

Orange County Fire Authority

Community Risk Reduction

1 Fire Authority Road, Building A, Irvine, CA. 92602 www.ocfa.org 714-573-6100

Fire Extinguishing Systems for Commercial Cooking Operations



Guideline D-02

Serving the Cities of Aliso Viejo • Buena Park • Cypress • Dana Point • Garden Grove • Irvine • Laguna Hills • Laguna Niguel • Laguna Woods
Lake Forest • La Palma • Los Alamitos • Mission Viejo • Rancho Santa Margarita • San Clemente • San Juan Capistrano • Seal Beach
Santa Ana • Stanton • Tustin • Villa Park • Westminster • Yorba Linda and Unincorporated Areas of Orange County

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 commercial cooking fire extinguishing systems. Such systems shall comply with ANSI/UL 300—05(R2014), 2019 National Fire Protection Association (NFPA)16 when applicable; 2021 NFPA 17A; 2021 NFPA 17, 2021 NFPA 96, 2019 NFPA 750, 2022 California Fire Code (CFC) Chapter 9, and the 2022 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 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. The automatic fire extinguishing system shall be required to comply with the applicable provisions from 2022 CFC.

DEFINITIONS

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.

Commercial Cooking Equipment – Appliances used in food service establishments for cooking or heating food in which produce grease vapor, steam, fumes, smoke, or food odors that are required to be removed by a local exhaust ventilation system. For the purpose of this definition, a food service establishment (regardless of whether there is a charge for the food) shall include any building or portion of thereof used for the preparation or serving of food.

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 is ready to operate, or if it has already operated.

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

Owner's Manual - A pamphlet containing the manufacturer's instructions for the proper design, installation, inspection, and operation of the extinguishing system.

Trained - One who has completed certification in accordance with the manufacturer's requirements.

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.

The extinguishing system plans shall contain the following information:

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.
4. Applicable codes and standards used for the system design (e.g., 2022 CFC, 2022 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:
 - 8.1. Whether or not the fryer has a drip board
 - 8.2. Type of char-broiler
 - 8.3. 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.
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 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 512.3.3
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 2022 NFPA 13, Section 8.9.2.

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 electrostatic precipitators 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 review 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 518.3, 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. [NFPA 96: 16.2.1] 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: 16.2.2] CMC 518.3.2
4. Manual Reset: The airflow switch or transducer shall be a manual reset device or circuit. [NFPA 96: 16.3.3] CMC 518.4.2
5. Surface Materials: Surfaces located directly above the cooking appliance shall be of noncombustible or limited combustible materials. [NFPA 96: 16.4] 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), 2021 NFPA 17A; 2021 NFPA 96, 2022 CFC, 2022 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.
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.
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.
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.
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.
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.
11. A placard shall be conspicuously placed near each extinguisher that states:
"Fire Protection System Shall Be Activated Prior To Using The Fire Extinguisher."
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.
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.
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.

SYSTEM MONITORING

Where a building fire alarm is installed, the automatic fire-extinguishing system(s) shall be monitored. 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. Operations and maintenance: Automatic fire extinguishing systems protecting commercial cooking systems shall be maintained in accordance with California Code of Regulations.
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 needs recharging.
5. The extinguishing system shall be maintained in accordance with the adopted version of 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. 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.
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.
8. Fusible links shall be replaced annually.
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.
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.

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.

The entire duct system shall be inspected. 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.

| 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 |

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 2021 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:
 - 3.1. Residue that might begin to restrict the vent or create an additional fuel source
 - 3.2. 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 15.9.2.8, 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.