NFPA No.

96

VENTILATION OF COOKING EQUIPMENT 1970

Fifty Cents

NATIONAL FIRE PROTECTION ASSOCIATION
International
60 Batterymarch Street, Boston, Mass. 02110

10M-6-70-FP-SC
Printed in U.S.A.

Official NFPA Definitions

Adopted Jan. 23, 1964: Revised Dec. 9, 1969. Where variances to these definitions are found, efforts to eliminate such conflicts are in process.

SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations or that which is advised but not required.

APPROVED means acceptable to the authority having jurisdiction. The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of nationally recognized testing laboratories,* i.e., laboratories qualified and equipped to conduct the necessary tests, in a position to determine compliance with appropriate standards for the current production of listed items, and the satisfactory performance of such equipment or materials in actual usage.

*Among the laboratories nationally recognized by the authorities having jurisdiction in the United States and Canada are the Underwriters' Laboratories, Inc., the Factory Mutual Research Corp., the American Gas Association Laboratories, the Underwriters' Laboratories of Canada, the Canadian Standards Association Testing Laboratories, and the Canadian Gas Association Approvals Division.

LISTED: Equipment or materials included in a list published by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

LABELED: Equipment or materials to which has been attached a label, symbol or other identifying mark of a nationally recognized testing laboratory that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling is indicated compliance with nationally recognized standards or tests to determine suitable usage in a specified manner.

AUTHORITY HAVING JURISDICTION: The organization, office or individual responsible for "approving" equipment, an installation, or a procedure.

Statement on NFPA Procedures

This material has been developed in the interest of safety to life and property under the published procedures of the National Fire Protection Association. These procedures are designed to assure the appointment of technically competent Committees having balanced representation from those vitally interested and active in the areas with which the Committees are concerned. These procedures provide that all Committee recommendations shall be published prior to action on them by the Association itself and that following this publication these recommendations shall be presented for adoption to the Annual Meeting of the Association where anyone in attendance, member or not, may present his views. While these procedures assure the highest degree of care neither the National Fire Protection Association, its members, nor those participating in its activities accepts any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

Standard for the Installation of Equipment for the

Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment

NFPA No. 96 — 1970

1970 Edition of No. 96

This 1970 Edition of Standard No. 96 supersedes the 1969 Edition. It was adopted by the National Fire Protection Association on May 21, 1970.

This 1970 Edition contains changes from the 1969 Edition which involve paragraphs 11, 4122(c), 4131, 612, 6122(a) and 94. The title of Section 9 was changed and a definition added to Appendix B.

Origin and Development of No. 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 Standard No. 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 No. 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 No. 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 and 1969.

Committee on Chimneys and Heating Equipment

H. E. Kuhlman, *Chairman,*
Oklahoma Inspection Bureau, P. O. Box 559, Oklahoma City, Okla. 73101

Warren M. Apgar, *Secretary,*
American Insurance Assn., 85 John St., New York, N. Y. 10038

Rixford A. Beals, National Oil Fuel Institute.
John Beilein, Maryland Fire Underwriters Rating Bureau.
C. E. Blome, Gas Appliance Manufacturers Assn.
Lt. William Carpenter, Fire Marshals Assn. of North America.
Clifton P. Geisert, Illinois Inspection and Rating Bureau.
Robert C. Haufler, American Mutual Insurance Alliance.
C. Allen Ivey, Cerny & Ivey Associates.
E. A. Jahn, American Gas Assn., Inc.
Arthur Jungdahl, Gas Vent Institute.
David S. Martin, Underwriters' Laboratories of Canada.
Ernest R. Menold, Sheet Metal & Air Conditioning Contractors' National Assn.
Anthony R. O'Neill, The Travelers Insurance Cos.
Joseph F. Schulz, Incinerator Institute of America.
Ross A. W. Switzer, Dept. of Public Works, Ottawa, Canada.
R. H. Zelinske, Underwriters' Laboratories, Inc.

Alternates.

J. J. Fannon, Maryland Fire Underwriters Rating Bureau. (Alternate to John Beilein.)
Robert D. Lynch, National Oil Fuel Institute. (Alternate to Rixford A. Beals.)
W. R. Sarno, American Gas Association. (Alternate to E. A. Jahn.)
Jack Schmidt, Incinerator Institute of America. (Alternate to Joseph F. Schulz.)
J. H. Witte, Underwriters' Laboratories, Inc. (Alternate to R. H. Zelinske.)

