# CHAPTER IX
# SPECIAL VENTING

## RESTAURANT COOKING EQUIPMENT—AND DRYERS

### 901—INSTALLATION OF EQUIPMENT FOR THE REMOVAL OF SMOKE AND GREASE-LADEN VAPORS FROM COMMERCIAL COOKING EQUIPMENT

SCOPE—This section covers basic requirements for the design, installation and use of exhaust system components including (1) hoods; (2) grease removal devices; (3) exhaust ducts; (4) dampers; (5) air moving devices; (6) electrical equipment; and (7) fire extinquishing equipment for the exhaust system and the cooking equipment used therewith in commercial, industrial, institutional and similar cooking applications. This Section does not apply to installations for normal residential family use.

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### 902—REQUIREMENTS

(a) Cooking equipment used in processes producing smoke or grease-laden vapors shall be equipped with an exhaust system complying with the following:

(1) A hood or canopy complying with the requirements of Section 903.0

(2) A duct system complying with the requirements of Section 903.4.

(3) Grease removal equipment complying with the requirements of Section 905.6.

(4) Fire extinguishing equipment complying with the requirements of Section 911.0.

### 903.0—HOOD OR CANOPY

### 903.1—MATERIALS

The hood or that portion of a primary collection means designed for collecting cooking vapors and residues shall be constructed of, and be supported by steel not lighter than No. 18 Manufacturers Standard Gage, stainless steel not lighter than No. 20 Manufacturers Standard Gage.

### 903.2—CONSTRUCTION

All seams and joints shall have a liquidtight continuous external weld.

Troughs, gutters, or trays should not be used. If troughs, gutters, or trays are necessary they shall have a maximum width of 1½ inches, a maximum depth of ¼ inch and be pitched to drain to an enclosed metal container having a capacity not exceeding one gallon. The container should be emptied daily.

### 903.3—

Hoods or enclosures of listed grease extractors are considered as complying with the material and construction requirements of Section 903.0. The clearances specified in Section 906.0 shall be maintained.

### 903.4—DUCT SYSTEMS

Duct systems from hoods, canopies, or other collection systems shall comply with the following:

(a) Listed grease ducts installed in accordance with the terms of the listing and the manufacturer's instructions.

(b) Ducts complying with the following requirements:

(1) MATERIALS. Ducts shall be constructed of and supported by steel not lighter than No. 16 Manufacturer Standard Gage or stainless steel not lighter than No. 18 Manufacturers Standard Gage.

EXCEPTION:The exhaust duct from a hood for all charcoal broilers and/or more than two deep fat fryers shall be constructed from No. 10 gauge metal. 3-13-73

In old structures where ducts of lighter gauge are already installed these ducts may be reused if adequate UL Listed fire dampers and fire extinguishing equipment (Listed) is installed and approved by the Inspection Department.

(2) INSTALLATION REQUIREMENTS FOR INTERIOR LOCATIONS

(I) All seams and joints shall have a liquidtight continuous external weld. Note: Temperatures in excess of 2,000° F. may be experienced within ducts in event of fire. Means for expansion of long lengths of ducts should be provided.

(II) All ducts should lead horizontally, as directly as possible, to the exterior of the building and shall be installed without forming dips or traps which might collect residues.

(III) Vertical ducts should be located outside the building and adequately supported. If absolutely necessary to locate vertical ducts within a building the ducts shall be located in a continuous enclosure extending from the ceiling above the hood through the roof. The enclosure shall conform to the following requirements:

(aa) If the building is three stories or less in height the enclosure walls shall be of noncombustible construction having a fire resistance rating of not less than one hour.

(bb) If the building is four stories or more in height the enclosure walls shall be of noncombustible construction having a fire resistance rating of not less than two hours.

(cc) Clearance from the duct to interior surfaces of the enclosure shall be not less than 6 inches.

(dd) If openings in the enclosure walls are provided they shall be protected by approved self-closing fire doors of proper rating. See Standard For Fire Doors and Windows, NFPA No. 80.

(ee)

(c) Each duct system shall constitute an individual system serving only exhaust hoods on one floor.

(d) Duct systems shall not be interconnected with any other building ventilating or exhaust system.

(e) An opening shall be provided at each change in direction of the duct for purposes of inspection and cleaning. Openings shall be at the sides and large enough to permit cleaning. In horizontal sections the lower edge of the opening shall be not less than 1½ inches from the bottom of the duct. Covers shall be constructed of the same material and thickness as the duct and shall be greasetight when in place.

