1. GENERAL

1.1 INTENT OF SPECIFICATIONS

This specification details the requirements for a Kidde ARIES Control Unit and AIR-Intelligence Air Sampling Smoke Detection. 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 Kidde 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.

B. 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.

C. The Air Sampling Smoke Detection (ASD) system shall provide early warning smoke detection, in the incipient stage of fire. The Air Sampling Smoke Detector shall be AIR-Intelligence by Kidde.

D. The AIR-Intelligence Smoke Detection system shall consist of a distributed air sampling pipe network connected to the inlet manifold of a central detection unit housing precision flow sensor(s), high efficiency aspirator, particle filtration system, precision high sensitivity laser chamber, processing card, and termination points for system networking and interface to other systems. The detector shall reject dust by a combination of electronic and mechanical means and shall utilize a system of perpetually updating Perceptive Artificial Intelligence to ensure a consistent level of protection by continually varying its operating parameters to match environmental changes within the protected area. Air Sampling Smoke detection systems using a method of fixed sensitivity, where settings are manually or automatically set then remain fixed until manually altered, are not acceptable.

E. The ASD Detector shall communicate pre-alarm, alarm and trouble events with the Kidde ARIES Control Unit via its Signaling Line Circuit.

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 ed: 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. 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.
D. A total flooding, clean agent fire suppression system, filled with FM-200 waterless agent, shall be installed to meet a minimum design concentration of _____% by volume in all designated spaces to be protected.

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: Kidde Engineered System products for thirty-six (36) months; Kidde ARIESControl Unit for sixty (60) months; and the SmartOne and AIR-Intelligence devices 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 Kidde ARIES 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 Kidde ARIES PCB. All internal wiring and communications cabling shall be shown.
3. A primary-power calculation that details the power requirements for the Kidde 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 Kidde ARIES 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.
5. Wiring Diagram for the ASD system showing the power supply requirements and all field wire terminations. Power supply for the ASD shall preferably be drawn from the Kidde ARIES Auxiliary Power Output
6. The contractor shall submit the air sampling pipe network PipeCAD reports complete with calculated transport time and sample hole diameters
7. [OPTIONAL, Delete if using Kidde ARIES panel auxiliary power out] The contractor shall submit a calculation justifying the capacity of batteries selected.

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. KIDDE ARIES Installation, Operation and Maintenance Manual.
   2. AIR-Intelligence 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. The Kidde ARIES shall be an addressable, distributed-intelligence type Control Unit. Its distributed intelligence shall extend to the SmartOne initiating devices on its Signaling Line Circuit
B. The Air Sampling Smoke Detection (ASD) system shall consist of the AIR-Intelligence Detector(s) with Power Supply, Air Sampling Network and integral electronic interface to the Kidde ARIES Control Unit.

2.3 SYSTEM CONFIGURATION

A. Activation of the extinguishing system shall be via crossed-zoned smoke detection in the following optional combinations:
   1. Zone 1 Model PSD-7152 SmartOne Photoelectric and Zone 2 AIR-Intelligence
   2. Zone 1 Model PSD-7152 SmartOne Photoelectric and Zone 2 Model CPD-7052 SmartOne Ionization
   3. Zone 1 and Zone 2 AIR-Intelligence.
B. Detection system layout shall be in accordance with NFPA72 and 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.
C. 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.

2.4 CONTROL PANEL

A. The control unit shall consist of a printed-circuit board (PCB), 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 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 Kidde 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 electro-explosive initiators, 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
   6. 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.
   7. 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 Kidde ARIES Control Unit via any standard Web browser such as Internet Explorer or Netscape Navigator. The ICM shall provide the following client services:

i. Dial-up control-unit monitoring and status reporting
ii. Automatic event detection and reporting via e-mail
iii. Web-browser-based
iv. Emulated display for the control unit
v. Access to items in the control unit's List Menu.

2.5 ANNUNCIATION

A. The following modules shall be provided for remote-event annunciation and operator control as indicated on the bid documents.
   1. Textual-Type Remote Display Control Module (RDCM)
      i. Model RDCM shall completely duplicate the display and operator-intervention capabilities of the main-control-unit display.
      ii. The RDCM shall communicate with the Kidde ARIES Control Unit via RS-485 communications, and the system shall be capable of supporting with up to 15 remote displays.
      iii. The remote displays shall operate on 24 VDC power provided by the Kidde 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.
      iv. The main Kidde 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.

