

**1. GENERAL**

**1.1 INTENT OF SPECIFICATIONS**

This specification details the requirements for an AEGIS Single Hazard Agent Release Panel. All requirements outlined in this specification shall be completed in their entirety. These requirements, combined with good engineering practices must be followed in order to produce a safe and effective fire protection and suppression system.

**1.2 GENERAL DESCRIPTION**

- A. The Fire Alarm-Suppression Control System shall consist of a Control Panel that provides control for all devices that make up the complete system. All AEGIS control units shall be of a single board design and construction and must be factory equipped with all required controls as described in subsequent sections for one suppression hazard.
- B. The AEGIS system shall perform fire alarm, supervisory, and trouble event initiation; occupant notification; event annunciation; local control functions; fire extinguishing system release, and off premises transmission.
- C. The control unit shall be listed to be compatible with Fenwal Conventional point-type Ionization and Photoelectric Detectors, Normally Open contact type Thermal Detectors and switches, Fenwal Solenoid operated Control Heads and initiators, Factory Mutual Sprinkler Solenoid Valves and Fenwal Audio-Visual Notification Appliances.
- D. The control unit shall have dual release capabilities, where each release circuits shall be capable to fully operate independently with different time delay and abort function.
- E. All System components provided with a key-lock feature shall be keyed alike.

**1.3 CODES AND COMPLIANCE**

- A. The design, installation, testing and maintenance of the integrated suppression shall be in accordance with the following applicable codes, standards and regulatory bodies:
  - 1. NFPA 12A: Halon 1301 Fire Extinguishing Systems
  - 2. NFPA 2001: Clean Agent Fire Extinguishing Systems
  - 3. NFPA 70: National Electrical Code (NEC)
  - 4. NFPA 72: National Fire Alarm Code
  - 5. NFPA 75: Protection of Electronic Computer/Data Process Equipment
  - 6. NFPA 76: Fire Protection for Telecommunications Systems
  - 7. NFPA 92A: Recommended Practice for Smoke Control Systems
  - 8. UL 864, 9th edition: Control Units and Accessories for Fire Alarm Systems
  - 9. UL 2166: Halocarbon Clean Agent Extinguishing System Units
  - 10. UL 268: Standard for Smoke Detectors for Open Areas
  - 11. UL 268A: Standard for Smoke Detectors for Duct Application
  - 12. ANSI B1.20.1: Standard for Pipe Threads, General Purpose
  - 13. Factory Mutual
  - 14. Requirements of the Local Authority Having Jurisdiction
  - 15. Manufacturer's Design, Installation, Operation & Maintenance Manual
- B. The complete system shall have the applicable following listings and approvals:
  - 1. Underwriters Laboratories, Inc.
  - 2. Factory Mutual Global

**1.4 SYSTEM DESIGN CRITERIA**

- A. All system components shall be manufactured and/or supplied by Kidde Fire Systems, 400 Main Street, Ashland, MA 01721, USA, phone (508) 881-2000. URL: <http://www.kiddefiresystems.com>
- B. All materials and equipment shall be new and unused.

**1.5 QUALIFICATIONS**

- A. Manufacturer
  - 1. The manufacturer/supplier of the system hardware and components shall have a minimum of fifteen (15) years experience in the design and manufacture of systems of similar type
  - 2. The manufacturer/supplier of the systems shall be certified to ISO 9001 for a minimum period of five (5) years for the design, production and distribution of fire detection, fire alarm and fire suppression systems.
  - 3. The name of the manufacturer/supplier and manufacturer part numbers shall appear on all major components.
  - 4. All devices, components and equipment shall be the products of the same manufacturer/supplier.
  - 5. The system manufacturer/supplier shall have the ability to provide multiple suppression system arrangements to accommodate the performance criteria required by the project.
- B. Contractor
  - 1. The system shall be supplied and installed by a factory authorized, Kidde Fire Systems distributor. The Contractor shall be trained by the manufacturer to calculate/design, install, test and maintain the fire suppression system and shall be able to produce a certificate stating such on request.
  - 2. The installing contractor shall employ a person who can show proficiency at least equal to a NICET level IV certification in special hazards design.
  - 3. The Contractor shall confirm in writing that he stocks a full complement of spare parts and offers 24-hour emergency service for all equipment being furnished.

