

Orange County Fire Authority

Community Risk Reduction

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Fire Extinguishing Systems for Commercial Cooking Operations



Guideline D-04

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Fire Extinguishing Systems for Commercial Cooking Operations

PURPOSE

This guideline has been prepared to assist those responsible for the design, installation, testing, and inspection of wet chemical fire extinguishing systems. Wet chemical fire extinguishing systems shall comply with ANSI/UL 300—05(R2010), used to protect commercial cooking appliances to comply with 2015 NFPA16 when applicable; 2017 NFPA 17A; 2017 NFPA 17, 2017 NFPA 96, 2019 California Fire Code (CFC) Chapter 9, Section 904.11; and the 2019 California Mechanical Code (CMC) Chapter 5. The information contained in this document is intended to promote compliance and to ensure that commercial-type food heating and processing operations are adequately protected, tested and maintained to adequately operate in the event of a grease fire.

SCOPE

This guideline applies to any facility where commercial cooking operations produce grease-laden vapors. Cooking appliances producing grease-laden vapors shall be equipped with a Type 1 exhaust system with the following components: hood, grease removal devices, duct system, and fire extinguishing equipment. This guideline defines protection for cooking surfaces, deep fat fryers, griddles, upright broilers, char-broilers, range tops and grills, open face ovens, salamanders, cheese melters, woks, open face pizza ovens, and other similar cooking appliances. Protection shall also be provided for the enclosed plenum space within the hood, above filters, and in exhaust ducts serving the hood. CFC 904.2.2 Existing automatic fire-extinguishing systems. Where changes in the cooking media, positioning of cooking equipment, or replacement of cooking equipment occur in existing commercial cooking systems, the automatic fire extinguishing system shall be required to comply with the applicable provisions of Sections 904.12 through 904.12.4.

DEFINITIONS

General- The definitions contained in this Guideline shall apply to the terms used in this standard. Where terms are not defined in this Guideline, they shall be defined using their ordinarily accepted meanings within the context in which they are used.

Approved - Acceptable to the authority having jurisdiction

AHJ - Authority Having Jurisdiction

Branch Duct - The duct work that contains the exhaust air from a single hood or hazard area.

Certified - A formally stated recognition and approval of an acceptable level of competency.

Common Duct - The duct work containing the exhaust air from two or more branch ducts.

Indicator - A mechanical or electrical device shall be provided that shows when an extinguishing system or critical component of it is ready to operate, or if it has already operated. NFPA 17A - 5.2.1.8

Maintenance - Work performed to ensure that equipment operates as directed by the manufacturer.

Owner's Manual - A pamphlet containing the manufacturer's recommendations for the proper inspection and operation of the extinguishing system.

Trained - One who has undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's listed manual.

PROTECTION OF COMMON EXHAUST DUCT

1. A fusible link or other mechanically operated heat detection device from the common duct fire extinguishing system shall be located at each branch duct-to-common duct connection where electrical operation of the common duct fire extinguishing system does not meet the requirements of NFPA 17A section 5.6.2.1.1.
2. Where a fusible link or mechanically operated heat detector is located at a branch duct-to-common duct connection, an access panel shall be installed in accordance with NFPA 96, to enable servicing of the detector where the detector is not accessible from the branch duct connection to the exhaust hood. NFPA 17A section 5.6.2.1.2

SUBMITTAL REQUIREMENTS

OCFA does not review the installation of the hood but rather the fire extinguishing system which is installed. Fees are based on the number of fire extinguishing systems installed, rather than the number of hoods. Submit **two** sets of legible scaled plans and **one** electronic copy in .pdf format. All electronic copies may be submitted on CD, DVD, or flash drive. Also submit **one** complete **hard copy** set of current; technical data sheets/manufacturer's specifications manual.

Note: One wet stamped set of approved plans shall be left with the owner to be maintained on the premises permanently or until the hood exhaust is removed or replaced.

The extinguishing system plans shall contain the following information and items in accordance with CFC 901.6.2.1:

1. Scope of work for the project.
2. Complete address of the project.
3. Proof of proper training for the designer and installer shall be provided upon plan submittal. Only persons properly trained shall be considered competent to design, install, and service pre-engineered wet chemical systems. CMC 513.10 and NFPA 17A-6.2
4. Applicable codes and standards used for the system design (e.g., 2019 CFC, 2019 CBC, Manufacturer's Manual, etc.).
5. Sectional view of cooking appliances with the dimensions of each piece of cooking equipment specified.