2.6 DETECTORS

A. Air Sampling Smoke Detection System (ASD)
   1. Detection shall be based on laser light scattering mass detection and particle evaluation principles.
   2. The system(s) shall have a detection sensitivity measurement range of 0.00046% to 7.62% obscuration per foot with a particle sensitivity range of 0.003 to 10 microns.
   3. The detector(s) shall provide programmability of four smoke density alarm thresholds within the system(s) sensitivity measurement range. Setting of time delays for each of the four alarm thresholds shall also be programmable. Relay outputs shall be provided for remote indication of alarm conditions.
   4. Resistance to unwanted alarms while still achieving maximum sensitivity is of paramount importance. The system shall incorporate advanced statistical based signal processing techniques proven to reduce unwanted alarms. The system(s) shall utilize a system of

perpetually updating Perceptive Artificial Intelligence to ensure a consistent level of protection by continually varying its operating parameters to match environmental changes within the protected area. Air Sampling Smoke detection systems using a method of fixed sensitivity, where settings are manually or automatically set then remain fixed until manually altered, are not acceptable.

5. The detector shall incorporate a dual technology system for the automatic discrimination of signals from non-fire related sources such as dust. The system shall automatically compensate for changes in environmental conditions and the negative effect of filter contamination.
6. The detector shall supervise filter contamination, detection chamber operation, microprocessor malfunction, network condition, and airflow in sampling pipes outside normal limits. Configurable relay output shall be provided for remote indication of fault conditions.
7. The system shall provide for automatic detector chamber sensitivity adjustments to compensate for the negative effect of filter contamination/ageing. The system shall also be capable of monitoring filter usage, and allow programming of maintenance interval reminders.
8. An airflow sensor shall be provided in each pipe inlet for supervising an increase or decrease in flow rate through the air sampling pipe network. The system(s) shall be capable of having programmable fault thresholds, per pipe inlet, to accommodate normal fluctuation present in the protected area.
9. System programming shall be by an integral or remotely located programmer/ network controller, or by PC via RS232. Both RS232 and RS485 shall be integral to each detector. No additional equipment shall be required for direct interface of an individual detector to a PC.
10. All system devices shall be capable of communicating with each other via an RS485 network. The digital communication port of each device shall comply with EIA RS485 Protocol. The RS485 network shall be able to support up to 127 detectors of any type per loop. Remote displays, programmers, and network relay modules residing on the network shall not take up an available network address. There shall be no additional hardware required for making a device network compatible. Remote displays, programmers, and network relay modules residing on the network shall not take up an available network address.
11. The RS485 network shall be capable of being configured in a fault tolerant loop for both short circuit and open circuit. Any communication faults shall be reported unambiguously and shall be clearly attributable to an individual device or wire link in the fault messages.
12. PC based configuration tools shall be available to configure and manage the entire network of devices.
13. [OPTIONAL, Delete if N/A] When applied in duct applications, the detectors shall provide early detection of smoke and products of combustion present in air moving through HVAC duct supply, return, or both.
14. [OPTIONAL, Delete if N/A] When applied in duct applications, the detectors shall prevent recirculation or spread of smoke in areas by air handling system's fans and blowers.
15. [OPTIONAL, Delete if N/A] The complete HVAC-related system may be shut down in event of smoke detection.
16. Other related building automation and life safety systems shall be activated as required in event of smoke detection.
17. The Air Sampling Smoke Detector shall be the AIR-Intelligence ASD-160H, ASD-320 and ASD-640 as appropriate for the location.
18. The ASD-160H detector shall have the following features:
    i. The ASD-160H shall be optimized for discrete small localized applications of area up to 2,500 sq. feet
    ii. The ASD-160H shall support a single pipe inlet
    iii. The ASD-160H shall be suitable for up to 10 sample ports
    iv. The ASD-160H shall be capable of supporting at least 164 feet of sampling pipe

v. The ASD-160H shall feature built-in RS232 and RS485 ports
vi. The ASD-160H shall feature integral on-board status LED's for OK status, Alarm and Fault
vii. The ASD-160H shall be provided an integral docking station enable easy docking and undocking.
viii. The ASD-160H shall be programmed either via a PC running Remote Configuration software or the network Command Module as applicable
ix. Irrespective of the method used, programming shall support the following features at a minimum:
    a. Programming of individual AIR-Intelligence detectors.
    b. Initiating ClassiFire "Perceptive Artificial Intelligence" viewing window.
    c. Viewing of the status of AIR-Intelligence detectors.
    d. Facilities for referencing.
    e. Testing of relays assigned to a specific zone to aid commissioning.
    f. Adjustment of any adjustable parameter.
    g. Event log viewing/printing.
x. [OPTIONAL, Delete if N/A] The ASD-160H shall accommodate a relay card for those specific locations requiring additional contact outputs.

