.1.2* In-Line Exhaust Fans.

8.1.2.1 In-line fans shall be of the type with the motor located outside the airstream and with belts and pulleys protected from the airstream by a greasetight housing.

8.1.2.2 In-line fans shall be connected to the exhaust duct by flanges securely bolted as shown in Figure 8.1.2.2(a) through Figure 8.1.2.2(d) or by a system specifically listed for such use.

8.1.2.3 Flexible connectors shall not be used.

Note: (without prior approval from the building official)
8.2 Airflow.

8.2.1 Air Velocity.

- **8.2.1.1** The air velocity through any duct shall be not less than 365.8 m/min (1200 ft/min). *NFPA 2003: 500 FPM*

- **8.2.2.1** Exhaust air volumes for hoods shall be of a sufficient level to provide for capture and removal of grease-laden cooking vapors.

- **8.2.2.2** Test data, performance acceptable to the authority having jurisdiction, or both, shall be provided, displayed, or both, upon request.

- **8.2.3.2** The hood exhaust fan shall not be required to restart upon activation of the extinguishing system if the exhaust fan and all cooking equipment served by the fan have previously been shut down.

*Grease deposition rate is lowest at 500FPM; ventilated shafts increase deposition rates, insulated ducts reduce deposition rates.*
**8.3* Replacement Air.**

- **8.3.1** Replacement air quantity shall be adequate to prevent negative pressures in the commercial cooking area(s) from exceeding 4.98 kPa (-0.02 in. water column).

- **8.3.2** When its fire-extinguishing system discharges, makeup air supplied *internally* to a hood shall be shut off.

- **8.4** Common Duct (Manifold) Systems.

- **9.2.3** Lighting Units.

- MN Food Code MR4626 requires 70 foot candles (min.) beneath hood (cooking surface)
Chapter 9 Auxiliary equipment

9.1 Dampers.

- 9.1.1 Dampers shall not be installed in exhaust ducts or exhaust duct systems.

- 9.1.2 Where specifically listed for such use or where required as part of a listed device or system, dampers in exhaust ducts or exhaust duct systems shall be permitted.

- 9.2.1 Wiring systems of any type shall not be installed in ducts.
Chapter 9 continued…

- **9.3.3** Any equipment, listed or otherwise, that provides secondary filtration or air pollution control and that is installed in the path of travel of exhaust products shall be provided with an approved automatic fire-extinguishing system for the protection of the component sections of the equipment and shall include protection of the ductwork downstream of the equipment, whether or not the equipment is provided with a damper.

- **9.3.4** If the equipment provides a source of ignition, it shall be provided with detection to operate the fire-extinguishing system protecting the equipment.
Chapter 10 Fire-Extinguishing Equipment

10.1.1 Fire-extinguishing equipment for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems shall be provided.

10.1.2* Cooking equipment that produces grease-laden vapors and that might be a source of ignition of grease in the hood, grease removal device, or duct shall be protected by fire-extinguishing equipment.
10.2 Types of Equipment.

- 10.2.3* Automatic fire-extinguishing systems shall comply with standard UL 300, *Standard for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas*, or other equivalent standards and shall be installed in accordance with the requirements of the listing.

REF: UL 300
10.2 Types of Equipment.

10.2.1 Fire-extinguishing equipment shall include both automatic fire-extinguishing systems as primary protection and portable fire extinguishers as secondary backup.

K type extinguishers
ABC extinguishers
Variety in safety equivalency

- **10.2.5** Automatic fire-extinguishing equipment provided as part of listed recirculating systems shall comply with standard UL 197, *Standard for Commercial Electric Cooking Appliances*.

- **10.2.6** Automatic fire-extinguishing systems shall be installed in accordance with the terms of their listing, the manufacturer’s instructions, and the following standards where applicable.
  - (1) NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*
  - (2) NFPA 13, *Standard for the Installation of Sprinkler Systems*
  - (3) NFPA 17, *Standard for Dry Chemical Extinguishing Systems*
  - (4) NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*
UL197SB changed to UL710B

102.5 Equivalency
10.3 Simultaneous Operation.

- **10.3.1** Fixed pipe extinguishing systems in a single hazard area *(see Section 3.3 for the definition of single hazard area)* shall be arranged for simultaneous automatic operation upon actuation of any one of the systems.

