
1. GENERAL SPECIFICATION

- 1.1 An Air Sampling Smoke Detection (ASD) system shall be installed to provide early warning smoke detection in the incipient stage of fire.

2. CODES/STANDARDS COMPLIANCE

- 2.1 The design, installation, testing and maintenance of the Air Sampling Smoke Detection System shall be in accordance to the following codes, standards and regulatory bodies:

- A. NFPA 72: National Fire Alarm Code
- B. NEC: National Electrical Code
- C. CSFM: California State Fire Marshal
- D. IFC: International Fire Code
- E. IMC: International Mechanical Code
- F. NFPA 75: Protection of computer and data processing equipment
- G. NFPA 76: Standard for the protection of telecommunications facilities
- H. NFPA 92A: Recommended Practice for Smoke Control Systems
- I. UL 268: Standard for Smoke Detectors for Open Areas
- J. UL 268A: Standard for Smoke Detectors for Duct Application
- K. ULC-S529-02 Standard for Smoke Detectors
- L. Factory Mutual
- M. Requirements of the Local Authority Having Jurisdiction
- N. Manufacturer's Design, Installation, Operation & Maintenance Manual

- 2.2 The ASD system must have the following listings and approvals:

- A. FM Approved
- B. UL268 Listed for Open Area Protection and Special Applications
- C. UL286A Listed for Duct Detection
- D. cUL/ULC-S529-02 Listed for Open Area Protection and Special Applications
- E. CSFM Approved

- 2.3 The manufacturer shall have the following qualifications:

- A. The manufacturer must meet ISO 9001 requirements for the design, production and distribution of fire detection and fire alarm systems.
- B. The manufacturer shall have a minimum of 15 years experience in manufacturing Air Sampling Smoke Detection systems

- 2.4 The system shall be supplied and installed by a factory-authorized Contractor with the following qualifications:

- A. The Contractor shall be trained by the manufacturer to calculate/design, install, test and maintain the Air Sampling Smoke Detection System and shall be able to produce a certificate stating such on request.
- B. The Contractor shall have a minimum of 5 years experience in the installation of fire protection systems.
- C. The Contractor shall employ a person who can show proficiency at least equal to a NICET Level IV certification in fire alarm system design.

3. SYSTEM DESCRIPTION

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- 3.1 All Air Sampling Smoke Detectors and accessories must be AIR-Intelligence by Kidde Fire Systems, 400 Main Street, Ashland, MA 01721, U.S.A., phone: (508) 881-2000, URL: <http://www.kiddefiresystems.com>
 - 3.2 The manufacturer shall warrant all Air Sampling Smoke Detection products for two years from date of shipment.
 - 3.3 [OPTIONAL, Delete if N/A] All ASD Detectors shall report all alarms and troubles to an ARIES Intelligent Control Panel.
 - 3.4 AIR-Intelligence Air Sampling Smoke Detection System(s) shall be installed in areas designated on construction drawings and shall provide very early “active” detection of smoke and products of combustion present in both still and high airflow environments.
 - 3.5 The 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.
 - 3.6 Detection shall be based on laser light scattering mass detection and particle evaluation principles.
 - 3.7 The air sampling pipe network design shall be supported by calculations from PipeCAD™, the manufacturer’s computer-based design modeling tool for validating performance criteria such as Air Sampling flow, suction balance, transport times and hole-sensitivity.
 - 3.8 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.
 - 3.9 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.
 - 3.10 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.
 - 3.11 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.
 - 3.12 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.
 - 3.13 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.
 - 3.14 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.
 - 3.15 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.

- 3.16 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.
- 3.17 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.
- 3.18 PC based configuration tools shall be available to configure and manage the entire network of devices.
- 3.19 [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.
- 3.20 [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.
- 3.21 [OPTIONAL, Delete if N/A] The complete HVAC-related system may be shut down in event of smoke detection.
- 3.22 Other related building automation and life safety systems shall be activated as required in event of smoke detection.