(f) Ducts shall not pass through fire walls or fire partitions, unless fire dampers are used. 6-11-74



**(6-11-74) Page 9-2—Section 903.4(b)(2)—Add new paragraph "(ee)" under sub-paragraph III to read as follows: "The shaft or enclosure shall be used exclusively to enclose a single grease exhaust system."**

Used Chimney & Vent Connector Clearance shown for 18" clearance. Table 2, Page 3-13



(g) Where ducts pass through partitions or walls of combustible material, the material shall be cut away to provide a clearance to the duct not less than 18 inches unless protection is provided.

(h) Installation Requirements for Exterior Locations

(1) The vertical portion of exhaust ducts shall be connected to the horizontal portion of the duct system and shall be installed and adequately supported on the exterior of a building.

(2) All seams and joints shall have a liquidtight continuous external weld. Note: Temperatures in excess of 2,000°F. may be experienced within ducts in event of a fire. Means for expansion of long lengths of ducts should be provided.

(3) All ducts, except those constructed of stainless steel, aluminum, or fiber glass or other non-corrosive material, shall be protected on the exterior by paint or other suitable weather-protective coating. 6-11-74

(4) A residue trap shall be provided at the base of each vertical riser with provisions for cleanout.

(i) **Termination of Ducts.** Ducts shall extend above the building in which located and shall terminate as follows:

(1) With at least forty (40) inches clearance from the outlet to the nearest roof surface. 6-11-74

(2) With a minimum of ten (10) feet of clearance from the outlet to adjacent buildings, property lines, air intakes and adjoining grade levels.

(3) With the direction of flow of exhaust air away from the surface of the roof vertically. If such is not possible, a metal pan shall be provided on the roof surface to catch residues that pass through the system. The pan shall have a minimum one (1) inch lip at all edges to retain residues and should be cleaned regularly.

## 904—AIR MOVEMENT

(a) Exhaust Fan. Exhaust fans and motors shall be approved and rated for continuous operation and shall be installed to comply with the following requirements:

(1) All wiring and electrical equipment shall comply with the North Carolina State Electrical Code.

(2) When the fan is not visible a signal light shall be installed in the kitchen area to indicate when the fan is operating.

(3) Means shall be provided for inspections, servicing, and cleaning.

(b) Air Flow. The air velocity through any duct shall not be less than 1,500 feet per minute.

(c) Replacement Air. Adequate replacement air shall be provided by designer and/or exhausted air shall be replaced with fresh air equal to that exhausted independently.

## 905—GREASE REMOVAL DEVICES

Grease removal devices shall be provided and shall consist of one of the following types:

(a) Listed Grease Extractors. Listed grease extractors shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

Note - Approx. January 1973 U.L. changed listed to classified.



(b) Grease Filters or other means of grease removal complying with the following requirements:

(1) MATERIALS. Grease filters, including frames, or other grease removal devices shall be constructed of noncombustible materials. → U.L. Listed.

(2) INSTALLATION.

The distance between the grease filter or removal device and the cooking surface shall be as great as possible. Where overhead or canopy type hoods are used in conjunction with charcoal or charcoal type broilers, including gas or electrically heated char-broilers, a minimum vertical distance of 4 feet shall be maintained between the lower edge of the grease filter or removal device and the cooking surface.

Grease filters or other grease removal devices shall be protected from combustion gas outlets and from direct flame impingement occuring during normal operation of cooking appliances producing high flue gas temperatures such as deep fat fryers, upright or high broiler (salamander broilers) when the distance between the filter or removal device and the appliance outlet (heat source) is less than 18 inches. This protection may be accomplished by the installation of a steel or stainless steel baffle placed between the heat source and the filter or removal device. The baffle plate shall be so sized and located that flames or combustion gases must travel a distance not less than 18 inches from the heat source to the grease filter or removal device. The baffle shall be located not less than 6 inches from filters or removal devices.

Filters shall be tight fitting and firmly held in place, yet be easily accessible and removable for cleaning.

Filters shall be installed at an angle not less than 45 degrees from the horizontal and shall be equipped with a drip tray beneath the lower edge of the filters. The tray shall have a maximum width of 1½ inches a maximum depth of ¼ inch and be pitched to drain to a metal container, which shall by emptied daily. The container shall be enclosed and have a capacity not exceeding one gallon.

**906—CLEARANCE**

Hoods, grease extractors, and ducts shall have a clearance of at least 18 inches to unprotected combustible material unless listed for lesser clearances or protected.

**907—DAMPERS**

Dampers shall not be installed in ducts or duct systems unless specifically listed for such use or are required as part of a listed grease extractor, an approved extinguishing system, or an approved fan bypass system.

