

NFPA

96



VAPOR REMOVAL FROM COOKING EQUIPMENT 1978



NATIONAL FIRE PROTECTION ASSOCIATION

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NATIONAL FIRE PROTECTION ASSOCIATION

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See Official NFPA Definitions at the back of this pamphlet.

NFPA 96 - 1978
ERRATA
FIRE NEWS March 1981

✓ **NFPA 96, Removal of Smoke and Grease-Laden Vapors from
Commercial Cooking Equipment**

1. Add a new Paragraph 7-3 to read as follows:

7-3 Operating Requirements

7-3.1 See NFPA 12 and NFPA 17 for requirements pertaining to the shut off of fuel and heat sources.

7-3.2 The operation of a fixed system employing liquids with extinguishing and saponification characteristics shall automatically shut off all sources of fuel and heat to all equipment protected by the extinguishing system or located under ventilating equipment protected by the extinguishing system.

NFPA 101, Life Safety Code®

1. Delete exception to Paragraph 10-3.4.1.

NFPA 232, Protection of Records

1. Revise Paragraph 3-1.1 to read as follows:

All records in file rooms shall be kept in noncombustible containers.

Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment

NFPA 96 — 1978

1978 Edition of NFPA 96

This document was prepared by the Technical Committee on Venting Systems for Cooking Appliances and this present edition was adopted by the Association on November 15, 1978, at its Fall Meeting in Montreal, Quebec, Canada. It was released by the Standards Council for publication on December 4, 1978.

Origin and Development of NFPA 96

The subject of the ventilation of restaurant type cooking equipment was first considered by the NFPA Committee on Blower and Exhaust Systems. That Committee developed material on ventilation of restaurant type cooking equipment to be included in NFPA 91, Blower and Exhaust Systems. This was adopted by the Association in 1946. Revisions to the Section were adopted in 1947 and 1949.

When the NFPA Committee on Chimneys and Heating Equipment was organized in 1955, the material on ventilation of restaurant cooking equipment in NFPA 91 was assigned to this new Committee with the suggestion that it be revised and published as a separate standard. Thus in recent years this Standard has been published as NFPA 96 and this is the latest edition thereof. Previous editions of the Standard prepared by the Committee on Chimneys and Heating Equipment were adopted by the Association in 1961, 1964, 1969, 1970, 1971, 1973, 1976, and 1978.

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This list represents the membership at the time the Committee was balloted on the test of this edition. Since that time changes in the membership may have occurred.

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Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment

NFPA 96-1978

Chapter 1 General

1-1 Scope. This edition of NFPA 96 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) auxiliary equipment; and (7) fire extinguishing equipment for the exhaust system and the cooking equipment used therewith in commercial, industrial, institutional and similar cooking applications. This standard does not apply to installations for normal residential family use.

1-2 Definitions.

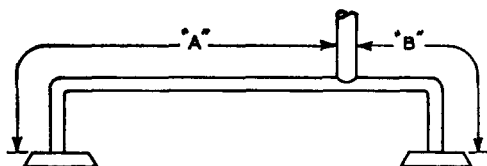
1-2.1 Combustible Material. As used in this standard, combustible material is material made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that will ignite and burn, whether flameproofed or not, or whether plastered or unplastered.

1-2.2 Single Hazard Area. An area which includes:

(a) the hood, or hoods connected by a common plenum; all cooking equipment beneath the hoods; and all duct work within 125 running feet of duct from any hood served, and

(b) any other hoods, cooking equipment, and duct work interconnected by a common duct from another hood and connected by less than 125 running feet of duct from the common point of connection. (*See Figure 1-2.2.*)

1-2.3 For other definitions, see *Glossary of Terms Relating to Heat Producing Appliances*, NFPA 97M-1972.



BOTH "A" AND "B" MUST BE 125 FEET TO CLASSIFY AS SEPARATE HAZARD AREAS. IF EITHER "A" OR "B" IS LESS THAN 125 FEET, BOTH PORTIONS ARE TO BE CONSIDERED A SINGLE HAZARD AREA.

Figure 1-2.2

1-3 General Requirements.