- **10.3.2** Simultaneous operation shall not be required where the fixed pipe extinguishing system is an automatic sprinkler system.

- **10.3.3** Simultaneous operation shall not be required where dry or wet chemical system shall be permitted to be used to protect common exhaust ductwork by one of the methods specified in NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, or NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*. 

Reference NFPA 17 and NFPA 17A
11.2 Inspection of Fire-Extinguishing Systems.

- **11.2.1** An inspection and servicing of the fire-extinguishing system and listed exhaust hoods containing a constant or fire-actuated water system shall be made at least every 6 months by properly trained and qualified persons.
### Table 11.3 Exhaust System Inspection Schedule

<table>
<thead>
<tr>
<th>Type or Volume of Cooking Frequency</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems serving solid fuel cooking operations</td>
<td>Monthly</td>
</tr>
<tr>
<td>Systems serving high-volume cooking operations such as 24-hour cooking, charbroiling, or wok cooking</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Systems serving moderate-volume cooking operations</td>
<td>Semiannually</td>
</tr>
<tr>
<td>Systems serving low-volume cooking operations, such as churches, day camps, seasonal businesses, or senior centers</td>
<td>Annually</td>
</tr>
</tbody>
</table>

#### 11.4 Cleaning of Exhaust Systems.

**11.4.1** Upon inspection, if found to be contaminated with deposits from grease-laden vapors, the entire exhaust system shall be cleaned by a properly trained, qualified, and certified company or person(s) acceptable to the authority having jurisdiction in accordance with Section 11.3.
12.1.2 Installation.

- **12.1.2.1** All listed appliances shall be installed in accordance with the terms of their listings and the manufacturer’s instructions.

- **12.1.2.3.1** An approved method shall be provided that will ensure that the appliance is returned to an approved design location.

- **12.1.2.4** All deep fat fryers shall be installed with at least a 406-mm (16-in.) space between the fryer and surface flames from adjacent cooking equipment.
Chapter 13 Recirculating Systems

13.1 General Requirements. Recirculating systems containing or for use with appliances used in processes producing smoke or grease-laden vapors shall be equipped with components complying with the following:

1. The clearance requirements of Section 4.2
2. A hood complying with the requirements of Chapter 5
3. Grease removal devices complying with Chapter 6
4. The air movement requirements of 8.2.1.2 and 8.2.2.3
5. Auxiliary equipment (such as particulate and odor removal devices) complying with Chapter 9
6. Fire-extinguishing equipment complying with the requirements of Chapter 10; 10.1.1 and 10.5.1 shall not apply
7. The use and maintenance requirements of Chapter 11
8. The minimum safety requirements of Chapter 11
9. All the requirements of Chapter 13

13.2 Design Restrictions. All recirculating systems shall comply with the requirements of Section 13.2.

13.2.1 Only gas-fueled or electrically fueled cooking appliances shall be used.
13.2.12 Listing evaluation shall include the following:

- (1) Capture and containment of vapors at published and labeled airflow.
- (2) Grease discharge at the exhaust outlet of the system not to exceed an average of 5 mg/m³ of exhausted air sampled from that equipment at maximum amount of product that is capable of being processed over a continuous 8-hour test per EPA Test Method 202, *Determination of Condensable Particulate Emissions for Stationary Sources*, with the system operating at its minimum listed airflow.
- (3) Listing and labeling of clearance to combustibles from all sides, top, and bottom.
- (4) Electrical connection in the field in accordance with NFPA 70, *National Electrical Code*.
- (5) Interlocks on all removable components that lie in the path of airflow within the unit to ensure that they are in place.
Chapter 14 Solid Fuel Cooking Operations

14.1 Venting Application. Venting requirements of solid fuel cooking operations shall be determined in accordance with 14.1.1 through 14.1.7.

14.1.1 Where solid fuel cooking equipment is required by the manufacturer to have a natural draft, the vent shall comply with Section 14.4.

14.1.2 Where the solid fuel cooking equipment has a self-contained top, is the only appliance to be vented in an isolated space (except for a single water heater with its own separate vent), has a separate makeup air system, and is provided with supply and return air (not supplied or returned from other spaces), the system shall comply with Sections 14.4 and 14.6.