#### 1.6 WARRANTY

- A. The manufacturer shall warrant the system from the date of shipment from the factory as follows: AEGIS Control Unit for sixty (60) months; and all other equipment for twenty-four (24) months.

#### 1.7 SUBMITTALS

- A. The architect will review all submittals for conformance to the drawings and specifications. The contractor shall be required to resubmit any materials, with appropriate modifications, that are found to be in non-conformance with the requirements of the drawings and these specifications after review by the architect. Approval of the submittals by the architect shall not relieve the Contractor of their responsibility to meet the requirements of the drawings and specifications.
- B. Engineered Design Drawings: The Contractor shall provide all required documents that shall include the following details:
  - 1. Plan and riser drawings showing the location of the AEGIS Control Unit and the locations and necessary installation and mounting details of all field devices such as smoke detectors, manual-release stations and notification appliances. Conduit routings shall be shown, with number of conductors, type of wire, and wire sizes indicated for each conduit segment.
  - 2. Point-to-point wiring diagram showing the termination points for all field-wiring circuits to the internal AEGIS PCB. All internal wiring and communications cabling shall be shown.
  - 3. A primary-power calculation that details the power requirements for the AEGIS Control Unit and all field devices such as smoke detectors, notification appliances and releasing solenoids. Include the required capacity of the main AC power-line feed from the commercial power and light company.
  - 4. A secondary power calculation that shows the quiescent and alarm power requirements for the AEGIS Control Unit and all field devices. Include the periods of time for which the quiescent and alarm power requirements shall be supported in order to determine the necessary standby battery capacity.

- C. Commissioning Equipment List: The Contractor shall provide a commissioning equipment list for each installed system. The equipment list shall identify all installed equipment and configurations. The Contractor shall submit the following:
  - 1. Four (4) sets of installation drawings for each installed system and one (1) set of calculation reports, owner's manuals and product data sheets.
  - 2. A description of system functionality and a detailed matrix of all the initiating points, control modules, and field circuits that identifies the labeling of all components and shows the relationships and activation sequences among the various initiating points and the control modules and/or field circuits.
  - 3. The contractor shall submit a commissioning check sheet for each installed ASD detector. The check sheet shall list all installed equipment, configurations and measured ambient conditions
  - 4. The Contractor shall submit a test plan that describes how the system shall be tested. This shall include a step-by-step description of all tests and shall indicate type and location of test apparatus to be used. Tests shall not be scheduled or conducted until the engineer of record approves the test plan. At a minimum, the tests to be conducted shall be per the relevant referenced codes and any additional supplemental tests required by the AHJ. Tests shall not be scheduled or conducted until the engineer of record approves the test plan.
  - 5. Upon completion of installation and commissioning acceptance, two (2) sets of "As-Built" installation drawings and One (1) set of the calculation report for each installed system.
  
- D. Documentation: The Contractor shall submit two (2) copies the following after complete installation:
  - 1. AEGIS Installation, Operation and Maintenance Manual.

## **2. ELECTRICAL SYSTEM REQUIREMENTS**

### **2.1 ELECTRICAL WORK**

- A. 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.
- B. 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.
- C. White colored wire shall be used exclusively for the identification of the neutral conductor of an alternating-current circuit. Green colored wire shall be used exclusively for the identification of the earth-ground conductor of an AC or DC circuit. Appropriate color-coding shall be utilized for all other field wiring.
- D. All electrical circuits shall be numerically tagged with suitable markings at each terminal point. All circuits shall correspond with the installation drawings.