SCOPE: To prepare fire protection standards on chimneys, fireplaces, heating appliance venting systems, incinerators, and similar heat producing or heat removal devices, including clearances between heat sources and combustible materials.

CONTENTS

Standard for the Installation of Equipment for the

Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment

NFPA No. 96 — 1970

1. Scope.

11. This edition of NFPA Standard No. 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.

2. Requirements.

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

211. A hood or canopy complying with the requirements of Section 3, and

212. A duct system complying with the requirements of Section 4, and

213. Grease removal equipment complying with the requirements of Section 6, and

214. Fire extinguishing equipment complying with the requirements of Section 10.

3. Hood or Canopy.

31. Materials.

311. 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.

32. Construction.

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

322. Troughs, gutters, or trays should not be used except as provided in Section 6. 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.

33. Hoods or enclosures of listed grease extractors are considered as complying with the material and construction requirements of Section 3. The clearances specified in Section 7 shall be maintained.

4. Duct Systems.

41. Duct systems from hoods, canopies, or other collection systems shall comply with 411 or 412.

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

412. Ducts complying with the following requirements:

4121. MATERIALS. Ducts shall be constructed of and supported by steel not lighter than No. 16 Manufacturers Standard Gage or stainless steel not lighter than No. 18 Manufacturers Standard Gage.

4122. INSTALLATION REQUIREMENTS FOR INTERIOR LOCATIONS.

(a.) 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.

(b.) 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.

(c.) 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 enclosed in a

continuous enclosure constructed of materials which are not combustible, such as masonry (see Appendix B), and extending from the ceiling above the hood 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:

(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.

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

(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 No. 80.

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

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

(f.) 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.

(g.) Ducts shall not pass through fire walls or fire partitions.

(h.) 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 in accordance with Appendix B.

4123. INSTALLATION REQUIREMENTS FOR EXTERIOR LOCATIONS.

(a.) 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.

(b.) 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.

(c.) All ducts, except those constructed of stainless steel, shall be protected on the exterior by paint or other suitable weather-protective coating.

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

413. Termination of Ducts. Ducts shall extend above the building in which located and shall terminate as follows:

4131. With at least forty (40) inches clearance from the outlet to the roof surface.

4132. With a minimum of ten (10) feet of clearance from the outlet to adjacent buildings, property lines, air intakes and adjoining grade levels.

4133. With the direction of flow of exhaust air away from the surface of the roof. 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 in accordance with Appendix C.

5. Air Movement.

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

511. All wiring and electrical equipment shall comply with the National Electrical Code, NFPA No. 70. See Section 9.

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

513. Means shall be provided for inspections, servicing, and cleaning.

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

52. Air Flow. The air velocity through any duct shall not be less than 1,500 feet per minute. Air volume through any duct shall not be less than that specified in Appendix A.

53. Replacement Air. Adequate replacement air shall be provided as specified in Appendix A.

6. Grease Removal Devices.

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

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

612. Grease Filters or Other Means of Grease Removal. Grease filters or other means of grease removal shall comply with the following requirements:

6121. MATERIALS.

(a.) Grease filters, including frames, or other grease removal devices shall be constructed of noncombustible materials.

6122. INSTALLATION.

(a.) 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.

(b.) 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 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.

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

(d.) Filters shall be installed at an angle not less than 45° 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 be emptied daily. The container shall be enclosed and have a capacity not exceeding one gallon.

7. Clearance.

71. 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 in accordance with Appendix B.

8. Dampers.

81. 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.

9. Auxiliary Equipment.

91. 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.

92. 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.

93. All electrical equipment shall be installed in accordance with the National Electrical Code, NFPA No. 70, with due regard to the effects of heat, vapor, and grease on the equipment.

94. Fume incinerators or other 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.

10. Fire Extinguishing Equipment.

101. 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:

1011. 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:

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

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

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

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

1012. Portable inert gas or dry chemical extinguishers or other types specifically listed for Class B fires and having a minimum rating of 5B. See Standard for the Installation of Portable Fire Extinguishers, NFPA No. 10.

102. Fixed pipe extinguishing equipment shall be installed to conform with the following requirements:

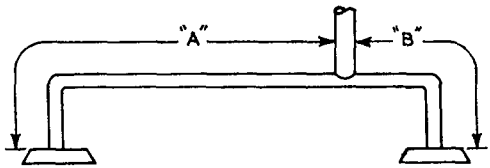
1021. A readily accessible means to manually actuate the fire extinguishing equipment shall be provided in a path of exit or egress and shall be clearly identified. Such means shall be mechanical and shall not rely on electric power for actuation unless a reserve power supply is provided.