- Where a hood is not required, in buildings where the duct system is three stories or less in height, a duct complying with Chapter 7 shall be provided.

- **14.4.1** If a hood is used in buildings where the duct system is three stories or less in height, the duct system shall comply with Chapter 7.

- **14.4.2** A listed or approved grease duct system shall be provided for solid fuel cooking exhaust systems that is four stories in height or greater.

- **14.4.3** Where a hood is used, the duct system shall conform with the requirements of Chapter 7.

- **14.4.4** Wall terminations of solid fuel exhaust systems shall be prohibited.
Fire damper key

Key:
- Continuous liquidtight welded construction
- Greasetight construction
- Fire-actuated damper
- Multiblade fire-actuated damper
- Register/perforated panel
End of NFPA 96 portion
After the Break…
Additional CKV considerations

- Future use limitations
- Sec 101
- Type I or Type II?
- When is no hood required?
- MN Revision to IMC
- Proposed revisions to current IMC
- New tech, research and test methods
- Q&A
Materials\whales.MPG
Future Use Limitations

- Current frame of intended use is specific to Current permit application and review
- Future possible use is an issue for future permit application and review
September 30, 2002

Thomas Johnson
Johnson Diversified Prod Inc
1408 Northland Dr #407
Mendota Hts MN 55120-1013

Subject: Duct Velocity Requirements

Dear Thomas:

This is in response to your request for interpretation of the Uniform Mechanical Code regarding duct velocity requirements.

The 2002 UMC Interpretations Committee answered Item UMC 02-16 below:

1. The 2000 UMC requires a type I hood for collecting and removing grease and smoke in commercial applications. (UMC 507.0) When there is empirical evidence that these factors are not present in the exhaust streams of commercial equipment, then a type II hood is indicated.

2. The presence or absence of grease or smoke in the exhaust stream of the equipment installed would determine the type of hood required.

3. The UMC is a minimum code standard. Any element of a mechanical system may be upgraded beyond code requirements. Future use is not a consideration in this code, unless it is part of the plans and specifications used to obtain the permit.

Change of use may occur, but unless plans are produced and a permit issued the Administrative Authority would be held blameless in the event of misuse of existing equipment and facilities.

Considering this issue were Chairman, Roger Rotundo, City of Phoenix, AZ; Richard Butz, Summit County, Coalville, UT; William Daly, City of St. Paul, MN; Dennis King, City of San Francisco, CA; and Charlie Newcomer, City of Sheridan, WY; Clinton O. Stanford, City of Grand Prairie, TX. Thank you for your patience and interest.

Sincerely,

Roger Rotundo
Chairman, UMC Interpretations Committee
Ext. 138
The (mechanical) code applies to the construction, alteration, moving, demolition, repair, and use of any building, structure, or building service equipment in a municipality.

Subp. 6. **Building service equipment.** "Building service equipment" refers to the plumbing, mechanical, electrical, and elevator equipment, including piping, wiring, fixtures, and other accessories, that provides sanitation, lighting, heating, ventilation, cooling, refrigeration, firefighting, and transportation facilities essential to the occupancy of the building or structure for its designated use and occupancy.
Exemptions from permit requirements of the code do not authorize work to be done in any manner in violation of the code or any other laws or ordinances of this jurisdiction.

**IMC 106.2:** Permits shall not be required for the following:
- portable heating appliances
- Portable ventilation appliances and equipment,
- Portable cooking equipment…
IMC Section 101 is amended to read as follows:

101 Scope. This code shall regulate the design, installation, maintenance, alteration, and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings.
SECTION 109
MEANS OF APPEAL

109.1 Application for appeal. A person shall have the right to appeal a decision of the code official to the board of appeals. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The application shall be filed on a form obtained from the code official within 20 days after the notice was served.