### **2.2 GENERAL**

#### **A. Control Panel:**

- 1. The single hazard Control Panel shall consist of a single Printed Circuit Board with the main microprocessor and an integral operator interface Module, a primary Power Supply Unit, a 24 VDC Battery backup complete with Battery Charger capable of charging 68 AH batteries, in an 18 gauge painted NEMA 1 steel enclosure with door. The enclosure size shall be capable of housing the Printed Circuit Board, the Power Supply Unit and a Battery of capacity 12 AH at 24 VDC. Enclosures intended for use in Canada shall be

- provided an additional steel dead-front plate. Battery cabinets shall be available to accommodate batteries of capacity 17 to 68 AH at 24 VDC.
2. The power-supply / charger assembly shall be configurable to accept either 120 or 240 VAC input voltage, and shall provide 5.4 A at 24 VDC of filtered and regulated power to operate the system and charge the system's standby battery. The charger assembly shall be capable of charging batteries of capacities up to 68 AH.
  3. The Control Panel shall provide two resettable Auxiliary Outputs rated at 2 Amp total at 24 VDC for external use.
  4. The battery backup system shall consist of 24 VDC, maintenance free, sealed lead acid batteries of capacity such as to provide for 24 to 90 hours of Standby operation followed by 5 to 10 minutes of Alarm operation in case of AC Mains failure. The battery charger shall be capable of charging a fully discharged battery within 48 hours.
  5. The Control Panel shall supervise and control the overall system operation, including the execution of the site-specific configuration. Its printed circuit board shall contain the hazard-specific input and output circuits.
  6. The control unit operator interface Module shall provide a digital display, system control switches, and Light emitting diodes (LED's) to indicate the status of individual input and output circuits and a summary of Alarm, Supervisory and Trouble events.
  7. The digital display shall also provide a countdown timer to indicate the time remaining prior to an impending suppression system release. Panels that do not display releasing countdown shall not be acceptable.
  8. The operator interface Module shall be provided Light Emitting Diodes (LED) to indicate Power ON, Alarm, Pre-Release, Releasing, Post-Release, Trouble, Supervisory and Signal Silenced.
  9. The operator interface module shall have control keys for system operation and shall allow System Diagnostics, Lamp Test, and System Configuration Menu Controls. All access to the Menu System shall be password protected.
  10. A system buzzer shall annunciate each Alarm, Supervisory, or Trouble event.
  11. The Control panel shall be provided 3 Class A/B Detection Initiating Device Circuits
    - i. The Initiating Device Circuits shall all be power limited, and shall be field-configurable in either style of supervision without the use of any converter boards, wiring jumpers, or dip switches. Panels that require the use of Class A/Class B converter boards shall not be permitted.
    - ii. Each circuit shall be capable of supporting Normally Open contact-type alarm devices as well as a minimum of 25 Fenwal Conventional point-type smoke detectors in any combination.
    - iii. The Initiating Device Circuits shall be configurable to activate the Suppression System on the occurrence of any of the alarm and supervisory combination as described in subsequent paragraphs.
    - iv. The contractor shall only utilize Fenwal smoke or electronic heat detectors that have been UL listed for compatibility with the Kidde AEGIS panel.
    - v. The Waterflow/Detection Circuit shall be field-configurable in either a water flow or general alarm detection in a style B or style D of supervision without the use of any converter boards, wiring jumpers, or dip switches. .
  12. The Control panel shall be provided 1 Class A/B Manual Release Circuit
    - i. The circuit shall be power limited and shall be capable of supporting Kidde Manual Pull Stations. The release of agent subsequent to the operation of the Manual Release shall be configurable to be either instantaneous or delayed. If delayed, the time delay shall be 10 seconds, 20 seconds, or 30 seconds. The operation of the Manual Release shall override any existing Abort Station input.
    - ii. The contractor shall only utilize Kidde Pull Stations that have been UL listed for compatibility with the Kidde AEGIS panel.
  13. The Control panel shall be provided 1 Class A/B Abort Circuit.

