1. GENERAL

1.1 INTENT OF SPECIFICATIONS

This specification details the requirements for an ARIES™ Control Unit. All requirements outlined in this specification must be completed in their entirety. These requirements, which are in accordance with the items listed in Section 1.03, combined with good engineering practices, shall be followed in order to produce a safe and effective fire suppression system.

1.2 GENERAL DESCRIPTION

The ARIES addressable, distributed-intelligence control unit and fire-alarm/-suppression 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.

The system’s distributed intelligence shall extend to the SmartOne™ automatic initiating devices on the signaling line circuit. Each automatic initiating device shall have a microprocessor capable of independently determining whether or not a fire signature at its monitored location is of sufficient magnitude to warrant the issuance of an alarm signal to the control unit.

1.3 CODES AND COMPLIANCE

A. The design, installation, testing and maintenance of the fire-alarm/-suppression shall be in accordance with the following applicable codes, standards and regulatory bodies:

1. NFPA 12A: Halon 1301 Fire Extinguishing Systems
2. UL 864, 9th ed.: Control Units and Accessories for Fire Alarm Systems
3. NFPA 13: Standard for the Installation of Sprinkler Systems
5. NFPA 70: National Electrical Code
8. NFPA 76: Fire Protection for Telecommunications Systems
10. Factory Mutual
11. Requirements of the Local Authority Having Jurisdiction

B. All of the components of the fire-alarm/-suppression system shall have the following listings and approvals:

1. Underwriters Laboratories, Inc.
2. Factory Mutual Global
3. California State Fire Marshal (CSFM)

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. The system shall be supplied and installed by a Contractor. The Contractor shall be trained by the manufacturer to design, install, test and maintain the Kidde ARIES Control Unit and AIR-Intelligence ASD and shall be able to produce certificates stating such on request.

C. 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.
6. All devices, components and equipment shall be listed by:
   i. FM Approved: Factory Mutual Research Center
   ii. UL Listed: Underwriters' Laboratories 864, 9th Edition
   iii. California State Fire Marshal (CSFM)

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: Kidde ARIES Control Unit for sixty (60) months; and SmartOne devices for twenty-four (24) months.

1.7 SUBMITTALS
A. The factory-authorized Kidde Fire Systems distributor shall provide all required installation drawings that shall include the following details:
   1. Plan and riser drawings showing the location of the ARIES Control Unit and the locations of all field devices such as smoke detectors, manual-release stations and notification appliances. Include all necessary installation and mounting details. 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 ARIES PCB. All internal wiring and communications cabling shall be shown.
   3. A primary-power calculation that details the power requirements for the ARIES 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 ARIES Control Unit and all field devices such as smoke detectors, notification appliances, and releasing solenoids. 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.
B. The contractor shall provide the following supporting materials for the equipment being utilized in this project:
   1. A complete component and equipment list with model numbers and Kidde Fire Systems part numbers.
2. Product information sheets for each item of equipment.
3. A theory of operations, with a description of system functionality.
4. 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.
5. 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 his responsibility to meet the requirements of the drawings and specifications.

C. 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.

D. Five (5) copies of the ARIES Installation, Operation and Maintenance Manual shall be submitted after complete installation.

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 SYSTEM CONFIGURATION
A. Activation of the extinguishing system shall be via crossed-zoned smoke detection. One half of the crossed-zoned smoke-detection system shall consist of either Model PSD-7152 SmartOne Photoelectric Detectors or ORION-XT High Sensitivity Smoke Detectors. The other half of the crossed-zoned smoke-detection system shall consist of Model CPD-7052 Ionization Detectors.
B. The Model PSD-7152 SmartOne Photoelectric Detectors or ORION-XT High Sensitivity Smoke Detectors shall be used as the primary pre-alarm detection system because they are more likely to alarm during the pre-combustion or early stages of the fire development. The Model CPD-7052 Ionization Detector shall be utilized primarily as a fire-confirmation detector to ensure the presence of a flame before the extinguishing system is discharged. Ionization detectors are small-particle detectors and are more likely to respond to flaming fires.
C. Spot-type detectors from each half of the crossed-zoned detection system shall be alternated throughout the protected area. It shall require the activation of at least one detector from each of the two crossed-zoned detector groupings to trigger the automatic release of the extinguishing system.
D. 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.

2.3 POWER SUPPLIES
A. The Control Panel shall operate on 120 or 240 VAC 50/60 Hz Mains Supply.
B. The battery backup system shall consist of 24 VDC, maintenance free, sealed lead acid batteries of 12 AH capacity such as to provide for 24 hours of Standby operation followed by five (5) minutes of Alarm operation in the case of AC Mains failure. The battery charger shall be capable of providing a charging current of 1.0 Amperes.

2.4 ANNUNCIATION
The following modules shall be provided for remote-event annunciation and operator control as indicated on the bid documents.