109.1.1 Limitation of authority. The board of appeals shall have no authority relative to interpretation of the administration of this code nor shall such board be empowered to waive requirements of this code.
Sec 109.7

109.7 Court review. Any person, whether or not a previous party of the appeal, shall have the right to apply to the appropriate court for a writ of certiorari to correct errors of law. Application for review shall be made in the manner and time required by law following the filing of the decision in the office of the chief administrative officer.
Sec 501

SECTION 501
GENERAL

501.1 Scope. This chapter shall govern the design, construction and installation of mechanical exhaust systems, including dust, stock and refuse conveyor systems, exhaust systems serving commercial cooking appliances and energy recovery ventilation systems.
Definitions

COMMERCIAL COOKING RECIRCULATING SYSTEM. Self-contained system consisting of the exhaust hood, the cooking equipment, the filters, and the fire suppression system. The system is designed to capture cooking vapors and residues generated from commercial cooking equipment. The system removes contaminants from the exhaust air and recirculates the air to the space from which it was withdrawn.

COMMERCIAL COOKING APPLIANCES. Appliances used in a commercial food service establishment for heating or cooking food and which produce grease vapors, steam, fumes, smoke or odors that are required to be removed through a local exhaust ventilation system. Such appliances include deep fat fryers; upright broilers; griddles; broilers; steam-jacketed kettles; hot-top ranges; under-fired broilers (charbroilers); ovens; barbecues; rotisseries; and similar appliances. For the purpose of this definition, a food service establishment shall include any building or a portion thereof used for the preparation and serving of food.
M507.2.2 domestic cooking appliances used for commercial purposes require either a type I or type II hood depending upon application.

Where the facility is licensed by a jurisdictional authority that enforces the MN food code, this practice is prohibited unless the equipment is listed to appropriate ANSI/NSF standard for its intended use.

Mr4626.0690 4-301.14
COMMERCIAL KITCHEN HOODS.

Backshelf hood. A backshelf hood is also referred to as a low-proximity hood, a pass over hood, a plate shelf hood, or a downdraft hood. Its front lower lip is set back a maximum of 12 inches (305 mm) from the leading edge of the cooking surface, and it is supported from above. Backshelf hoods are sometimes used as island hoods when suspended over conveyor ovens that toast sandwiches or bake convenience foods.

309.2.1 Mechanical ventilation system balancing. Mechanical ventilation systems shall provide airflow rates within +/-10 percent of design capacities and fan speed shall be adjusted to meet design airflow conditions.
506.3.13.3. IMC Sections 506.3.1 through 506.3.7 and 506.3.9 through 506.3.13.3 are deleted and replaced with NFPA 96-2001 with the following amendments:

5.1.1 The hood or that portion of a primary collection means designed for collecting cooking vapors and residues shall be constructed of stainless steel not less than 0.94 mm (0.037 in.) (No. 20 MSG) in thickness or other approved material of equivalent strength and fire and corrosion resistance. Refer to the Minnesota Food Code, Minnesota Rules, chapter 4626, for additional requirements for commercial kitchen hoods licensed and inspected by the Department of Agriculture, Department of Health, or local authorities that conduct inspections of food establishments.

7.5.2.1 All seams, joints, penetrations, and duct-to-hood collar connections shall have a liquid tight continuous external weld. Listed grease ducts and ducts complying with 7.5.1 through 7.5.5.5 that are installed within a concealed enclosure shall maintain an air pressure test of 0.10 inches water column positive pressure for a minimum of 20 minutes, unless an equivalent alternate test is specified by the building official.

8.1.2.3 Flexible connectors shall not be used without prior approval from the building official.

8.1.3.5 Flexible connectors shall not be used without prior approval from the building official.

8.2.1.1 The air velocity through any duct shall be not less than 152.4 m/min (500 ft/min).

Note: 500 FPM minimum velocity; no maximum limit!
Food Code References:

4-202.18 Ventilation Hood Systems, Filters.

Filters or other grease extracting EQUIPMENT shall be designed to be readily removable for cleaning and replacement if not designed to be cleaned in place.

4-204.11 Ventilation Hood Systems, Drip Prevention.

Exhaust ventilation hood systems in FOOD preparation and WAREWASHING areas including components such as hoods, fans, guards, and ducting shall be designed to prevent grease or condensation from draining or dripping onto FOOD, EQUIPMENT, UTENSILS, LINENS, and SINGLE-SERVICE and SINGLE-USE ARTICLES.

4-301.14 Ventilation Hood Systems, Adequacy.

Ventilation hood systems and devices shall be sufficient in number and capacity to prevent grease or condensation from collecting on walls and ceilings.
501.4.2.6 Makeup air effectiveness. The makeup air shall not reduce the effectiveness of exhaust systems or performance of vented combustion appliances, and makeup air shall not adversely affect the heating or cooling capability of the mechanical equipment.