4. COMPONENTS

4.1 Air Sampling Smoke Detector

[Specify one or more of the AIR-Intelligence ASD-160H, ASD-320 and ASD-640 detectors. Modify from the following paragraphs to meet the specific requirements of your application. Consult AIR-Intelligence for assistance in choosing the detector type, if required].

- A. The Air Sampling Smoke Detector installed at locations shown in the bid documents shall be the AIR-Intelligence ASD-160H. The detector shall have the following features:
1. The ASD-160H shall be optimized for discrete small localized applications of area up to 2,500 sq. feet
 2. The ASD-160H shall support a single pipe inlet
 3. The ASD-160H shall be suitable for up to 10 sample ports
 4. The ASD-160H shall be capable of supporting at least 164 feet of sampling pipe
 5. The ASD-160H shall feature built-in RS232 and RS485 ports
 6. The ASD-160H shall feature ClassiFire™ Perceptive Artificial Intelligence which shall automatically configure the detector during initial setup and then shall automatically and continuously adjust the sensitivity of the detector to compensate for normal changes in the environment throughout the life of the detector. Mass scattering detectors which allow only fixed sensitivity settings are prone to false alarms and are not acceptable.
 7. The ASD-160H shall feature Dual Technology LDD-3D3™ Laser Dust Discrimination and elimination system enabling wide applicability including extremely dusty or dirty environments.
 8. The ASD-160H shall feature integral on-board status LED's for OK status, Alarm and Fault
 9. The ASD-160H shall be provided an integral docking station enable easy docking and undocking.

10. The ASD-160H shall be programmed either via a PC running Remote Configuration software or the network Command Module as applicable
 11. Irrespective of the method used, programming shall support the following features at a minimum:
 - i. Programming of individual AIR-Intelligence detectors.
 - ii. Initiating ClassiFire “Perceptive Artificial Intelligence” viewing window.
 - iii. Viewing of the status of AIR-Intelligence detectors.
 - iv. Facilities for referencing.
 - v. Testing of relays assigned to a specific zone to aid commissioning.
 - vi. Adjustment of any adjustable parameter.
 - vii. Event log viewing/printing.
 12. [OPTIONAL, Delete if N/A] The ASD-160H shall accommodate a relay card for those specific locations requiring additional contact outputs.
- B. The Air Sampling Smoke Detector installed at locations shown in the bid documents shall be the AIR-Intelligence ASD-320. The detector shall have the following features:
1. The ASD-320 shall be optimized for discrete medium localized applications of area up to 10,000 sq. feet
 2. The ASD-320 shall support two pipe inlets
 3. The ASD-320 shall be suitable for up to 20 sample ports
 4. The ASD-320 shall be capable of supporting at least 328 feet of sampling pipe
 5. The ASD-320 shall feature built-in RS232 and RS485 ports
 6. The ASD-320 shall feature ClassiFire™ Perceptive Artificial Intelligence which shall automatically configure the detector during initial setup and then shall automatically and continuously adjust the sensitivity of the detector to compensate for normal changes in the environment throughout the life of the detector. Mass scattering detectors which allow only fixed sensitivity settings are prone to false alarms and are not acceptable.
 7. The ASD-320 shall feature Dual Technology LDD-3D3™ Laser Dust Discrimination and elimination system enabling wide applicability including extremely dusty or dirty environments.
 8. The ASD-320 shall feature integral on-board status LED’s for OK status, Alarm and Fault
 9. The ASD-320 shall be provided an integral docking station enable easy docking and undocking.
 10. The ASD-320 shall be programmed either via a PC running Remote Configuration software or the network Command Module as applicable
 11. Irrespective of the method used, programming shall support the following features at a minimum:
 - i. Programming of individual AIR-Intelligence detectors.
 - ii. Initiating ClassiFire “Perceptive Artificial Intelligence” viewing window.
 - iii. Viewing of the status of AIR-Intelligence detectors.
 - iv. Facilities for referencing.
 - v. Testing of relays assigned to a specific zone to aid commissioning.
 - vi. Adjustment of any adjustable parameter.
 - vii. Event log viewing/printing.