6. Nozzle placement detail or reference to the figure number from manufacturer's manual.
7. Specify the size and location of the back shelf (solid/non-solid), if any. If there is a shelf, specify the manufacturer's detail depicting nozzle aim and placement or reference the nozzle placement detail. Detail for each nozzle placement shall be readily available during inspection.
8. If applicable to the appliances on site, specify the following:
 - A. whether or not the fryer has a drip board
 - B. type of char-broiler
 - C. the depth of wok and diameter of wok (not the burner opening diameter)
9. Floor plan layout that includes the location of the cooking equipment, exit doors, manual pull, Class K extinguisher(s) and other non-protected appliances indicated.
10. Fire extinguishing protection is required for open pizza ovens. If the pizza oven is closed, and no protection is provided, this must be specified on the plan.
11. Hood, plenum, and duct dimensions.
12. An elevation view of the hood, plenum and all duct work to the exhaust point above the roof. Note: In some cases additional protection may be required.
13. Piping schematic that includes the equivalent pipe length calculation (if applicable); the number and type of nozzles; and the location, height and direction of nozzle placement over each piece of cooking equipment.
14. When applicable, provide calculations that demonstrate the minimum and maximum volume quantities meet manufacturer's specifications per the General Piping Requirements.
15. An equipment legend for each supply tank (multiple cylinders supplying the same nozzles shall be combined on legend). The legend shall include the type of nozzles that are connected to that tank, the tip number/identifier, the total number of flow point used, and the number of flow points allowed for that size tank or manifolded system (when permitted).
16. Detection schematic that includes the location of each fusible link for each protected equipment, the location of the manual pull, and the length of the detection system. NFPA 17A 5.6.1.6
17. All hoods shall be secured in place by noncombustible supports. CMC 508.5
18. 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 at 1 inch below the surface.
19. New exhaust systems: Provide a copy of the final construction plans for the complete hood exhaust system (if applicable). Sufficient drawings shall be provided that depicts the hood, plenum, duct, pollution control units if applicable, from the hood to the exhaust ejection point to the atmosphere.
20. Existing exhaust systems: Provide a scaled elevation view of the exhaust system from the floor through the roof/wall to the point where the exhaust is ejected to the atmosphere. The cooking appliances and any pollution control unit or smoke/odor scrubber shall be depicted. If there are areas that cannot be surveyed due to lack of access, they shall be identified within the elevation view.
21. Listed ultra-violet hoods shall be installed, maintained and protected in accordance with the terms of their listing and the manufacturer's instructions. CMC 508.2.1
22. 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. If the equipment can be a source of ignition, it shall be provided with appropriate detection to operate the fire extinguishing system. CMC 512.3.2

23. Where a cooking exhaust system employs an air pollution control device that re-circulates air into the building, the provisions of CMC 516.0 and the manufacturing instruction manual shall apply. CMC 512.3.3

NOTE: If the chemical fire extinguishing system is not designed to fully protect the duct then the duct will also require fire sprinklers to be installed as per 2016 NFPA 13, Section 7.10.3.

ADDITIONAL SUBMITTAL REQUIREMENTS—Recirculating Systems (Ventless Hoods)

Recirculation Systems-Use and Maintenance:

1. Automatic or manual covers on cooking appliances, especially fryers, shall not interfere with the application of the fire suppression system.
2. All filters shall be cleaned or replaced in accordance with the manufacturer's instructions.
3. All ESPs shall be cleaned a minimum of once per week following the manufacturer's cleaning instructions.
4. The entire hood plenum and the blower section shall be cleaned a minimum of once every 3 months.
5. Inspection and testing of the total operation and all safety interlocks in accordance with the manufacturer's instructions shall be performed by qualified service personnel a minimum of once every 6 months or more frequently if required.
6. Fire extinguishing equipment shall be inspected every 6 months.
7. A signed and dated log of maintenance as performed shall be available on the premises for use by the authority having jurisdiction.