8.3.1 Replacement air quantity shall be adequate to prevent negative pressures in the commercial cooking area(s) from exceeding 4.98 kPa (-0.02 in. water column). NFPA96

Magnehelix or equivalent pressure instrumentation
SECTION 508
COMMERCIAL KITCHEN MAKEUP AIR

508.1 Makeup air. Makeup air shall be supplied during the operation of commercial kitchen exhaust systems that are provided for commercial cooking appliances. The amount of makeup air supplied shall be approximately equal to the amount of exhaust air. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both. For mechanical makeup air systems, the exhaust and makeup air systems shall be electrically interlocked to insure that makeup air is provided whenever the exhaust system is in operation. Makeup air intake opening locations shall comply with Sections 401.5 and 401.5.1.
When is Type II localized ventilation NOT required?

- When general mechanical system is able (due to design) to adequately mitigate latent heat thereby preventing an environmental health risk by preventing elevated humidity level’s which are conducive to mold growth and degradation of framing materials in the space.

- When localized ventilation wastes incrementally more energy without quantifiable advantage for public health or safety.
General Ventilation Criteria Flow Chart

I. A. Does process generate grease laden vapors or smoke?
   - Yes
   - No

   II. A. Is total heat input greater than 12,000 BTUH or 3.7KWH?
   - Yes
   - No

   I. B. Does process (food eq) include meats (protein) or oil medium?
   - Yes
   - No

   II. B. Is food heated in open (ungasstained) compartment?
   - Yes
   - No

   I. C. Is system or equipment/process documented as compliant to UL 1977?
   - Yes
   - No

   II. C. Does maximum temp setting exceed 300°F?
   - Yes
   - No

   III. A. Is unit electrically powered?
   - Yes
   - No

   III. B. Is this a dishwasher?
   - Yes
   - No

   III. C. Does process generate excess steam, vapor, heat, or odors?
   - Yes
   - No

   No hood required

Type I hood with grease ducts
Type II hood and ducts

Other Criteria:
1. Menu/Volume (food and equip)
2. Temperatures and heat gain
3. Type of fuel
4. Method of heat transfer
5. Space, HVAC rates, % fresh air (outside)
When Type II vs no hood?

The code official should examine the frequency, duration and nature of cooking operations before determining whether a Type I or Type II hood is required for a particular food heat-processing appliance or a food heat-processing appliance installation. Bear in mind the primary purpose of Type I hood is to control a potential fire hazard associated with grease and the purpose of Type II is to control waste heat and moisture that burden HVAC systems and promote an unhealthy workplace. Excess moisture can deteriorate building components, promote the growth of mold and fungi and can create unhealthy and uncomfortable working conditions for employees.
507.2 Where required. A Type I hood shall be installed above all commercial food heat-processing appliances that produce grease-laden vapors or smoke. A Type I or Type II hood shall be installed at or above all commercial food heat-processing appliances that produce fumes, steam, odor, or heat. A Type II hood shall be installed above commercial dishwashing machines.

Exceptions:
1. Food heat-processing appliances installed within a dwelling unit.
2. Under-counter-type commercial dishwashing machines.
3. Electric countertop appliances with a heat input less than 3.7 kW used for heating food with limited grease emissions including warming ovens, microwave ovens, toasters, soup warmers, hotdog rollers, pretzel warmers, coffee makers, heated display cases, and hot air popcorn poppers.
4. Integral recirculating (ductless) hoods listed, labeled, and installed in accordance with UL 197 and Chapter 13 of NFPA 96-2001.

Subp. 3. Section 507.2.1. IMC Section 507.2.1 is deleted.
Subp. 4. Section 507.2.2. IMC Section 507.2.2 is amended to read as follows:
Latent+Sensible=Total Energy (BTU/H)

