

1. GENERAL SPECIFICATION

- 1.1 This specification outlines the requirements for a pre-engineered fire extinguishing system comprising Kidde Fire Systems WHDR Wet Chemical Fire Suppression System, Kidde APC fire suppressant and Kidde ARIES-NET Fire-Alarm/Suppression System Control Unit. All requirements outlined in this specification must be completed in their entirety.
- 1.2 The suppression system shall be a pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system for protection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork and cooking appliances.
- 1.3 The suppression system shall be a Kidde Fire Systems Model WHDR Wet Chemical Fire Suppression System.
- 1.4 The control panel shall be a Kidde Fire Systems ARIES-NET Fire Alarm & Suppression Release Control Panel to perform the following functions:
 - A. Fire alarm, supervisory and trouble event initiation
 - B. Occupant Notification
 - C. Event annunciation
 - D. Local control functions
 - E. Fire extinguishing system release

2. CODES & STANDARDS COMPLIANCE

- 2.1 The design, installation, testing and maintenance of the system shall be in accordance with the following codes and standards as applicable:
 - A. ANSI/UL 864 9th Edition, *Standard for Control Units and Accessories for Fire Alarm Systems*
 - B. UL 300, *Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*
 - C. ULC/ORD-C1254.6, *Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units*
 - D. NFPA 17A: *Standard for Wet Chemical Extinguishing Systems*
 - E. NFPA 70: *National Electrical Code® (NEC)*
 - F. NFPA 72: *National Fire Alarm Code*
 - G. NFPA 96: *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*
 - H. Factory Mutual Approval Guide, latest edition
 - I. New York City Buildings Department, Materials and Equipment Acceptance Division (MEA)
 - J. Kidde Fire Systems *WHDR Wet Chemical Fire Suppression System Design, Installation, Operation and Maintenance (DIOM) Manual*, part number 87-122000-001 and all applicable addenda & technical bulletins, as identified by Underwriters Laboratories and Underwriters Laboratories Canada, File No. EX3559
 - K. All applicable insurance company requirements
 - L. All applicable local and state codes and standards
 - M. Requirements of the Local Authorities Having Jurisdiction (AHJ)
- 2.2 All of the components of the suppression system shall have the following listings and approvals

where applicable:

- A. Underwriters Laboratories (UL)
 - B. New York City Buildings Department, Materials and Equipment Acceptance Division (MEA)
- 2.3 All of the components of the intelligent control system shall have the following listings and approvals where applicable:
- A. Underwriters Laboratories (UL)
 - B. New York City Buildings Department, Materials and Equipment Acceptance Division (MEA)
 - C. California State Fire Marshal (CFSM)
 - D. Factory Mutual System (FM)
- 2.4 The manufacturer shall meet ISO 9001 requirements for the design, production and distribution of the wet chemical fire suppressions systems for cooking operations.

3. SYSTEM DESCRIPTION

- 3.1 All fire suppression and control system equipment and accessories must be manufactured and/or supplied by Kidde Fire Systems, 400 Main Street, Ashland, MA 01721, USA, Telephone 508.881.2000, www.kiddefiresystems.com.
- 3.2 The manufacturer shall be ISO 9001 certified.
- 3.3 The manufacturer shall warranty the suppression system & components for six (6) years from the date of shipment. The manufacturer shall warrant the control unit for five (5) years from date of shipment.
- 3.4 The system shall be supplied and installed by an authorized Kidde Fire Systems distributor. The organization and installer shall be trained by the manufacturer to design, install, test and maintain the WHDR Wet Chemical Fire Suppression System and shall be able to produce a certificate stating such upon request.
- 3.5 The factory authorized Kidde Fire Systems distributor shall confirm in writing that they stock a full complement of spare parts and offer 24-hour emergency service for all equipment supplied.
- 3.6 The suppression system shall consist of Kidde WHDR Series APC Storage Cylinder(s), Kidde actuation hardware and Kidde distribution nozzles attached to a fixed pipe network. The system shall use Kidde APC (Aqueous Potassium Carbonate) wet chemical agent, a potassium salt solution fire suppression agent. This agent works by producing a synthetic cellular mass (saponification) on the surface of hot or burning grease. This foam layer acts to smother a fire, and serves to prevent re-flash until the grease cools.
- 3.7 The suppression systems design shall be of a pre-engineered, modular type.
- 3.8 The control panel shall be a Kidde ARIES-NET Intelligent Fire Alarm & Suppression System Control Unit.