ADDITIONAL SUBMITTAL REQUIREMENTS—Downdraft Appliance

1. A downdraft appliance ventilation system containing or for use with appliances used in processes that produce smoke or grease-laden vapors shall be equipped with components that are in accordance with NFPA 96, CMC 518.0.1, Items 1-5.
2. Integral Fire Extinguishing System: A listed downdraft appliance ventilation system employing an integral fire extinguishing system (including detection systems that have been evaluated for grease and smoke capture, fire extinguishing, and detection) shall be required in accordance with Section 5UU. [NFPA 96: 15.2.1] CMC 518.3.1
3. Interlocks: The downdraft appliance ventilation system shall be provided with interlocks such that the cooking fuel supply will not be activated unless the exhaust and supply air system have been activated. [NFPA 96: 15.2.2] CMC 518.3.2
4. Manual Reset: The airflow switch or transducer shall be a manual reset device or circuit. [NFPA 96: 15.3.3] CMC 518.4.2
5. Surface Materials: Surfaces located directly above the cooking appliance shall be of noncombustible or limited combustible materials. [NFPA 96: 15.4] CMC 518.5



ORANGE COUNTY FIRE AUTHORITY

NOTES: FIRE EXTINGUISHING FOR COMMERCIAL COOKING

PLACE THE FOLLOWING NOTES VERBATIM ON THE PLAN:

1. This system is designed in accordance with ANSI/UL 300—05(R2010), 2017 NFPA 17A; 2017 NFPA 96, 2019 CFC, 2019 CMC, and the most recent manufacturer's manual.
2. OCFA final inspection required. Please schedule all field inspections *at least 48 hours* in advance. Call OCFA Inspection Scheduling at 714-573-6150. Phasing of inspections may require additional fees. Inspections canceled after *1 p.m. on the day before the scheduled date will be subject to a re-inspection fee.*
3. All gas fueled, electrically powered, and heat-producing equipment located under the hood shall shut down upon activation of the extinguishing system. *CFC 904.11.2*
4. Discharge nozzles shall be located and installed as shown in the manufacturer's listed installation manual and the OCFA approved plans. All discharge nozzles shall be provided with caps, covers, or other suitable protective devices. *NFPA 17A 4.3.1.5*
5. Piping shall be rigidly supported to prevent movement (shall not be able to sway for cleaning). Swivel nozzles shall be rotated to a predetermined aiming point and then tightened to hold that angle. Careful attention shall be given at the time of designing the system as nozzles cannot be moved "out of the way" once approved in the field. Any moving of the pipe or nozzles shall require an approved contractor to evaluate the pipe/nozzle layout.
6. Movable cooking equipment shall be provided with a means to ensure that it is correctly positioned in relation to the appliance discharge nozzle during cooking operations. *NFPA 17A 5.6.4*
7. Fryers shall be separated from surface flame appliances by 16 inches or an 8 inch steel or tempered glass baffle plate shall be provided between fryers and surface flames. *CMC 515.0*
8. Manual pull stations shall be located no higher than 4 feet above finished floor and shall be readily accessible for use at or near a means of egress from the cooking area a minimum of 10 feet and maximum of 20 feet from the kitchen exhaust system. The distance is measured from the edge of the hood. *CFC 904.11.1*
9. Where more than one manual actuator (pull) is installed, they shall be identified with a permanent sign indicating which extinguishing system will activate.
10. A Class K-rated extinguisher shall be provided within a maximum of 30 feet of cooking equipment. Placement is at the discretion of the inspector. Additional extinguishers may be required based on travel distance for solid fueled equipment or multiple fryers with 6 square foot surface area or greater. Portable fire extinguishers shall be conspicuously located along normal paths of travel where they are readily accessible. Portable fire extinguishers shall be maintained in accordance with NFPA and CFC requirements. *CFC 906.1 & 906.2*
11. A placard shall be conspicuously placed near each extinguisher that states:
"Fire Protection System Shall Be Activated Prior To Using The Fire Extinguisher." *NFPA 17A*
12. Exhaust Fan Operation: A hood exhaust fan(s) shall continue to operate after the extinguishing system has been activated unless fan shutdown is required by a listed component of the ventilation system or by the design of the extinguishing system.
13. The hood exhaust fan shall not be required to start upon activation of the extinguishing system if the exhaust fan and all cooking equipment served by the fan have been shut down. *NFPA 96 8.2.3.2*
14. The exhaust fan shall be provided with a means so that the fan is activated when any appliance under the hood is turned on. *CMC 515.2.3 and NFPA 96 8.2.3.3*
15. The inside edge of the hood shall overhang a horizontal distance of not less than 6 inches beyond the edge of the cooking surface on all open sides, and the vertical distance between the lip of the hood and the cooking surface shall not exceed 4 feet unless the manufacturer's specifications states otherwise. *CMC 508.4.1*

SYSTEM MONITORING

Where a building fire alarm or monitoring system is installed, the automatic fire-extinguishing system(s) shall be monitored in accordance with NFPA 72. *CFC 904.3.5*

Monitoring of commercial cooking hood and duct systems will be field verified only and installation must be performed by a contractor with a valid C-10 License. A separate fire alarm plan is not required.