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hobart LX-14 undercounter type dish machine = 8K BTUH latent + 8K BTUH sensible = 16K BTUH total (exception in 507.2.2 IMC) NOTE 16K BTU = 4.668 KWH</td>
</tr>
<tr>
<td>2.</td>
<td>Hobart AM-14 door-type dish machine = 10,650 BTUH latent + 8K BTUH sensible = 26,650 BTUH (Type II system would be optimized mechanical system for this unit/process)</td>
</tr>
<tr>
<td>3.</td>
<td>Model CME 506 icemaker (self contained) rated for 500# ice per day with a net cooling capacity of 6,275 BTUH (suction pres 25) x 1.31 = 8,220 BTUH Total Heat Rejection (THR).</td>
</tr>
<tr>
<td>4.</td>
<td>Model CME 856 icemaker (self contained) rated for 700# ice per day with a net cooling capacity of 12,500 BTUH x 1.31 = 16,375 BTUH (THR).</td>
</tr>
<tr>
<td>5.</td>
<td>80” self contained refrigerated prep table 2,500 BTUH X 1.31 = 3,275 BTUH THR</td>
</tr>
<tr>
<td>6.</td>
<td>Three section reach in refrigerator self contained 3057 BTUH x 1.31 = 4,004 BTUH THR</td>
</tr>
<tr>
<td>7.</td>
<td>Three section reach in FREEZER, self contained 3501 BTUH x 1.50 = 5,251 BTUH THR</td>
</tr>
<tr>
<td>8.</td>
<td>Hatco GRAH60 heat lamp, 208/1/80 = 3.1 KWH</td>
</tr>
<tr>
<td>9.</td>
<td>Single section self contained blast chiller/shock freezer, 12K BTU cooling X 1.50 = 18,000 BTUH THR</td>
</tr>
<tr>
<td>10.</td>
<td>TurboChef C-3 rapid cook oven with platinum catalytic combustion tech = 6,000 BTUH, based upon third party test data (Foodservice Technology Center, Fisher Nickel, PG&amp;E Labs, San Ramon, CA, and pursuant to UL listing). The TurboChef cook 7-10 times faster than other conventional equipment due to its highly advanced leading edge combination of energy transfer method (microwave plus impinged air). Note microwave ovens are exempt from hoods pursuant to 507.2.2.</td>
</tr>
</tbody>
</table>

2004 JDP, Inc. All Rights Reserved  tomi@jdpinc.com
IMC 509.1- Where Required

SECTION 509
FIRE SUPPRESSION SYSTEMS

509.1 Where required. Commercial cooking appliances required by Section 507.2.1 to have a Type I hood shall be provided with an approved automatic fire suppression system complying with the International Building Code and the International Fire Code.

When cooking PROCESSES produce smoke and grease vapor and a Type I is REQUIRED for safe operation, THEN sec 509 is activated.
Fan Logic?

- UL Listed Fire Dampers
- Flow condition
  - Fan on
    - Leave ex on, MUA off; shunt trip/solenoid, annunciate
  - Fan off
    - Turn ex on (not req’d by NFPA 96), leave MUA off, shunt trip/solenoid, ann.
- Switch on
  - Signal on to MUA and Ex simultaneously
    - Pressure switch disables Ex when 0.02” exceeded, and notification
5. In a sprinklered building, if the cooking equipment underneath an exhaust hood having approved hood and plenum fire protection is provided with approved surface fire protection, such protection shall be considered to meet the requirements of NFPA 13, Section 4-9 (99). No additional sprinklers are required under the hood to meet floor protection requirements. If, however, the cooking equipment is not protected with a fixed extinguishing system (e.g. no grease laden vapors produced) and the hood is over 4 feet in width, either approved floor protection must be provided under the hood or an acceptable alternate would be to install approved hood, plenum and surface fire protection as mentioned previously.

6. The State Fire Marshal Division will accept a hose bib with a hose to an open floor drain as an alarm test valve connection to meet the requirements of NFPA 13 (99).

7. Sprinklers must be installed throughout the exhaust duct as specified in NFPA 13, Section 4-9 (99).

8. The exhaust fan must continue to operate on activation of the extinguishing system protecting kitchen cooking equipment.

9. Systems for the protection of commercial cooking equipment shall be inspected on a semi-annual basis as required by MSFC (03) Section 904.11.6.4 and the SFMD Fact Sheet titled, System Testing, Inspection and Maintenance.