4. COMPONENTS

4.1 WHDR Series Cylinder and Valve Assembly

- A. The APC wet chemical agent shall be contained in one or more stored pressure DOT/TC rated steel cylinder and valve assemblies. Cylinders requiring an external source to pressurize the cylinder shall not be acceptable. The cylinder and valve assemblies shall have the following features:
 - 1. Sufficient cylinder quantities and sizes to protect the entire hazard area shall be provided in accordance with the Kidde WHDR DIOM Manual and filled with the required amount of APC wet chemical agent.
 - 2. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.
 - 3. The cylinder shall have a separately mounted shield to protect the pressure gauge.
 - 4. The cylinder and valve assemblies shall be pressurized with dry nitrogen to 175 PSIG (1207 kPa) at 70°F (21°C). The cylinder and valve assemblies shall be capable of being stored and operated at temperatures from 0°F to 120°F (-18°C to 49°C).
- B. Approved bracketing shall be provided to mount the cylinders securely to the intended mounting surface.

4.2 Distribution Nozzles

- A. Nozzles shall be located to protect the exhaust ducts, plenums, and all cooking appliances requiring protection. Nozzles shall not be permitted under the grates of char-rock broilers or radiant (non-upright) char-broilers. Nozzle type, coverage and location shall be according to the Kidde WHDR DIOM Manual.
- B. All nozzles shall be equipped with strainers to prevent foreign matter in the agent distribution piping or tubing from clogging the nozzle orifice. All nozzles shall be equipped with foil seals to prevent entry of grease and foreign matter into the nozzles and piping. The foil seals are to be ruptured by pressure at system discharge.
- C. All nozzles shall incorporate a ring identification system to easily identify nozzle types. Rings are to be machined into the nozzle body by the manufacturer.

4.3 Distribution System

- A. The APC wet chemical agent distribution system shall be designed and installed in accordance with the Kidde WHDR DIOM Manual.
- B. The distribution system shall consist of Schedule 40 black steel pipe or stainless steel tubing. Chrome plated piping is permissible. Galvanized piping shall not be used.
- C. All fittings for Schedule 40 pipe shall be standard weight steel, malleable iron, ductile iron or cast iron. Galvanized fittings shall not be used.
- D. Fittings for stainless steel tubing shall be compression or flare type. Bending of tubing is permissible. All bending radii shall be in accordance with the Kidde WHDR DIOM Manual using commercially available bending jigs.

4.4 Suppression System Control Equipment

- A. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder and valve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.
- B. The system control head shall be either cylinder or wall mounted, whichever is applicable. Actuators shall be supplied for each system cylinder valve. All mechanical components of the

control heads shall be enclosed. No exposed levers, except for a local manual actuation handle, shall be permitted.

- C. The control head shall be capable of automatic actuation, either by electrical or mechanical means. The control head shall be equipped with microswitch contacts for monitoring by the ARIES-NET Control Unit (audible alarm and/or equipment shutdown). For multiple cylinder systems, additional actuators shall be provided for each additional cylinder. All cylinders protecting one hazard area must be connected for simultaneous discharge by all methods of system actuation.
- D. For automatic mechanical actuation, the system control head shall be activated by Kidde thermobulb link or fusible metal alloy link fire detectors per the Kidde WHDR DIOM Manual. The thermobulb or fusible link system shall require no outside source of power for operation. Detector links used for mechanical system actuation shall be located in accordance with the Kidde WHDR DIOM Manual and all applicable NFPA and UL standards. These links shall be chosen with a rating suitable for their expected normal exposure temperature.

4.5 Fire Alarm & Suppression Control Panel

- A. For automatic electric actuation, the electric solenoid shall be actuated by the Kidde ARIES-NET Control Unit. The detectors shall be Fenwal Detect-A-Fire rate-compensated heat detectors for rapid detection with resistance to false alarms. The rate-compensated heat detectors shall be chosen with a temperature rating suitable to their expected normal exposure temperature and located in accordance with NFPA 72. The heat detectors shall be color coded for ease of identification. All detection and releasing circuits shall be supervised and the system shall provide for a secondary power supply calculated, at minimum, according to NFPA and UL standards.
- B. The control-unit configuration shall consist of:
 - 1. Printed-circuit board (PCB) with the main microprocessor, an integral display/control assembly, and terminations for all field circuits
 - 2. Primary power supply
 - 3. Enclosure with removable door and viewing window
- C. The PCB shall contain the main-system microprocessor, the real-time clock, the history buffers, the watchdog timer, one USB device port, and two RS-232 serial communications ports. It shall also provide terminations for the following field circuits:
 - 1. Two (2) signaling line circuit (SLC) which can be expanded to up to 8
 - 2. Two (2) notification appliance circuits (NACs)
 - 3. Two (2) combination NAC/releasing circuits (Combos)
 - 4. Two (2) releasing circuits
 - 5. Three (3) programmable relays
 - 6. One (1) trouble relay
 - 7. One (1) RS-485 communications circuit
 - 8. Connections for BACNET, Modbus, TCP/IP and Modbus over IP
 - 9. Battery charging circuit
 - 10. AC input power connections.