SYSTEM AND EQUIPMENT MAINTENANCE

1. *904.12.5*: Operations and maintenance: Automatic fire extinguishing systems protecting commercial cooking systems shall be maintained in accordance with California Code of Regulations, Title 19, Division 1, Chapter 5 and Sections 904.12.5.1 through 904.12.5.3. Sections 904.12.5.1 through 904.12.5.3.
2. The approved set of plans shall be delivered by the contractor to the owner/manager to be kept on-site for reference and inspection records along with the completed "Wet Chemical Acceptance Test Report."
3. The owner shall be provided with a copy of the manufacturer's listed installation and maintenance manual or listed owner's manual.
4. Wet chemical systems shall be provided with an audible or visual indicator to show that the system is in a ready condition or is in need of recharging. *NFPA 17A 4.8*
5. The extinguishing system shall be maintained in accordance with the current CFC, CMC, NFPA 16, NFPA 17A, NFPA 17 and manufacturer's requirements as applicable.
6. For existing hood extinguishing systems, where changes in the cooking media, positioning of cooking equipment or replacement of cooking equipment occur, plans shall be submitted to the OCFA for the automatic fire-extinguishing system and shall comply with the applicable provisions. *CFC Sections 904.11.6.1* Approval from the Orange County Health Care Agency and the Building Department shall be required for all new equipment. A higher air exchange may be required based on the type of equipment being proposed. *CMC 507.1 and NFPA 96:4.1.4.*
7. Extinguishing systems shall be serviced at least every 6 months, or after activation of the system, by a qualified trained technician. Maintenance shall be conducted by a Certified Technician in accordance with the manufacturer's listed installation and maintenance manual. *CFC 901.6.2 NFPA 17A Section a7.3*
8. Fusible links shall be replaced annually. *CFC 904.12.5.3*
9. The hood ventilation system shall be operated at the required rate of air movement, and approved grease filters shall be in place when cooking equipment under a kitchen grease hood is operated.
10. Hydrostatic testing of the wet chemical extinguishing system shall be completed in intervals not exceeding 12 years. *NFPA 17A 7.5*
11. All interior surfaces of the exhaust systems shall be made accessible for cleaning and inspection purposes. If during the inspection it is found that the hood, grease removal devices, fans, ducts or other appurtenances have an accumulation of grease, such components shall be cleaned. Flammable solvents or other flammable cleaning aids shall not be used. *CMC 507.1.Item 6; CFC 609.3.3.2*

TESTING AND INSPECTION

The system shall be pre-tested prior to OCFA inspection to determine that the system is properly installed and functions in accordance with the approved plans and the manufacturer’s installation and maintenance manual. **The complete technical manual shall be made available to the inspector.** Please note, if a full manual is not available, the inspection may be discontinued, and a rescheduling fee will apply. Testing during the OCFA inspection shall include a manual and automatic activation via fusible link. A shut down of all electrical and gas cooking equipment shall also be demonstrated. Nozzle type, height, and orientation relative to placement of cooking appliances will also be verified during the inspection.

Table 609.3.3.1 COMMERCIAL COOKING SYSTEM INSEPCTION FREQUENCY

Type of Cooking Operations as determined by Fire Code Official	Minimum Frequency of Inspections
High-Volume cooking operations such as 24-hour cooking, charbroiling or wok cooking	3 months
Low-Volume cooking operations such as places of religious worship, seasonal businesses and senior centers	12 months
Cooking operations utilizing solid fuel burning cooking appliances	1 month
All other cooking operations	6 months

The entire duct system shall be inspected at a minimum per Table 609.3.3.1. If during the inspection it is found that the hood, grease removal devices, fans, ducts or other appurtenances have an accumulation of grease, such components shall be cleaned. *CFC 609.3.3.2*

Additional OCFA Notes for Systems Burning Solid Fuel

Procedures for Inspection, Cleaning and Maintenance for Solid Fuel Cooking

PLACE THE FOLLOWING NOTES VERBATIM ON THE PLAN:

Solid cooking appliances shall be inspected, cleaned, and maintained in accordance with the following per 2019 NFPA 96:

1. The combustion chamber shall be scraped clean to its original surface once each week and shall be inspected for deterioration or defects.
2. Any significant deterioration or defect that might weaken the chamber or reduce its insulation capability shall be immediately repaired.
3. The flue or chimney shall be inspected weekly for the following conditions:
 - a. Residue that might begin to restrict the vent or create an additional fuel source
 - b. Corrosion or physical damage that might reduce the flue's capability to contain the effluent
4. The flue or chimney shall be cleaned before these conditions exist.
5. The flue or chimney shall be repaired or replaced if any unsafe condition is evident.
6. Spark arrester screens located at the entrance of the flue or in the hood assembly shall be cleaned prior to their becoming heavily contaminated and restricted.
7. Filters and filtration devices installed in a hood shall be cleaned.