**908—ELECTRICAL EQUIPMENT (See Section 422 Appendix "B")**

(a) Wiring systems of any type shall not be installed in ducts. Motors, lights and other electrical devices shall not be installed in ducts or hoods or located in the path of travel of exhaust products unless specifically approved for such use.

(b) Lighting units having steel enclosures mounted on the outer surface of the hood and separated from exhaust products by tight-fitting glass may be used. Lighting units on hoods shall not be located in concealed spaces unless part of a listed grease extractor.

(c) All electrical equipment shall be installed in accordance with the N.C.

State Electrical Code with due regard to the effects of heat, vapor, and grease on the equipment.

I. Fire Extinguishing Equipment

Approved fire extinguishing equipment shall be provided for the protection of duct systems, grease removal devices, and hoods. Cooking equipment which may be a source of ignition of grease in the hood, grease removal device, or duct (such as fat fryers, ranges, griddles, and broilers) shall also be protected by approved extinguishing equipment. If acceptable to the authority having jurisdiction, that portion of the fire extinguishing system required for protection of the duct may be omitted when all cooking equipment is served by listed grease extractors. The extinguishing equipment shall include both of the following types:

(a) Automatically operated fixed pipe systems, or other automatic systems specifically listed for the hazard. Listed fire extinguishing systems shall be installed in accordance with the terms of their listing and the manufacturer's instructions. Other fire extinguishing equipment shall be installed in compliance with the applicable Standards listed:

(1) Standard on Carbon Dioxide Extinguishing Systems, NFPA No. 12

(2) Standard for the Installation of Sprinkler Systems, NFPA No. 13.

(3) Standard for Foam-Water Sprinkler Systems and Foam-Spray Systems, NFPA No. 16.

(4) Standard for Dry Chemical Extinguishing Systems, NFPA No. 17.

(b) Portable inert gas or dry chemical extinguishers or other types specifically listed for Class B fires and having a minimum rating of 4B. See Standard for the Installation of Portable Fire Extinguishers, NFPA No. 10.

(c) Fixed pipe extinguishing equipment shall be installed to conform with the following requirements:

(1) A readily accessible means to manually actuate the fire extinguishing equipment shall be provided in a path of exit or egress and shall be clearly identified. Such means shall be mechanical and shall not rely on electric power for actuation unless a reserve power supply is provided.

(2) All fixed pipe extinguishing system, except sprinkler systems, in a single hazard area shall be arranged for simultaneous automatic operation upon actuation of any one of the systems.
Note: For the purpose of this requirement a single hazard area is defined as one which includes all cooking equipment, hoods, and duct work within 125 running feet of duct from any hood served, and any other cooking equipment, hoods, and duct work connection by less than 125 running feet of duct from the closed hood served.

(3) The operation of any extinguishing system shall automatically shut off all sources of fuel and heat to all cooking equipment except for the fuel supply to proved gas pilots. A manual operation shall be required to reestablish the fuel or heat supply. When gaseous fuels are used, a permanent notice shall be posted at the reset device cautioning the operator to shut off the gas at all appliances before resetting the device. Exception—Electrically heated equipment except fat fryers need not be shut off.

(4) Visual means shall be provided to show that the extinguishing system is energized if actuation is electrical.

(5) If required by the authority having jurisdiction, detailed information of the system shall be submitted for review.

(6) Installation of systems shall be made only be persons properly trained and qualified by the manufacturer of the system being installed. Extinguishing systems shall be made only by properly trained and qualified personnel. All actuation components including remote manual pull stations, mechanical or electrical devices, detectors, actuators, etc., shall be checked for proper operation during the inspection. Fusible links shall be replaced annually. If required, Certificates of Inspection shall be forwarded to the authority having jurisdiction.

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## 910—RECOMMENDED PROCEDURES FOR THE USE AND MAINTENANCE OF EQUIPMENT

OPERATING PROCEDURES

(a) Exhaust systems should be operated during all periods of cooking and should be equipped with a timing device which will continue the operation of the exhaust system for at least two (2) hours after cooking devices are turned off to allow fat fryers and other appliances to cool.

(b) Care must be exercised not to create flash grease fires by placing solid fats on preheated cooking surfaces. Solid fats heated too rapidly can be ignited at the edges before entirely melted.

(c) Filter equipped exhaust systems should not be operated with filters removed.

(d) Openings shall be provided for replacing air exhausted through ventilating equipment and shall not be restricted by covers, dampers or any other means which would reduce the operating efficiency of the exhaust system.

(e) Instructions for manually operating the fire extinguishing system should be posted conspicuously in the kitchen and should be reviewed periodically with employees by the management.