19. The ASD-320 detector shall have the following features:
i. The ASD-320 shall be optimized for discrete medium localized applications of area up to 10,000 sq. feet
ii. The ASD-320 shall support two pipe inlets
iii. The ASD-320 shall be suitable for up to 20 sample ports
iv. The ASD-320 shall be capable of supporting at least 328 feet of sampling pipe
v. The ASD-320 shall feature built-in RS232 and RS485 ports
vi. The ASD-320 shall feature integral on-board status LED's for OK status, Alarm and Fault
vii. The ASD-320 shall be provided an integral docking station enable easy docking and undocking.
viii. The ASD-320 shall be programmed either via a PC running Remote Configuration software or the network Command Module as applicable
ix. Irrespective of the method used, programming shall support the following features at a minimum:
    a. Programming of individual AIR-Intelligence detectors.
    b. Initiating ClassiFire "Perceptive Artificial Intelligence" viewing window.
    c. Viewing of the status of AIR-Intelligence detectors.
    d. Facilities for referencing.
    e. Testing of relays assigned to a specific zone to aid commissioning.
    f. Adjustment of any adjustable parameter.
    g. Event log viewing/printing.
x. [OPTIONAL, Delete if N/A] The ASD-320 shall accommodate a relay card for those specific locations requiring additional contact outputs.

20. The ASD-640 detector shall have the following features:
i. The ASD-640 shall be optimized for medium to large applications up to 20,000 sq. feet area
ii. The ASD-640 shall support four pipe inlets
iii. The ASD-640 shall be suitable for up to 100 sample ports
iv. The ASD-640 shall be capable of supporting at least 640 feet of sampling pipe with 100 sampling ports and up to 820 feet with 80 sampling ports
v. The ASD-640 shall feature built-in RS232 and RS485 ports
vi. The ASD-640 shall provide four alarm levels and sensitivity range extending from high to low sensitivity (0.00046 to 7.62% obscuration/foot), that is field selectable depending upon the application environment.
vii. The ASD-640 shall be programmed either via the display-keypad, a PC running Remote Configuration software or the network Command Module as applicable

viii. The ASD-640 shall be provided a rugged sheet steel enclosure or an aesthetic lightweight plastic enclosure, based on the application.
ix. Irrespective of the method used, programming shall support the following features at a minimum:
  a. Programming of individual AIR-Intelligence detectors.
  b. Initiating ClassiFire "Perceptive Artificial Intelligence" viewing window.
  c. Viewing of the status of AIR-Intelligence detectors.
  d. Facilities for referencing.
  e. Testing of relays assigned to a specific zone to aid commissioning.
  f. Adjustment of any adjustable parameter.
  g. Event log viewing/printing.

21. Addressable Panel Interface Card (APIC)
  i. The ASD shall connect directly to the addressable loop of a Kidde ARIES intelligent fire alarm control panel with an APIC.
  ii. Any hardware required for the addressable loop connection shall be integrated within the ASD.
  iii. The ASD shall communicate the following through the Kidde ARIES SLC:
    a. Alarm and Pre-Alarm conditions
    b. Real-time smoke and airflow levels
    c. Trouble conditions
    d. The Kidde ARIES shall be capable of performing a detector test on any ASD connected to its SLC.
22. Sampling Pipe Network
  i. The ASD shall be connected to an air sampling pipe network through which air is drawn from the protected area to the ASD.
  ii. The sampling pipe network shall be made of smooth bore preferably CPVC or ABS pipe. The pipe may be metallic or non-metallic.
  iii. All joints in the sampling pipe network shall be airtight to prevent leakage.
  iv. All sampling pipe shall be clearly marked as "smoke detection sample pipe."
  v. All sampling points and ports shall be clearly marked as smoke detection sampling points or ports.
  vi. The sampling pipe network shall be designed using PipeCAD pipe network design calculation software.
  vii. The maximum transport time of the entire pipe network shall not exceed local codes, specified end-user limitations, or NFPA 72 requirements of 120 seconds.
23. [OPTIONAL, Delete if using Kidde ARIES panel auxiliary power out] Power Supplies
  i. The system shall be powered from a UL-1481 listed regulated power supply of nominal 24 VDC.
  ii. The power supply unit shall be suitable for 110 V AC input
  iii. The power supply shall be provided with battery backup that transfers automatically from AC to battery in the event main AC power is interrupted
  iv. The battery backup shall be calculated to be based on 24 hours standby duty followed by 10 minutes in an alarm condition.
  v. The calculated battery capacity shall be derated 20% for battery selection.
24. [OPTIONAL, Delete if N/A] Remote Display Units (RDU) shall be provided for remote annunciation at locations marked. RDUs shall have the following features:
  i. RDUs shall be suitable for being installed anywhere along the RS485 network and associated with any detector on the network.
  ii. RDUs shall be provided a 20 segment bar-graph display.
  iii. RDUs shall be provided four independent high intensity alarm indicators: Auxiliary, Pre-Alarm, Fire 1 and Fire 2, corresponding to the four alarm settings of the detector.
  iv. RDUs shall be provided a Common fault indicator.
  v. RDUs shall be provided an OK indicator.
  vi. RDUs where specified shall be provided a remote relay board.

vii. RDUs shall be suitable for either 19" card frame mounting or shall be housed in single wall mounted enclosure.

B. 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.

C. 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.

D. 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 Kidde 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 Kidde 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 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