1-3.1 Cooking equipment used in processes producing smoke or grease-laden vapors shall be equipped with an exhaust system complying with the following:

- (a) A hood complying with the requirements of Chapter 2, and
- (b) A duct system complying with the requirements of Chapter 3, and
- (c) Grease removal devices complying with the requirements of Chapter 4, and
- (d) Fire extinguishing equipment complying with the requirements of Chapter 7.

1-3.2 Clearance. Hoods, grease extractors, and ducts shall have a clearance of at least 18 inches to combustible material.

Exception: When the hood, grease extractor or duct is listed for lesser clearances or the combustible material is protected in a manner satisfactory to the authority having jurisdiction.

1-3.3 If required by the authority having jurisdiction, notification in writing shall be given of any alteration, replacement, or relocation of any exhaust or extinguishing system or part thereof, or cooking equipment.

Chapter 2 Hoods

2-1 Construction.

2-1.1 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 or of other approved material of equivalent strength, fire, and corrosion resistance.

Exception: Hoods or enclosures of listed grease extractors or listed automatic damper and hood assemblies, evaluated under the same fire severity as the hood or enclosure of listed grease extractors, shall be considered as complying with the material and construction requirements of 2-1.1, 2-1.2, and 2-1.3.

2-1.2 All seams and joints shall have a liquidtight continuous external weld.

Exception: See exception to 2-1.1 above.

2-1.3 Troughs or gutters shall not be permitted except as provided in 4-1.2.2.6.

Exception: See exception to 2-1.1 above.

2-2 Hood Size.

2-2.1 Canopy Hoods.

2-2.1.1 The overhead canopy-type hood shall be sized to completely cover the equipment it is designed to ventilate plus an overhang of at least six (6) inches on all sides of equipment not immediately adjacent to walls or other construction extending above the cooking surface.

2-2.1.2 The distance between the floor and the lower edge of the canopy hood shall not exceed seven (7) feet.

2-2.1.3 The depth of a canopy-type hood from the lower to the upper edge shall be at least two (2) feet.

2-2.2 Noncanopy Hoods.

2-2.2.1 Noncanopy, prefabricated hoods shall be sized according to the manufacturer's specifications for the type cooking appliances being served.

Chapter 3 Duct Systems

3-1 Listed Grease Ducts. Listed grease ducts shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

3-2 Other Grease Ducts. Other grease ducts shall comply with the following requirements.

3-2.1 Materials. Ducts shall be constructed of and supported by carbon steel not less than 0.054 inch (No. 16 MSG) or stainless steel not less than 0.043 (No. 18 MSG) inch in thickness.

3-2.2 All seams and joints shall have a liquidtight continuous external weld.¹

3-2.3 Duct systems shall not be interconnected with any other building ventilating or exhaust system.

3-2.4 Ducts shall not pass through fire walls or fire partitions.

3-2.5 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.

Exception: When the combustible construction is protected in a manner satisfactory to the authority having jurisdiction.

3-2.6 All ducts shall be installed without forming dips or traps which might collect residues.

Exception: Traps provided for continuous or automatic removal of residue are permissible.

3-2.7 All ducts shall lead, as directly as possible, to the exterior of the building.

3-2.8 Exterior Installations.

3-2.8.1 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.

¹Temperatures 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.

3-2.8.2 All ducts shall be protected on the exterior by paint or other suitable weather-protective coating or shall be constructed of noncorrosive stainless steel.

3-2.8.3 A residue trap shall be provided at the base of each vertical riser with provisions for cleanout.

3-2.9 Interior Installations.

3-2.9.1 In *all* buildings more than one story in height, and in one story buildings where the roof or roof-ceiling assembly is required to have a fire resistance rating, the ducts shall be enclosed in a continuous enclosure extending from the ceiling 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. The enclosure shall conform to the following:

3-2.9.1.1 If the building is less than 4 stories in height, the enclosure wall shall have a fire resistance rating of not less than 1 hour.

3-2.9.1.2 If the building is 4 stories or more in height, the enclosure wall shall have a fire resistance rating of not less than 2 hours.

3-2.9.1.3 Clearance from the duct to the interior surface of enclosures of combustible construction shall not be less than 18 inches and clearance from the duct to the interior surface of enclosures of noncombustible construction shall not be less than 6 inches. Provisions for reducing clearances as described in Appendix A are not applicable to enclosures.