(f) Listed grease extractors should be operated in accordance with the terms of their listings and manufacturer's instruction.

## 911—INSPECTION

(a) An inspection and servicing of the fire extinguishing system by qualified persons should be made at least every six months.

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(b) Depending on the amount of cooking equipment usage the entire exhaust system, including grease extractors, should be inspected daily or weekly to determine if grease or other residues have been deposited within. When grease or other residues are in evidence as deposits within the hood, grease removal devices and/or ducts, the system should be cleaned.

## 912—CLEANING

(a) Hoods, grease removal devices, fans, ducts, and other appurtenances which are part of the exhaust system should be cleaned by scraping, brushing, washing or other positive means.

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(b) Listed grease extractors should be operated and cleaned in accordance with their listings and the manufacturer's instructions.

## 913—RECOMMENDED MINIMUM SAFETY REQUIREMENTS FOR COOKING EQUIPMENT

COOKING EQUIPMENT

(a) Cooking equipment ~~should~~ shall be approved based on:

(1) Listings by a nationally recognized testing laboratory, or

(2) Test data acceptable to the authority having jurisdiction

(b) Installation

All listed appliances should be installed in accordance with the terms of their listings and the manufacturer's instructions.

All fat fryers should be installed with at least a 16-inch space between the fryer and surface flames from adjacent cooking equipment.

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## 914—AUTOMATICALLY OPERATED APPLIANCES

When automatically operated appliances, such as water heaters, are vented through natural-draft ventilating hoods, dampers other than fire dampers, shall not be installed in the exhaust system.

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## 915—APPLIANCES WITH POWER MEANS OF EXHAUST

When the ventilating hood or exhaust system is equipped with power means of exhaust, the appliance control system shall be so interlocked as to permit appliance operation only when the power means of exhaust is in operation.

## 916—RESIDENTIAL TYPE OPEN TOP BROILERS

(a) A ventilating hood shall be installed above an open-top broiler in a residence. The hood shall be made with tight joints of sheet copper not lighter than No. 24B & S gauge or galvanized sheet steel no lighter than No. 28 galvanized sheet gauge with a clearance of not less than ¼ inch between the hood and the underside of combustible material or metal cabinets. The width and breadth of the hood shall be not less than that of the open-top broiler unit and the hood shall be centered over the unit.

(b) The hood required by Section 916.0 (a) above shall be exhausted directly through an outside wall to the outside or connected to a suitable chimney flue used for no other purpose. Connecting ducts shall be made of galvanized sheet metal not lighter than No. 28 gauge. A clearance of not less than 6 inches shall be provided between the exhaust duct and unprotected combustible material. This clearance may be reduced if the combustible material is protected.

## 917.0—RESIDENTIAL TYPE CLOTHES DRYERS (Type I)

(a) Residential type clothes dryers shall not be installed in bathrooms or bedrooms unless exhausted to the outside air.

(b) A clothes dryer exhaust duct shall not be connected into any vent connector, gas vent or chimney.

(c) Ducts for exhausting clothes dryers shall not be put together with sheet-metal screws or other fastening means which extend into the duct and which would catch lint and reduce the efficiency of the exhaust system.

## 918.0—COMMERCIAL TYPE CLOTHES DRYERS (Type II)

(a) All duct expelling lint shall be provided with a lint collector, unless the the dryer is so equipped.

(b) Commercial clothes dryers shall be exhausted to the outside air.

(c) Provision for make-up air shall be provided for commercial clothes dryers, with a minimum free area of 1 square inch for each 1000 Btu per hour total input rating of the dryers installed.

(d) A clothes dryer exhaust shall not be connected into any vent connector, gas vent or chimney.

(e) Ducts for exhausting clothes dryers shall not be put together with sheet-metal screws or other fastening means which extend into the duct and which would catch lint and reduce the efficiency of the exhaust

(f) Exhaust ducts for commercial clothes dryers shall be constructed of sheet metal or other noncombustible material. Such ducts shall be of adequate strength to meet the conditions of service with minimum thicknesses equivalent to No. 22 galvanized sheet gauge.

(g) Exhaust ducts for commercial clothes dryers shall have a clearance of at least 6 inches to combustible material except as provided in Section ~~908.0~~ 918.0 (h). 6-11-74

(h) Exhaust ducts for commercial clothes dryers may be installed with reduced clearances to combustible material provided the combustible material is protected as described in Table 2, Section 305.0 Chapter III.

(i) When ducts pass through walls, floors or partitions, the space around the duct shall be sealed with noncombustible material.

(j) Multiple installation of commercial clothes dryers shall be made in a manner to prevent adverse operation due to back pressures that might be created in the exhaust.