- D. The integral display-and-control assembly shall provide an 80-character, backlit liquid-crystal display (LCD). The LCD shall be 2 lines by 40 characters, and each SLC initiating and/or control device shall be identifiable by a label of up to 40 characters in length. The display shall automatically indicate the time remaining prior to discharge upon attainment of the discharge criterion in the area protected by a waterless extinguishing system.
- E. The display-and-control assembly shall have four control keys for system reset, event acknowledgement, alarm silence, and multiple-event scrolling, plus twelve additional numeric and navigation keys for access to the system service and configuration menus. All user access to the system menus shall be password protected. A system buzzer shall announce each alarm, supervisory, or trouble event.
- F. The SLC shall serve as the hardware and software interface between the intelligent initiating and control devices and the ARIES-NET Control Unit. The SLC shall be capable of communicating with up to 255 automatic detectors, monitor modules, and control devices, in any combination, without restrictions on the numbers of each type of field device. The communications protocol shall be fully digitized for speed and accuracy of data transmission. Communications protocols that are not fully digitized, or that place restrictions on the numbers and types of field devices that can be used on the signaling line circuit, shall not be considered as equivalent.
- G. The signaling line circuit shall be capable of being wired in a Class-B, Style-4 configuration, or in a Class-A, Style-6 or Style-7 configuration. Isolator modules shall be available for use with any of these wiring styles to prevent a short-circuit fault from disabling the entire signaling line circuit.
- H. All field devices connected to the SLC shall be electronically addressed and shall have a microprocessor with 4K of non-volatile memory. Each automatic initiating device shall be capable of independently determining whether or not a fire signature at its monitored location is of sufficient magnitude to warrant the issuance of an event signal to the control unit. The system's intelligence shall be distributed to the individual-initiating-device level.
- I. Systems that only distribute intelligence and/or processing power to the control-unit circuit-board level and rely on the control unit, rather than the initiating devices themselves, to determine whether or not an alarm condition exists at a specific location, or that use mechanically-operated code switches for device addressing, shall not be considered as equivalent.

4.6 Control Panel Outputs

A. Releasing Circuits

1. The two releasing circuits shall be capable of actuating the Kidde XV Solenoid Actuator (P/N 83-100034-001). Each releasing circuit shall be independently-programmable to activate two (2) Solenoid Actuators, supervised in series and activated in parallel.
2. The releasing circuits shall be protected against inadvertent activation by a triple-failure-redundancy safeguard system. This system shall require the main microprocessor to issue two release commands of opposite polarity and via separate signaling channels, combined with a signal from the control unit's watchdog timer confirming proper microprocessor operation, in order to activate a release circuit. This triple-failure-redundancy must ensure that an electrical transient or disturbance that temporarily interferes with the operation of the main microprocessor will not inadvertently activate an extinguishing system.

- B. Notification Appliance Circuits (NAC)
 - 1. The NACs shall incorporate built-in synchronization.
 - 2. The NACs shall have the ability to silence the strobes independently of the audible device on the same pair of wires.
- C. Combination Circuits
 - 1. The two combination circuits shall be configurable as either NACs or releasing circuits for solenoid valves. These combination circuits shall be independently programmable.
 - 2. The requirements for the solenoid releasing circuits shall be in accordance with Section 4.6.A.
 - 3. The requirements for NACs shall be in accordance with 4.6.B when both circuits are used as NACs.
- D. Relays
 - 1. The three programmable relays on the PCB shall be of a Form-C type, with a contact rating as follows:
 - i. 1 A @ 30 VDC (resistive)
 - ii. 0.5 A @ 30 VDC (inductive)
 - iii. 0.5 A @ 120 VAC (inductive).
 - 2. Each relay shall be independently-programmable for any of the following conditions:
 - i. loss of AC power only
 - ii. general or point- / zone-specific
 - a. pre-alarm
 - b. pre-release
 - c. release
 - d. time-limit cutoff
 - e. supervisory service
 - f. trouble
 - 3. A relay programmed for general trouble shall also have the option to be programmed for concurrent central-station service. This relay shall delay the loss-of-primary-power transmission to the central-station monitoring facility in user-configurable, one-hour periods of up to 12 hours.
 - 4. The fourth on-board relay shall be a dedicated trouble relay.