A. Textual-Type Remote Display Control Module (RDCM)
   1. The RDCM shall completely duplicate the display and operator-intervention capabilities of the main-control-unit display.
   2. The RDCM shall communicate with the ARIES Control Unit via RS-485 communications, and the system shall be capable of supporting with up to 15 remote displays.
   3. The remote displays shall operate on 24 VDC power provided by the ARIES-power supply, or by any remote power supply that is UL-Listed or FM-Approved for fire-alarm applications. The remote-display modules shall supervise their input-power connections.
   4. The main ARIES Control Unit display or one RDCM shall be capable of being programmed as the master unit with immediate operator-intervention privileges upon the occurrence of any alarm or fault condition. The master unit shall have control for a minimum period of 30 seconds, and all other control points shall be locked out and notified of the locked-out condition if another operator attempts to intervene during the locked-out period imposed by the master control module.

B. Output Driver Modules
   1. The Model ATM-L Annunciator Driver Module shall provide the Kidde ARIES Control Unit with up to 32 programmable outputs for remote LEDs, along with 6 system-level LEDs and 5 system-level functional switches.
   2. The Model ATM-R Relay Driver Module shall provide the Kidde ARIES Control Unit with up to 32 programmable outputs for remote relays.
   3. The ATM-L and -R Modules shall communicate with the Kidde ARIES Control Unit via the RS-485 communications circuit, with the most-remote module capable of being located up to 4,000 feet from the control unit. The ATM-Ls and ATM-Rs shall be capable of being installed in various combinations as long as the maximum number of 16 for each module type is not exceeded.
   4. Both modules shall be powered from the Kidde ARIES power supply, or from an external, regulated, and power-limited power supply Listed and Approved for use with fire-protective-signaling systems, depending upon the total load of the remote outputs. A typical external power supply is Kidde P/N 77-297106-000.

2.5 CONTROL PANEL
A. The control-unit configuration shall consist of a printed-circuit board (PCB) with the main microprocessor, an integral display/control assembly, and terminations for all field circuits, a primary power supply and an enclosure with removable door and viewing window.
B. 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. One (1) signaling line circuit (SLC)
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. Battery charging circuit
9. AC input power connections

C. The SLC shall serve as the hardware and software interface between the intelligent initiating and control devices and the ARIES 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.

D. The two releasing circuits shall be capable of actuating any of the following: an electro-explosive initiator, control heads, or solenoid valves. Each releasing circuit shall be independently programmable to activate any of the following configurations of extinguishing-system actuators:
   1. Electro-explosive initiators, supervised and activated in series, subject to the constraints below:
      i. Maximum of twelve (12) P/N 31-199932-004
      ii. Maximum of six (6) P/N 93-191001-001
   2. One (1) control head or solenoid valve
   3. Two (2) control heads or solenoid valves, supervised in series and activated in parallel. It shall not be necessary to use identical solenoid valves when two valves are activated on one releasing circuit.
   4. The releasing circuits shall be capable of actuating Factory Mutual System classified valves (Groups A, B, D, E, G).

E. The two notification-appliance circuits (NACs) shall be independently programmable and configurable for either Class-A or -B operation.
   1. The input power to the NAC shall be filtered and regulated. The NAC shall be capable of delivering a current of up to 1.5 A @ 24 VDC to the notification appliances.
   2. It shall be possible to field-configure each Class-B, Style-Y NAC to activate notification appliances with any and all of the following parameters via a personal-computer-based configuration program:
      i. Twenty-character location
      ii. Drill activation
      iii. Silenceable/non-silenceable operation
      iv. Walk-test activation
      v. Master-coded operation (60 bpm, 120 bpm, temporal per ANSI S3.41, continuous)
      vi. Cutoff delay (5, 10, 15 minutes)
      vii. Silence inhibit (1, 3, 5 minutes)
   3. It shall be possible to override one master code with another depending on the state (i.e., prealarm, prerelease, release, or time-limit-cutout) of the particular suppression zone. It shall also be possible to shut off and re-activate a NAC as required by the approved system operating sequence. No supplemental equipment shall be required to perform this functionality.
   4. It shall not be necessary to use external synchronization modules to synchronize the audible and visual notification signals created by any NAC
   5. Terminals for connection of field conductors to the NACs shall be large enough to accommodate #12 AWG wiring.

F. The basic power-supply / charger assembly shall consist of an AC to DC switching power unit. 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 70 AH. Two user-configurable auxiliary-
power circuits shall be provided on the PCB to power peripheral devices. The auxiliary-power circuits shall be software programmable for either continuous or interruptible power output, and shall be rated for 1.0 A at 24 VDC. It shall not be necessary to set jumpers or dip switches on the PCB to make these outputs continuous or interruptible.