3-2.9.1.4 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 80-1977.

3-2.9.2 An opening large enough to permit cleaning shall be provided at each change in direction of the duct for purposes of inspection and cleaning. Such openings shall conform to the following:

3-2.9.2.1 Openings shall be at the sides of the duct.

3-2.9.2.2 In horizontal sections the lower edge of the opening shall be not less than $1\frac{1}{2}$ inches from the bottom of the duct.

3-2.9.2.3 Covers shall be constructed of the same material and thickness as the duct and shall be greasetight when in place.

3-2.9.3 Each duct system shall constitute an individual system serving only exhaust hoods on one floor.

3-3 Termination of Ducts. Ducts shall terminate as follows:

3-3.1 With a minimum of ten (10) feet of clearance from the outlet to adjacent buildings, property lines, air intakes and adjoining grade levels.

3-3.2 With the direction of flow of exhaust air away from the surface of the roof.

Exception: 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 shall be cleaned regularly.

3-3.3 With the discharge at least forty (40) inches clearance from the outlet to the roof surface.

Exception No. 1: When permitted by the authority having jurisdiction, ducts may terminate at the exterior of a masonry wall, provided there are no building openings which would permit a fire emanating from the duct to enter the building or to ignite or endanger exposed combustible construction or damage other property.

Exception No. 2: When permitted by the authority having jurisdiction, ducts may terminate into the base of an up-discharge exhaust fan provided the ductwork extends a minimum of 18 in. above the roof surface and is constructed of materials complying with the provisions of 3-2.1 and at least 40 in. of clearance above the roof is maintained between the exhaust discharge and the roof surface.

Chapter 4 Grease Removal Devices

4-1 Grease Removal Devices. Grease removal devices shall be provided and shall consist of one of the following types:

4-1.1 Listed Grease Extractors. Listed grease extractors shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

4-1.2 Listed Grease Filters or Other Grease Removal Devices (Not Including Grease Extractors). Listed grease filters or other listed means of grease removal shall comply with the following requirements.

4-1.2.1 Materials.

4-1.2.1.1 Grease filters, including frames, or other grease removal devices shall be constructed of noncombustible materials.

4-1.2.1.2 Grease filters shall be a type listed for use with commercial cooking equipment.

4-1.2.2 Installation.

4-1.2.2.1 The distance between the grease filter or other grease removal device and the cooking surface shall be as great as possible. Where grease filters or other 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 4 feet shall be maintained between the lower edge of the grease filter or removal device and the cooking surface.

4-1.2.2.2 Grease filters or other grease removal devices shall be protected from combustion gas outlets and from direct flame impingement occurring 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 plate 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.

4-1.2.2.3 Filters shall be tight fitting and firmly held in place.

4-1.2.2.4 Filters shall be easily accessible and removable for cleaning.

4-1.2.2.5 Filters shall be installed at an angle not less than 45° from the horizontal.

4-1.2.2.6 Filters shall be equipped with a drip tray beneath the lower edge of the filters. The tray shall be kept to the minimum size needed to collect the grease and be pitched to drain to an enclosed metal container having a capacity not exceeding one gallon.

Chapter 5 Air Movement

5-1 Exhaust Fans.¹ Exhaust fans and motors shall be approved and rated for continuous operation and shall be installed to comply with the following requirements:

5-1.1 All wiring and electrical equipment shall comply with the *National Electrical Code*, NFPA 70-1978 (*also see Chapter 6*).

5-1.2 Means shall be provided for inspections, servicing, and cleaning.

5-2 Air Flow.

5-2.1 The air velocity through any duct shall not be less than 1,500 feet per minute.

5-2.2 Exhaust air volumes for hoods shall be of sufficient level to provide for capture and removal of grease-laden cooking vapors. Test data or performance acceptable to the authority having jurisdiction or both shall be provided or displayed or both upon request.

5-3 Replacement Air. When fuel-burning appliances that are directly vented to outdoors are located in the same room as the hood, the replacement air quantity shall be adequate to prevent negative pressures in the room from exceeding 0.02 inches water column.

¹To offset the possibility of leaks in the duct system, it is recommended the fan be located near the discharge end of the duct.