5. GENERAL MATERIALS ELECTRICAL

- 5.1 All electrical enclosures, raceways, and conduits shall be provided and installed in accordance with applicable codes and intended use, and shall contain only those electrical circuits associated with the fire-detection and control system. No circuit or circuits that are unrelated to the fire-alarm or suppression system shall be routed through the enclosures, raceways, and conduits dedicated to the fire-alarm or -suppression system.
- 5.2 All conductors shall be enclosed in rigid or thin-walled, steel conduit unless open wiring is permitted by the local electrical code.
- 5.3 Any conduit or raceway exposed to dampness or other similar conditions shall be properly sealed and installed to prevent moisture entrapment. Provisions for draining and drying shall be employed as required.
- 5.4 All wiring shall be of the proper size to conduct the circuit current, but shall not be smaller than #18 AWG unless permitted by the local electrical code. Wiring for the signaling line circuit shall be in accordance with the ARIES-NET Installation, Operation, and Maintenance Manual. Wire that has scrapes, nicks, gouges, or crushed insulation shall not be used. The manufacturer's minimum wire-bending radii shall be observed in all enclosures, raceways, and conduits. Aluminum wire shall not be used.
- 5.5 Splicing of circuits shall be kept to a minimum, and is only permitted in an electrical box suitable for the purpose. Appropriate hardware shall be used to make the wire splices. Wires that are spliced together shall have the same color insulation.
- 5.6 White colored wire shall be used exclusively for the identification of the neutral conductor of an alternating-current circuit.
- 5.7 Green colored wire shall be used exclusively for the identification of the earth-ground conductor of an AC or DC circuit.
- 5.8 Appropriate color-coding shall be utilized for all other field wiring.
- 5.9 All electrical circuits shall be numerically tagged with suitable markings at each terminal point. All circuits shall correspond with the installation drawings.

6. SYSTEM INSTALLATION AND COMMISSIONING

6.1 Equipment

- A. A factory authorized distributor shall install and commission the system in accordance with the appropriate Kidde Design, Installation, Operation and Maintenance Manual.
- B. Locations of all electrical equipment, the ARIES-NET Control Unit, and all system components are subject to the approval of the architect.

6.2 Training Requirements

The installer shall be certified and trained by Kidde Fire Systems on design, installation, testing and maintenance of the Kidde WHDR Wet Chemical Fire Suppression System and ARIES-NET Control Panel System.

6.3 Final Commissioning Tests

- A. All final-acceptance tests shall be performed in the presence of the architect and the authority having jurisdiction. All control heads and / or actuators for the extinguishing system, if present, shall be disconnected during the acceptance testing.
- B. All conductors shall be tested for continuity, shorts to earth ground and shorts between pairs.
- C. Each initiating point shall be tested for proper alarm or supervisory reporting. Receipt of all alarm and supervisory signals, including appropriate trouble signals as required, shall be verified at the ARIES-NET Control Unit.
- D. Specialty detectors such as Detect-a-Fire shall be tested, and proper operation verified, in accordance with the appropriate Kidde Fire Systems installation, operation, and maintenance manuals.
- E. All notification appliances shall be tested for proper operation.
- F. A complete functional test shall be conducted to confirm the operation of the system to the requirements of this specification.
- G. A copy of the commissioning tests and results shall be provided to the architect, the authority having jurisdiction, and the end-user.
- H. The system shall be properly armed and readied for its intended service following the successful completion of the commissioning tests. The end user shall be immediately notified when the system is put into service.

6.4 Maintenance

- A. WHDR Suppression System maintenance and periodic testing shall be performed in accordance with the Kidde WHDR DIOM Manual, NFPA 96, NFPA 17A, all applicable local codes and standards and local AHJ requirements.
- B. ARIES-NET Control System maintenance and periodic testing shall be performed as required by NFPA 72, current edition, and as recommended by the ARIES-NET Installation, Operation and Maintenance Manual.