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12. [OPTIONAL, Delete if N/A] The ASD-320 shall accommodate a relay card for those specific locations requiring additional contact outputs.
 - C. The Air Sampling Smoke Detector installed at locations shown in the bid documents shall be the AIR-Intelligence ASD-640. The detector shall have the following features:
 1. The ASD-640 shall be optimized for medium to large applications up to 20,000 sq. feet area.
 2. The ASD-640 shall support four pipe inlets
 3. The ASD-640 shall be suitable for up to 100 sample ports
 4. 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
 5. The ASD-640 shall feature built-in RS232 and RS485 ports
 6. The ASD-640 shall feature ClassiFire™ Perceptive Artificial Intelligence which shall automatically configure the detector during initial setup and then shall automatically and continuously adjust the sensitivity of the detector to compensate for normal changes in the environment throughout the life of the detector. Mass scattering detectors which allow only fixed sensitivity settings are prone to false alarms and are not acceptable.
 7. The ASD-640 shall feature Dual Technology LDD-3D3™ Laser Dust Discrimination and elimination system enabling wide applicability including extremely dusty or dirty environments.
 8. 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.
 9. The ASD-640 shall be programmed either via the display-keypad, a PC running Remote Configuration software or the network Command Module as applicable
 10. The ASD-640 shall be provided a rugged sheet steel enclosure or an aesthetic lightweight plastic enclosure, based on the application.
 11. Irrespective of the method used, programming shall support the following features at a minimum:
 - i. Programming of individual AIR-Intelligence detectors.
 - ii. Initiating ClassiFire “Perceptive Artificial Intelligence” viewing window.
 - iii. Viewing of the status of AIR-Intelligence detectors.
 - iv. Facilities for referencing.
 - v. Testing of relays assigned to a specific zone to aid commissioning.
 - vi. Adjustment of any adjustable parameter.
 - vii. Event log viewing/printing.
 12. [OPTIONAL, Delete if N/A or if stand-alone ASD-CM is included] The Air Sampling Smoke Detector installed at locations shown in the bid documents shall be the AIR-Intelligence ASD-640CM with an integral Command module to enable global network capability and & advanced system communications.
 13. [OPTIONAL, Delete if N/A or if stand-alone ASD-CM is included] The ASD-640CM shall be provided an integral graphic LED network display and network programmer with large matrix LCD screen.
 14. [OPTIONAL, Delete if N/A or if stand-alone ASD-CM is included] The ASD-640CM shall enable a network of up to 127 ASD detectors
 - D. [OPTIONAL, Delete if N/A] Addressable Panel Interface Card (APIC)

1. The ASD shall connect directly to the addressable loop of an ARIES intelligent fire alarm control panel with an APIC.
 2. Any hardware required for the addressable loop connection shall be integrated within the ASD.
 3. The ASD shall communicate the following through the ARIES SLC:
 - i. Alarm and Pre-Alarm conditions
 - ii. Real-time smoke and airflow levels
 - iii. Trouble conditions
 4. The ARIES shall be capable of performing a detector test on any ASD connected to its SLC.
- E. Sampling Pipe Network
1. The ASD shall be connected to an air sampling pipe network through which air is drawn from the protected area to the ASD.
 2. The sampling pipe network shall be made of smooth bore preferably CPVC or ABS pipe. The pipe may be metallic or non-metallic.
 3. All joints in the sampling pipe network shall be airtight to prevent leakage.
 4. All sampling pipe shall be clearly marked as "smoke detection sample pipe."
 5. All sampling points and ports shall be clearly marked as smoke detection sampling points or ports.
 6. The sampling pipe network shall be designed using PipeCAD pipe network design calculation software.
 7. 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.
- F. [OPTIONAL, Delete if using ARIES panel auxiliary power out] Power Supplies
1. The system shall be powered from a UL-1481 listed regulated power supply of nominal 24 VDC.
 2. The power supply unit shall be suitable for 110 V AC input
 3. The power supply shall be provided with battery backup that transfers automatically from AC to battery in the event main AC power is interrupted
 4. The battery backup shall be calculated to be based on 24 hours standby duty followed by 10 minutes in an alarm condition.
 5. The calculated battery capacity shall be derated 20% for battery selection.
- G. [OPTIONAL, Delete if N/A] Remote Display Units (RDU) shall be provided for remote annunciation at locations marked. RDUs shall have the following features:
1. RDUs shall be suitable for being installed anywhere along the RS485 network and associated with any detector on the network.
 2. RDUs shall be provided a 20 segment bar-graph display.
 3. 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.
 4. RDUs shall be provided a Common fault indicator.
 5. RDUs shall be provided an OK indicator.
 6. RDUs where specified shall be provided a remote relay board.
 7. RDUs shall be suitable for either 19" card frame mounting or shall be housed in single wall mounted enclosure.