G. The system shall have the ability to use an optional Intelligent Communications Module (ICM). The ICM shall be a device server that provides Internet access to the ARIES Control Unit via any standard Web browser such as Internet Explorer or Netscape Navigator. The ICM shall provide the following client services:
1. dial-up control-unit monitoring and status reporting
2. automatic event detection and reporting via e-mail
3. Web-browser-based
4. emulated display for the control unit
5. access to items in the control unit’s List Menu

2.6 DETECTORS
A. SmartOne Ionization Detector
1. The SmartOne Ionization Detector, Model CPD-7052, shall be a microprocessor-based smoke detector. The ionization detector shall be a dual-chamber, low profile, intelligent type that senses both visible and invisible products of combustion. The sensing chamber shall permit a full 360° smoke entry.
2. Each ionization detector shall be electronically addressable and fully field-programmable. It shall be possible to set both alert and alarm thresholds anywhere from 0.5 to 1.5% per foot obscuration in 0.1%-per-foot increments. Alarm thresholds shall be dynamically adjustable as a result of another alarm event anywhere in the system. Where permitted, each detector shall be programmable for alarm verification in periods of up to 180 seconds in 1-second increments. Each detector shall provide a real-time value of current, local obscuration level in percent-per-foot readout when requested by an operator at the control unit.
3. It shall be possible to configure each ionization detector for non-latching operation to prevent inadvertent or spurious fire signatures from accidentally discharging a waterless extinguishing system. The control unit shall latch the alarm report, but the discharge sequence shall be interrupted if the fire signature at the detector drops below the detector’s programmable alarm threshold.
4. Detector calibration, address, alert and alarm thresholds, and drift-compensation algorithm shall be stored in each detector’s non-volatile memory. Systems that store all detector parameters in the control unit (i.e., non-distributed-intelligence-to-the-device-level architecture) shall not be considered as equivalent.
5. A detector-housing, Model DH-2000, shall be available to allow an ionization detector to monitor for the presence of combustion products in an air duct. The detector housing shall be rated for air-duct velocities ranging from 500 to 4,000 feet per minute. It shall also be possible to mount the ionization detector in an air duct with velocities ranging up to 2,000 feet per minute.
B. SmartOne Photoelectric Detector
1. The SmartOne Photoelectric Detector, Model PSD-7252, shall be a microprocessor-based smoke detector. The photoelectric detector shall be a light scattering type, low profile, intelligent detector that senses a broad range of smoldering and flaming-type fires. The sensing chamber shall permit a full 360° smoke entry.
2. Each photoelectric detector shall be electronically addressable and fully field-programmable. It shall be possible to set an alert threshold anywhere from 0.2 to 3.4% per foot obscuration in 0.1%-per-foot increments, and to set an alarm threshold anywhere from 0.5 to 3.5% per foot obscuration in 0.1%-per-foot increments. Alarm thresholds shall be dynamically adjustable as a result of another alarm event anywhere in the system. Where permitted, each detector shall be programmable for alarm verification in periods of up to 180 seconds in 1-second increments. Each detector shall provide a real-time value
of current, local obscuration level in percent-per-foot readout when requested by an operator at the control unit.

3. It shall be possible to configure each photoelectric detector for non-latching operation to prevent inadvertent or spurious fire signatures from accidentally discharging a waterless extinguishing system. The control unit shall latch the alarm report, but the discharge sequence shall be interrupted if the fire signature at the detector drops below the detector’s programmable alarm threshold.

4. Detector calibration, address, alert and alarm thresholds, and drift-compensation algorithm shall be stored in each detector’s non-volatile memory. Systems that store all detector parameters in the control unit (i.e., non-distributed-intelligence-to-the-device-level architecture) shall not be considered as equivalent.

5. A detector-housing, Model DH-2000, shall be available to allow a photoelectric detector to monitor for the presence of combustion products in an air duct. The detector housing shall be rated for air-duct velocities ranging from 500 to 4,000 feet per minute. It shall also be possible to mount the photoelectric detector in an air duct with velocities ranging up to 4,000 feet per minute.

C. SmartOne Thermal Detector

1. The SmartOne Thermal Detector, Model THD-7252, shall be a microprocessor-based heat detector. The thermal detector shall be a thermistor-type, low profile, intelligent detector that responds to a fixed temperature with minimal thermal lag. The sensing chamber shall permit a full 360° heat entry.

2. Each thermal detector shall be electronically addressable and fully field-programmable. It shall be possible to set both alert and alarm thresholds anywhere from 80°F to 155°F in 1°F increments. Each detector shall provide a real-time value of current, local temperature in °F readout when requested by an operator at the control unit.

3. It shall be possible to configure each thermal detector for non-latching operation to prevent inadvertent or spurious fire signatures from accidentally discharging a waterless extinguishing system. The control unit shall latch the alarm report, but the discharge sequence shall be interrupted if the fire signature at the detector drops below the detector’s programmable alarm threshold.

4. Detector calibration, address, and alert and alarm thresholds shall be stored in each detector’s non-volatile memory. Systems that store all detector parameters in the control unit (i.e., non-distributed-intelligence-to-the-device-level architecture) shall not be considered as equivalent.

2.7 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 ARIES 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 ARIES 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 TRAINING REQUIREMENTS
The contractor shall be certified and trained by Kidde Fire Systems on installation, design and maintenance of the ARIES System and shall be able to produce a certificate stating such on request.

3.3 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 System.