Note: The Protectospray, Type EA-1, automatic spray nozzles over deep fat fryers are currently “de-listed”. The State Fire Marshal Division will approve their use over deep fat fryers if they are designed and installed in accordance with technical data sheet TD725. See NFPA 13, 1-4.
Revised IMC Proposal
ICC Code REVISION HEARINGS, Cincinnati

Reason: To not include heat or odor from a cooking process as a requirement for a hood. The heat shall be accounted for in the heating and cooling load calculation of the general HVAC. Odor will be removed with the smoke and grease vapor. Expand the list of Type II hood exceptions to agree with ASHRAE Standard 154 _Ventilation for Commercial Cooking Operations_.

_507.2 Where Required._ A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2.1 and 507.2.2. Where any cooking appliance under a single hood requires a Type I hood, a type I hood shall be installed. Where a Type II hood is required, a Type I or Type II shall be installed.

_507.2.1 Type I hoods._ Type I hoods shall be installed where cooking appliances produce grease or smoke, such as occurs with griddles, fryers, broilers, ranges and wok ranges.

_507.2.2 Type II hoods._ Type II hoods shall be installed where cooking or dishwashing appliances produce heat, or steam, and/or products of combustion and do not produce grease or smoke, such as steamers, kettles, pasta cookers and dishwashing machines.

**Exceptions:**

- Under-counter –type commercial dishwashing machines.
- A Type II hood is not required for dishwashers and potwashers that are provided with heat and water vapor exhaust systems that are supplied by the appliance manufacturer and are installed in accordance with the manufacturer’s instructions.
- A single light-duty convection, bread, retherm or microwave ovens, toasters, steam tables, popcorn popper, hot dog cooker, coffee maker, rice cooker, egg cooker, holding/warming oven.
UL 710B-2004  Recirculating Systems  ..........  904.11

Reason: Recirculating hood systems were previously tested and listed to Supplement B of UL 197. Supplement B was subsequently removed from UL 197 and incorporated into the Standard for Recirculating Systems, UL 710B. The Code needs to be updated to properly reflect the standard against which these products are being tested. No substantive changes were made to the test protocol as a result of these changes.
507.2.2 Type I, Type II or no hood?

- Light Duty Commercial Cooking Equipment?
  - Breads
  - Pastries
  - Sandwiches
  - Retherm
  - Raw to RTE

- Door, conveyor or flight dishwasher?
507.2 continued….

- Fryer, griddle, range?
- Rack Oven?
- Counter top elec pizza oven?
- Oven listed to UL710B and KNLZ without recirculating hood system?
- Process proven compliant with EPA 202?
Published Research

- ID and Characterization of effluents from cooking processes
- Effect of velocity on rate of deposition in ducts serving Type I hoods
- ..\Materials\COCO2.MPG
Today’s New Technologies

- Catalytic conversion
- UV systems to denature grease, photolysis – O3 oxidizing destruction
- Air pollution units to remove odor/smoke
- New filter and capture enhancement innovations (passive and active)
- UL listed ducts (UL 2221, future ANSI?)
- Variable flow exhaust systems
  - Sensor driven, rules based electronics
  - Mechanical torque conversion for green design, leeds credits, continuous “sweet spot” elec motor energy optimization
New Test Standard development update

- Grease removal device efficiency
- Sponsored by ad hoc industry group
  - ASHRAE TC5.10
  - Univ. of MN, ME (Tom Kuehn, PE, Ph. D., Dir)
- Quantify effectiveness of all grease removal or denaturing systems
- Intended to become ASME Test Std with ANSI certification
New Test Method, continued…

The CKV draft final report and draft MOT can be downloaded from the following website:

http://www.menet.umn.edu/~baolson/share/finaldocuments/
STANDARD TEST METHOD FOR GREASE PARTICLE CAPTURE EFFICIENCY OF COMMERCIAL KITCHEN FILTERS

DRAFT

1.0
Scope

1.1
This test method can be used to determine the grease particle capture efficiency of components and systems used in commercial kitchens to capture grease effluent prior to entering the exhaust duct. The results can be used to select a filter system best suited to a particular application.

This test method is applicable to filter components and systems with a nominal air flow rate of 250 cfm per lineal foot of filter. The performance information is obtained for new or clean filters and does not include the performance of used or loaded filters.

The filter can be evaluated with respect to the following (where applicable)

Pressure drop (11.1)

Particulate capture efficiency by particle size (12.1)

The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish the appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2.0
Referenced Documents

ASTM Standards