STORAGE OF SOLID FUEL

1. Where storage is in the same room as the solid fuel appliance or in the same room as the fuel-loading or clean-out doors, fuel storage shall not exceed a 1-day supply.
2. Fuel shall not be stored above any heat-producing appliance or vent or closer than 3 ft. to any portion of a solid fuel appliance constructed of metal or to any other cooking appliance that could ignite the fuel.
3. Fuel shall be permitted to be stored closer than the requirements of (Item 2 above) where a solid fuel appliance or other cooking appliance is listed or approved for less clearance to combustibles.
4. Fuel shall not be stored in the path of the ash removal.
5. Where stored in the same building as the solid fuel appliance, fuel shall be stored only in an area with walls, floor, and ceiling of noncombustible construction extending at least 3 feet past the outside dimensions of the storage pile.
6. Fuel shall be permitted to be stored in an area with walls, floor, and ceiling of combustible or limited-combustible construction.
7. Fuel shall be separated from all flammable liquids, all ignition sources, all chemicals, and all food supplies and packaging goods.
8. Where acceptable to the authority having jurisdiction, fuel storage areas shall be permitted to be protected with a fixed water pipe system with a hose capable of reaching all parts of the area.
9. In lieu of the sprinkler system outlined in 14.9.2.8, a listed 2-A rated water spray fire extinguisher or a 1.6 gallon wet chemical fire extinguisher listed for Class K fires with a maximum travel distance of 20 feet to the solid fuel piles shall be permitted to be used for a solid fuel pile, provided that the fuel pile does not exceed 5 cubic feet volume.

SOLID FUEL HANDLING AND ASH REMOVAL

1. Solid fuel shall be ignited with a match, an approved built-in gas flame, or other approved ignition source.
2. Combustible or flammable liquids shall not be used to assist ignition.
3. Matches and other portable ignition sources shall not be stored in the vicinity of the solid fuel appliance.
4. Solid fuel shall be added to the fire as required in a safe manner and in quantities and ways not creating a higher flame than is required.
5. Long-handled tongs, hooks, and other required devices shall be provided and used to safely add fuel, adjust the fuel position, and control the fire without the user having to reach into the firebox.

ASH PROTECTION

1. Ash, cinders, and other fire debris shall be removed from the firebox at regular intervals to prevent interference with the draft to the fire and to minimize the length of time the access door is open.
2. All ash shall be removed from the chamber a minimum of once a day.
3. The ash shall be sprayed with water before removal to extinguish any hot ash or cinders and to control the dust when the ash is moved.

ASH REMOVAL PROCESS

1. Tools shall be provided so that ash removal can be accomplished without having to reach into the chamber.
2. The ash shall be spread out gently in small lots on the chamber floor or on a shovel, to be sprayed before it is removed to the metal container or cart. If the floor of the chamber is of a metal that is subject to rapid corrosion from water, then a noncombustible, corrosion-resistant pan shall be placed just outside the cleanout door for this purpose.
3. The ash shall be carried to a separate heavy metal container (or dumpster) used exclusively for the purpose.

OTHER SAFETY REQUIREMENTS

1. Metal-fabricated solid fuel cooking appliances shall be listed for the application where produced in practical quantities or shall be approved by the authority having jurisdiction.
2. Where listed, metal-fabricated solid fuel cooking appliances shall be installed in accordance with the terms of their listings and with the applicable requirements of this standard.
3. No solid fuel cooking device of any type shall be permitted for deep fat frying involving more than 1 quart of liquid shortening, nor shall any solid fuel cooking device be permitted within 3 feet of any deep fat frying unit.
4. Site-built solid fuel cooking appliances shall be submitted for approval to the authority having jurisdiction before being considered for installation.
5. All units submitted to the authority having jurisdiction shall be installed, operated, and maintained in accordance with the approved terms of the manufacturer's instructions and any additional requirements set forth by the authority having jurisdiction.