Chapter 6 Auxiliary Equipment

6-1 Dampers. Dampers shall not be installed in ducts or duct systems.

Exception: When specifically listed for such use or required as part of a listed or approved device or system.

6-2 Electrical Equipment.

6-2.1 Wiring systems of any type shall not be installed in ducts.

6-2.2 Motors, lights and other electrical devices shall not be installed in ducts or hoods or located in the path of travel of exhaust products.

Exception: When specifically approved for such use.

6-2.3 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.

6-2.4 Lighting units on hoods shall not be located in concealed spaces.

Exception No. 1: When part of a listed grease extractor.

Exception No. 2: When specifically listed for such use and installed in accordance with the terms of the listing.

6-2.5 All electrical equipment shall be installed in accordance with the *National Electrical Code*, NFPA 70-1978, with due regard to the effects of heat, vapor, and grease on the equipment.

6-2.6 Fume incinerators, thermal recovery units, air pollution control devices, or other devices may be installed in ducts or hoods or located in the path of travel of exhaust products when specifically approved for such use, and shall not increase the fire hazard.

Chapter 7 Fire Extinguishing Equipment

7-1 Where Required.

7-1.1 Approved fire extinguishing equipment shall be provided for the protection of duct systems, grease removal devices, and hoods.

Exception: 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.

7-1.2 Cooking equipment (such as fat fryers, ranges, griddles, and broilers), which may be a source of ignition of grease in the hood, grease removal device, or duct, shall be protected by approved extinguishing equipment.

7-2 Types of Equipment.

7-2.1 The extinguishing equipment shall include both of the following types:

7-2.1.1 Automatic systems specifically listed for the hazard or automatically operated fixed pipe systems.

7-2.1.1.1 Listed fire extinguishing systems shall be installed in accordance with the terms of their listing and the manufacturer's instructions.

7-2.1.1.2 Other fire extinguishing equipment shall be installed in compliance with the provisions of the following applicable standards.

(a) *Standard on Carbon Dioxide Extinguishing Systems*, NFPA 12-1977.

(b) *Standard for the Installation of Sprinkler Systems*, NFPA 13-1978.

(c) *Standard for the Installation of Foam-Water Sprinkler Systems and Foam-Water Spray Systems*, NFPA 16-1974.

(d) *Standard for Dry Chemical Extinguishing Systems*, NFPA 17-1975.

7-2.1.2 Portable extinguishers installed in the kitchen area.

7-2.1.2.1 Those adjacent to cooking equipment shall include the alkaline dry chemical type (sodium bicarbonate or potas-

sium bicarbonate base¹) having a rating of at least 20-B:C for a travel distance of 30 feet or 40-B:C for a travel distance of 50 feet as listed in the *Standard for Portable Fire Extinguishers*, NFPA No. 10-1978, Table 3-3.1.2 for an extra hazard occupancy, and shall be installed in accordance with said standard.

7-2.1.2.2 Other extinguishers in the kitchen area shall be installed in accordance with *Standard for Portable Fire Extinguishers*, NFPA 10-1978.

7-3 Operating Requirements.

7-3.1 Fixed pipe extinguishing equipment shall be installed to conform with the following requirements:

7-3.1.1 A readily accessible means to manually activate the fire extinguishing system 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 electrical power for actuation.

Exception No. 1: A sprinkler system does not require a manual activation.

Exception No. 2: Electrical power may be used to manually activate the system if a reserve power supply is provided.

7-3.1.2 Fixed pipe extinguishing systems in a single hazard area (see 1-2.2) shall be arranged for simultaneous automatic operation upon actuation of any one of the systems.

Exception: When the fixed pipe extinguishing system is an automatic sprinkler system.

7-3.1.3 The operation of any extinguishing system shall automatically shut off all sources of fuel and heat to all equipment protected by an extinguishing system or located under ventilating equipment protected by an extinguishing system.

Exception: Electrically heated equipment, other than fat fryers, need not be shut off.

7-3.1.4 Visual means shall be provided to show that the extinguishing system is energized if actuation is electrical.

¹Acidic base extinguishing materials, such as ammonium phosphate base multipurpose types, impede saponification. Therefore, if the cooking equipment being protected involves exposed liquefied fat or oil in depth such as fat fryers, extinguishers employing these extinguishing agents are not recommended.