1022. All fixed pipe extinguishing systems, 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 purposes of this requirement a single hazard area is defined as one which

a) Includes all cooking equipment, hoods, and duct work within 125 running feet of duct from any hood served, and

b) Any other cooking equipment, hoods, and duct work connection by less than 125 running feet of duct from the closest hood served. See Figure 1.



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

1023. 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.

1024. Visual means shall be provided to show that the extinguishing system is energized if actuation is electrical.

1025. If required by the authority having jurisdiction, detailed information of the system shall be submitted for review.

1026. Installation of systems shall be made only by persons properly trained and qualified by the manufacturer of the system being installed. Extinguishing systems shall be inspected at least every six months. Inspections 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.

11. Recommended Procedures for the Use and Maintenance of Equipment.

111. Operating Procedures.

1111. 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.

1112. 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.

1113. Filter equipped exhaust systems should not be operated with filters removed.

1114. Openings provided for replacing air exhausted through ventilating equipment should not be restricted by covers, dampers or any other means which would reduce the operating efficiency of the exhaust system.

1115. 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.

1116. Listed grease extractors should be operated in accordance with the terms of their listings and manufacturer's instructions.

112. Inspection.

1121. An inspection and servicing of the fire extinguishing system by qualified persons should be made at least every six months. See requirement in 1026.

1122. 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 in accordance with 113.

113. Cleaning.

1131. 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. See Appendix C for suggestions for cleaning.

1132. Listed grease extractors should be operated and cleaned in accordance with their listings and the manufacturer's instructions.

12. Recommended Minimum Safety Requirements for Cooking Equipment.

121. Cooking Equipment.

1211. Cooking equipment should be approved based on:

1. Listings by a nationally recognized testing laboratory, or
2. Test data acceptable to the authority having jurisdiction.

1212. INSTALLATION.

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

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

122. Operating Controls.

1221. Deep fat fryers should be equipped with a separate high limit control in addition to the adjustable operating control (thermostat) to shut off fuel or energy in the event the fat exceeds a temperature of 425F.

APPENDIX A

Suggested Method For Providing Adequate Ventilation For Commercial Cooking Equipment

A. Hood Size.

A1. The overhead canopy-type hood should 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.

A2. The distance between the floor and the lower edge of the canopy hood should not exceed seven (7) feet.

A3. The depth of a canopy-type hood from the lower to the upper edge should be at least two (2) feet.

A4. Noncanopy, prefabricated "backshelf"-type hoods should be sized according to the manufacturer's specifications for the type cooking appliances being served.

B. Exhaust Air Volume.

B1. For canopy-type hoods where the lower edge is not more than seven (7) feet above the floor the air volumes should be in accordance with the following:

a) Hood open on all four sides

$$Q = 150A$$

b) Hood open on three sides or less

$$Q = 100A$$

where Q = Exhaust air in cubic feet per minute
A = Face (entrance) area of the hood in square feet

B2. For noncanopy, prefabricated "backshelf"-type hoods the minimum exhaust air volumes should be in accordance with the following equation unless the manufacturer's instructions or test results indicate otherwise:

$$Q = 300L$$

where Q = Exhaust air in cubic feet per minute
L = Total length in feet of the cooking appliance(s) being ventilated measured parallel to the front edge of the appliance(s).

C. Exhaust Air Velocity.

C1. All exhaust ducts should be sized to provide an air velocity in the ducts of at least 1,500 feet per minute.

D. Grease Filters.

D1. Grease filters or other grease removal devices should be of such size, type, and arrangement as will permit the required exhaust air volume to pass through the units at velocities conforming to those for which the units are designed.

E. Exhaust Fans.

E1. Fans should be selected to exhaust the required quantity of air against all calculated friction losses. The loss for grease filters should be based on the resistance under maximum recommended loading conditions but not less than 0.20 inch water column.

F. Replacement Air.

F1. In order to maintain design exhaust air volume, provision must be made to effectively introduce or admit into the space where the hood is located a quantity of air equal to or slightly less than that quantity of air being removed by all exhaust systems removing air from the space.

F2. The supply of adequate replacement air should not be dependent upon the opening of windows, doors, etc.

F3. When fuel-burning appliances that are directly vented to outdoors are located in the same room as the hood, the replacement air quantity should be adequate to prevent negative pressures in the room from exceeding 0.02 inches water column.