- i. The circuit shall be power limited and shall be capable of being user-configurable to abort either a single release output, or both. In applications where the AEGIS control unit dually controls a clean agent system and a water based system, activation of the abort circuit shall not affect the release of the water based system.
  - ii. The abort circuit shall be capable of supporting Kidde Abort Stations. When enabled, the abort circuit shall be configurable to operate in up to five modes including UL and disabled.
  - iii. The contractor shall only utilize Kidde Abort Stations that have been UL listed for compatibility with the AEGIS panel.
14. The Control panel shall be provided 2 Class A/B Supervisory Circuits
- i. The supervisory Circuit shall be field-configurable in either style of supervision without the use of any converter boards, wiring jumpers, or dip switches. Panels that require the use of Class A/Class B converter boards shall not be permitted.
  - ii. Each circuit shall be power limited.
  - iii. The supervisory circuit shall be configurable to allow for Supervisory input and Detection input to be cross zoned, to release the suppression system.
15. The Control panel shall be provided 3 Class A/B Notification Circuits.
- i. The Notification Circuits shall be field-configurable in either style of supervision without the use of any converter boards, wiring jumpers, or dip switches. Panels that require the use of Class A/Class B converter boards shall not be permitted.
  - ii. Each NAC circuit shall be capable of delivering an output of 1.5 Amps at 24 VDC.
  - iii. All circuits shall be individually programmable and configurable to activate on one or more of the conditions of General Alarm, First Alarm, Waterflow, Pre-Discharge, and Discharge.
  - iv. In the event of the occurrence of any of the above conditions, the circuits shall be configurable to generate the sound pattern of:
    - a. Silent
    - b. Pulse at 60 beats per minute Silenceable or Non-Silenceable
    - c. Pulse at 120 beats per minute Silenceable or Non-Silenceable
    - d. Temporal Silenceable or Non-Silenceable
    - e. Steady.
  - v. Synchronization of the notification appliance circuit shall be achieved without the use of external Sync Modules.
  - vi. It shall be possible to configure more than one circuits to activate for the same alarm condition
  - vii. It shall be possible to override one master code (tone) with another depending on the state (i.e., first alarm, prerelease, or release) of the particular suppression zone. No supplemental equipment shall be required to perform this functionality.
  - viii. The contractor shall only utilize Alarm Signals that have been UL listed for compatibility with the AEGIS panel.
16. The Control panel shall be provided 2 Class B Agent Release Circuits
- i. 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.
  - ii. It shall be possible to configure each release circuit for activation based on the following configuration criteria of inputs:
    - a. Manual Release
    - b. Single zone
    - c. Crossed zone