7-4 Review and Certification.

7-4.1 If required, complete drawings of the system installation to include the hood(s), exhaust duct(s), and appliances along with the interface of the fire extinguishing system detectors, piping, nozzles, fuel shut-off devices, agent storage container(s), and manual actuation device(s) shall be submitted to the authority having jurisdiction.

7-4.2 Installation of systems shall be made only by persons properly trained and qualified to install the specific system being provided. The installer shall certify to the authority having jurisdiction that the installation is in complete agreement with the terms of the listing and the manufacturer's instructions and/or approved design.¹

¹It is recommended that such training and qualification be by the manufacturer of the equipment being installed.

Chapter 8 Procedures for the Use and Maintenance of Equipment

8-1 Operating Procedures.

8-1.1 Exhaust systems shall be operated during all periods of cooking.

8-1.2 Filter equipped exhaust systems shall not be operated with filters removed.

8-1.3 Openings provided for replacing air exhausted through ventilating equipment shall not be restricted by covers, dampers or any other means which would reduce the operating efficiency of the exhaust system.

8-1.4 Instructions for manually operating the fire extinguishing system shall be posted conspicuously in the kitchen and shall be reviewed periodically with employees by the management.

8-1.5 Listed grease extractors shall be operated in accordance with the terms of their listings and manufacturer's instructions.

8-2 Inspection.

8-2.1 An inspection and servicing of the fire extinguishing system by properly trained and qualified persons shall be made at least every six months.¹

8-2.1.1 All actuation components including remote manual pull stations, mechanical or electrical devices, detectors, actuators, etc., shall be checked for proper operation during the inspection in accordance with the manufacturer's listed procedures. In addition to these requirements, specific inspection requirements in the applicable NFPA standard (*see 7-2.1.1.2*) shall also be followed.

8-2.1.2 Fusible links and automatic sprinkler heads shall be replaced at least annually or more frequently if necessary to assure proper operation of the system. Other detection devices shall be serviced or replaced in accordance with the manufacturer's recommendations.

8-2.1.3 If required, certificates of inspection and maintenance performed shall be forwarded to the authority having jurisdiction.

¹It is recommended that such training and qualification be by the manufacturer of the equipment being inspected and serviced.

8-3 Cleaning.

8-3.1 Hoods, grease removal devices, fans, ducts, and other appurtenances shall be cleaned at frequent intervals prior to surfaces becoming heavily contaminated with grease or oily sludge.¹

8-3.2 Flammable solvents or other flammable cleaning aids shall not be used.

8-3.3 At the start of the cleaning process, electrical switches, detection devices and system components that may be accidentally activated shall be locked, pinned, protectively covered and/or sealed.

8-3.4 Care shall be taken not to apply cleaning chemicals on fusible links or other detection devices of the automatic extinguishing system.

8-3.5 WHEN CLEANING PROCEDURES ARE COMPLETED, ALL ELECTRICAL SWITCHES, DETECTION DEVICES, AND SYSTEM COMPONENTS SHALL BE RETURNED TO AN OPERABLE STATE BY QUALIFIED PERSONNEL IN ACCORDANCE WITH 7-4.2. COVER PLATES SHALL BE REPLACED AND DAMPERS AND DIFFUSERS SHALL BE POSITIONED FOR PROPER AIR FLOW.

¹Depending 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 or ducts, or both, the system should be cleaned in accordance with 8-3.

Chapter 9 Minimum Safety Requirements for Cooking Equipment

9-1 Cooking Equipment.

9-1.1 Cooking equipment shall be approved based on:

- (a) Listings by a nationally recognized testing laboratory, or
- (b) Test data acceptable to the authority having jurisdiction.

9-1.2 Installation.

9-1.2.1 All listed appliances shall be installed in accordance with the terms of their listings and the manufacturer's instructions.

9-1.2.2 All fat fryers shall be installed with at least a 16-inch space between the fryer and surface flames from adjacent cooking equipment.

9-2 Operating Controls. Deep fat fryers shall be equipped with a separate high limit control in addition to the adjustable operating control (thermostat) to shut off fuel or energy when the fat temperature reaches 475° F, one inch below the surface.