- H. **[OPTIONAL, Delete if N/A or if ASD-640CM is included]** A stand-alone Command Module ASD-CM shall be provided for single point control and centralized programming of the network of detectors. The Command Module shall be provided the following features:
1. The Command Module shall be suitable to network up to 127 ASD detectors.
 2. The Command Module shall be equipped with a bargraph LED display and large matrix LCD programmer
 3. The Command Module shall provide connection to SenseNET™, computer based system management alarm/graphics package.
 4. The Command Module shall be equipped with RS485, RS232, and BACnet communication protocols
 5. The Command Module shall be equipped with on-board relays so as to act as a single point of interface to other systems
 6. The Command Module shall be provided a rugged sheet steel enclosure or an aesthetic lightweight plastic enclosure, based on the application.
- I. The network of detectors shall be provided AIR-Intelligence SenseNET Management Software package for graphical network management. SenseNET shall have the following features:
1. SenseNET shall be a PC Windows based graphic system providing an intuitive user interface with advanced communications and diagnostic tools enabling management of up to 16 network loops, each of up to 127 AIR-Intelligence detectors.
 2. The package shall include but not be limited to RS485 to RS232 High Level Interface, link cables and SenseNET PC software.

5. SUBMITTALS

- 5.1 The contractor shall submit required installation drawings including isometrics, plans, and elevations and wiring drawings.
- 5.2 The contractor shall submit the air sampling pipe network PipeCAD reports complete with calculated transport time and sample hole diameters
- 5.3 **[OPTIONAL, Delete if using ARIES panel auxiliary power out]** The contractor shall submit a calculation justifying the capacity of batteries selected.
- 5.4 The contractor shall submit a commissioning check sheet for each installed detector. The check sheet shall list all installed equipment, configurations and measured ambient conditions.
- 5.5 The contractor shall submit a test plan which 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.
- 5.6 The contractor shall submit ten (10) copies of shop drawings and product data sheets.
- 5.7 The contractor shall submit five (5) copies of the ASD Installation, Operation and Maintenance Manual after complete installation.
- 5.8 The contractor shall submit five (5) copies of as-built drawings

6. SYSTEM INSTALLATION AND COMMISSIONING

- 6.1 The contractor shall install the system in accordance with the manufacturer's installation, operation and maintenance manual.
- 6.2 The contractor shall be certified and trained by the manufacturer on installation, design and maintenance of Air Sampling Smoke Detection Systems.

- 6.3 The contractor shall record all equipment, tests and system configurations in a format supplied by the manufacturer. A copy of the commissioning results shall be provided to the end-user and sent to the manufacturer.
- 6.4 Routine maintenance shall be performed as recommended by the manufacturer's installation, operation and maintenance manual. Maintenance shall include the following:
 - A. Visual check of pipe network integrity.
 - B. Battery status check of all power supply batteries.
 - C. Gross smoke test of all installed detectors.
 - D. System Transport Time Test
 - E. Detector cleanliness