- iii. Each Agent Release Circuits shall be capable of operating the following 24 VDC Release Devices in the listed configurations:
    - a. 1 or 2 Kidde Control Heads
    - b. 1 FM Sprinkler Solenoid (Group A, B, D, E, G, F, I, J and K)
    - c. 1 Set of Fenwal Initiators
  - iv. The contractor shall only utilize release devices that have been UL listed/FM approved for compatibility with the Kidde AEGIS panel:
  - v. The circuit design shall be such that no additional module(s) or interface circuitry is required to be wired between the Control Panel Release Circuit output terminals and the Release Devices listed above for proper operation of the Suppression System.
  - vi. The circuit shall be configurable so as to provide activation power to Control Heads for 90 seconds and to Deluge Solenoids for 10 minutes, 15 minutes or On-Until-Reset.
  - vii. The circuit shall be configurable so that release of agent in the affected area may either be instantaneous or delayed by a maximum of 60 seconds. The site-specific time delay shall be configurable up to the maximum allowed in steps of 10 seconds.
17. The Control panel shall be provided 3 Independently Programmable Relays.
- i. The Programmable Relays shall be normally de-energized and shall have Form-C contacts rated 3 Amps at 120 VAC / 30 VDC.
  - ii. The contacts shall be programmable to transfer and latch on any one of the following conditions:
    - a. General Alarm Condition
    - b. First Alarm Condition
    - c. Pre-Discharge Condition
    - d. Discharge Condition
    - e. Waterflow Input
    - f. Manual Release
    - g. Global Abort Input
    - h. Global Supervisory Input
18. The Control panel shall be provided 1 System Trouble Relay.
- i. The Trouble Relay shall be normally energized and shall have Form-C contacts rated 3 Amps at 120 VAC / 30 VDC.
  - ii. The relay shall be non-latching and shall transfer on any trouble in the system.
19. All Input and Outputs shall be provided appropriate numbers of terminals of capacity suitable for 18 to 12 AWG wiring.
20. Kidde AEGIS Menu System
- i. The AEGIS control panel Menu System shall only be accessible from the user interface keypad. It shall be pass code protected to prevent unauthorized access and shall provide the following functions:
- B. Fenwal CPD-7054 and CPD-7054D Electronic Ionization Detectors
- 1. The Ionization Detector shall be a dual chamber, low profile, conventional type that senses both visible and invisible products of combustion.
  - 2. The sensing chamber shall permit a full 360 degree smoke entry.
  - 3. The Detector shall mount to a twist-to-lock, vandal resistant base, Model 2WB.
  - 4. The Detector shall be suitable for open-air velocities up to 300 fpm and shall have a nominal sensitivity of 1.3% obscuration per foot.
  - 5. It shall be possible to perform a sensitivity check on the detector without the need for generating smoke.
  - 6. It shall be possible to remotely check the detector sensitivity without removing the device from service and without interrupting its operability.

7. The strength of the Americium 241 radioactive source shall not exceed 0.8 microcurie. Detectors with higher radioactive strengths shall not be acceptable.
  8. The Detector shall be provided with 2 response LED's. These LED's shall flash to indicate power and shall light up steady with full brilliance on alarm.
  9. It shall be possible to view the operational status of the detector from a 360 degrees viewing angle
  10. All field wire connections shall be made to the base through the use of a clamping plate and screw.
- C. Fenwal PSD-7157 and PSD-7157D Electronic Photoelectric Detectors
1. The Photoelectric Detector shall be a light-scattering, low profile, conventional type that senses a broad range of smoldering and flaming-type fires.
  2. The sensing chamber shall permit a full 360 degree smoke entry.
  3. The Detector shall mount to a twist-to-lock, vandal resistant base, Model 2WB.
  4. The PSD-7157 and PSD-7157D detectors shall be suitable for open air velocities up to 300 fpm and shall have a nominal sensitivity of 1.78 to 3.25% obscuration per foot.
  5. It shall be possible to perform a sensitivity check on the detector without the need for generating smoke.
  6. It shall be possible to remotely check the detector sensitivity without removing the device from service and without interrupting its operability.
  7. The Detector shall be provided a response LED. This LED shall flash to indicate power and shall light up steady with full brilliance on alarm.
  8. All field wire connections shall be made to the base through the use of a clamping plate and screw.
- D. Fenwal THD-7052 and THD-7053 Heat Electronic Detectors
1. The THD-7157 and THD-7053 Detectors shall be a thermistor-based heat sensor with 135F (57C) set point. The THD-7052 shall have a Rate-Of-Rise temperature detection feature rated at 150 F (8.30C) per minute
  2. All field wire connections shall be made to the base through the use of a clamping plate and screw.
  3. The Detector shall be provided a response LED. This LED shall flash to indicate power and shall light up steady with full brilliance on alarm.
  4. The Detector shall mount to a twist-to-lock, vandal resistant base, Model 2WB.

### 2.3 SYSTEM CONFIGURATION

- A. Activation of the extinguishing system shall be via crossed-zoned smoke detection, or single zone heat detection, or a combination of smoke detection and supervisory inputs. In case of cross zoned smoke detection, one half of the crossed-zoned smoke detection system shall consist of PSD-7157 or PSD-7157D Photoelectric Detectors and the other half of CPD-7054 or CPD-7054D Ionization Detectors.
- B. Systems that use multi-criteria detectors that cannot be programmed to respond to the various stages of fire development, or systems that do not use different smoke detection principles to confirm the presence of a flaming fire, shall not be considered as equivalent or as meeting the intent of this specification.
- C. Activation of any smoke detector in the suppression zone shall:
1. Cause a pre-alarm (First Alarm) condition
  2. Create an audible and visible indication on the control unit display and any associated remote display
  3. Display the zone of the detector in alarm
  4. Activate audible pre-alarm notification appliances (e.g., bells) in the affected area
  5. Perform any necessary control functions such as HVAC equipment shutdown and activate any safety procedures such as closing doors
  6. Transmit an off-premises report to a Listed central or remote station, or directly to the local fire department.

- D. Activation of a smoke detector from each of the two crossed zones shall:
  - 1. Cause a pre-release (Second Alarm) condition
  - 2. Create an audible and visible indication on the control unit display and any associated remote display
  - 3. Display the zones of the detectors in alarm
  - 4. Initiate a programmable time delay, and indicate the time remaining prior to extinguishing-system discharge
  - 5. Display the time countdown to system discharge on the user interface display
  - 6. Activate audible and visual notification appliances (e.g., horns and strobes) in the affected area
  - 7. Perform any necessary control functions such as the closure of dampers and activate any safety procedures such as closing doors.
- E. The system shall, upon expiration of the time delay,
  - 1. Cause a release condition and energize the control head to discharge the extinguishing agent into the protected area
  - 2. Create an audible and visible indication on the control unit display and any associated remote display
  - 3. Display the attainment of the discharge condition
  - 4. Continue to activate the audible and visual notification appliances (i.e., strobes) in the affected area
  - 5. Perform any necessary control functions such as the emergency power off of all electrical equipment except for lighting and circuits required for life safety.
- F. The extinguishing system shall be capable of manual activation by Dual Action Manual Release Stations. Operation of a Manual Release Station shall cause all alarm and shutdown devices to operate as if the system had operated automatically and shall cause an immediate activation of the fire extinguishing system. Operation of a Manual Release Station shall override the operation of all Abort switches.
- G. Abort Stations shall, when operated, interrupt the countdown delay for the activation of the extinguishing system and prevent the operation of any alarms and control functions associated with the discharge of the extinguishing agent. The abort switches shall be momentary, dead-man type devices that require a constant force to remain engaged and active. Manual Release Stations shall override the operation of any Abort Station. Abort Station shall be configured for operation according to the requirements of the authority having jurisdiction.

#### 2.4 CONDUCTORS AND CONDUITS

- A. All conductors shall be enclosed in rigid or thin-walled, steel conduit unless open wiring is permitted by the local electrical code.
- B. 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.
- C. 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 AEGIS 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.

### 3. EXECUTION

#### 3.1 ELECTRICAL SYSTEM INSTALLATION

- A. The contractor shall install the system in accordance with the appropriate Kidde Fire Systems installation, operation and maintenance manual.



- B. Locations of all electrical equipment, the AEGIS Control Unit, and all system components are subject to the approval of the architect.
  - C. All final-acceptance tests shall be performed in the presence of the architect and the authority having jurisdiction. The contractor shall record all equipment, tests and system configurations in a format approved by the manufacturer and/or the local Authority Having Jurisdiction. A copy of the commissioning tests and results shall be provided to the architect, the authority having jurisdiction, and the end-user.
- 3.2 ROUTINE MAINTENANCE
- A. Routine maintenance on equipment shall be performed as recommended by the manufacturer's installation, operation and maintenance manual, the relevant NFPA Codes and the requirements of the local Authority. The routine maintenance shall be performed by a contractor certified by Kidde Fire Systems