Product
FAAST Aspirating Smoke Detection System

PART 1 - GENERAL

1.1 SCOPE

A. This document provides specification details for Fire Alarm Aspiration Sensing Technology (FAAST) detector. All items under this specification shall comply with all applicable code requirements and manufacturer's recommendations.

1.2 APPROVALS

A. The Aspirating Smoke Detector shall be tested, approved and/or listed by:

1. Underwriters Laboratories (UL) S911
2. Underwriters Laboratories Canada (ULC)
3. Factory Mutual (FM)
4. California State Fire Marshal (CSFM) 7259-1653:0215
5. Maryland State Fire Marshall (MSFM) 2244
6. VdS Approved (Europe)
7. CSIRO (ACTIVFIRE)
8. KFI (Korea)
9. Underwriters Laboratories for Class I Division II, Groups A, B, C and D Hazardous Locations.

1.3 CODE, STANDARDS, AND REGULATION

A. The aspirating smoke detector shall be installed per manufacturer's instructions, including pipe network, programming, and power requirements, and shall comply with one or more of the following codes and standards:

1. National Fire Protection Association (NFPA)
2. British Fire Protection Association (EN-54)
3. National Electrical Code (NEC)
4. UL 268: Standard for Smoke Detectors for Open Areas
5. UL 268A: Standard for Smoke Detectors for Duct Application
6. Local codes and standards

1.4 SYSTEM REQUIREMENTS

A. The Aspirating Smoke Detector (ASD) shall offer various classifications to include Very Early Warning Smoke Detection (VEWFD), Early Warning Smoke Detection (EWFD), and Standard Smoke Detection (SFD) settings as identified per the requirements of NFPA.

B. The ASD shall be self-contained and monitored by a display featuring LEDs and/or LCD to include a control system utilizing microprocessor-based

technology with all functions fully programmable, LED displays, alarm indications, airflow and detector faults.

C. The system shall constantly sample air from the environment. In operation, air shall be drawn from the air sampling piping network, through a particle separator and a 30 micron filter assembly being pulled through the detection chamber by the aspirator. The system shall not rely on air currents to bring smoke to the detector. Inside the smoke detection chamber, air shall be exposed to a blue LED and infrared laser light source. Light scattered by smoke particles shall flow through the chamber and be detected by solid state receivers, which shall convert the light to an electronic signal.

D. The ASD shall incorporate a dual light source 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.

E. The ASD shall display a series of LEDs or be visible via an interactive LCD. The ASD shall include a Reset, Isolate, and Test functions on the front of the panel. The system shall be configured by a programmer that is PC based via PipeIQ software.

F. The program shall allow the following detector parameters to be configured:

1. Up to five threshold alarm levels (Alert, Action 1, Action 2, Fire 1, and Fire 2).
2. Test, reset, and isolate functions from remote locations.
3. Design pipe network and ability to calculate obscurations levels, transport times, sample hole diameters, flow and pressure levels.
4. Shall allow the ability to program the detector to three different settings: day, night, and weekend mode.
5. Acclimate mode shall automatically adjust alarm levels within user-specified parameters to reduce nuisance alarms.

G. The program shall allow the ASD firmware to be updated in the field by system installers and maintainers.

H. The ASD shall have the capability to connect to the building automation/management system via Modbus Protocol utilizing a TCP server or serial connection using RS-485.

I. Provide local networking capability and monitoring through the onboard Ethernet connection allowing for up to six email addresses. Each address shall be configured to notify the recipient of a specific alarm level, fault level, or isolate condition.

J. Detector Performance Requirements

1. Detectors shall be tested and approved to cover up to (5,000 sq. ft. /464 sq. m) (8,000 sq. ft. /744 sq. m) (28,800 sq. ft. / 2,680 sq. m).
2. Detectors shall be approved to monitor up to five alarm levels. Each level shall be programmable and able to select desired sensitivity, ranging from 0.00029%/ft – 6.0%/ft. UL approval compliance recognizes sensitivity ranges from 0.00029%/ft – 4.0%/ft.

3. Detectors shall report alarms and faults using fault relays or direct connection via the SLC loop, if applicable.
4. Detectors shall include a field-replaceable filter and an internal particle separator to reduce the amount of non-combustible materials reaching the detection chamber.
5. The software shall provide pipe design, system configuration, and system monitoring in a single software program. It shall store up to 18,000 events. Events shall include smoke levels, alarm conditions, operator actions, and faults. The date and time of each event shall be recorded.
6. The front panel of the detector shall indicate flow faults, configuration, external monitor, time, communication, trouble, filter, isolation, voltage, and high flow faults via dedicated LEDs or an LCD display.
7. The ASD shall use ultrasonic sensors to confirm proper air flow through the pipe network and produce a fault when there is a change of a user-settable percentage from nominal air flow.
8. The ASD shall store vital statistics including airflow, obscuration signal level, alarm levels, fan speed, and temperature. The frequency with which these statistics are stored shall be adjustable.

1.5 SUBMITTALS

A. System shall be complete in all ways and shall include all engineering and electrical installation, all detection and control equipment, auxiliary devices and controls, alarm interfaces, functional testing, training, and all other operations necessary for a functional, UL Listed, and FM Approved system.

B. Prepare product data and site drawings indicating the system layout, including location of modules, detection/aspiration unit, air intake ports, flow calculations, transport times, power requirements, and sample hole obscuration sensitivity level calculations.

C. Show method and spacing of hanger supports on aspirating tube to the building structure.

D. System commissioning data shall be supplied as recommended per manufacturer's instructions within 30 days of installation.

E. As-Built Drawings:

1. Upon completion of the installation, the Contractor shall revise aspirating detection system design files, calculations, manuals, and operating instructions to agree with on-site conditions.

2. Submit a copy of the manufacturer's installation, operation, and maintenance manuals.

3. Final construction drawings shall be stamped/sealed by a licensed Professional Engineer in the state where the work is being constructed, or a NICET level III or higher certified fire alarm technician.

1.6 QUALITY ASSURANCE

A. Manufacturer

1. The manufacturer shall have a minimum of 30 years of production experience in the manufacturing and design of smoke detection devices.

B. Detector Requirements

1. The ASD shall have dual source (blue LED and infrared laser) optical smoke detection for a wide range of fire detection, with enhanced immunity to nuisance particulates. The ASD shall operate in air flows from 0-4000 ft/min (0-1,219 m/min). The system software shall provide pipe design, system configuration, and system monitoring in a single software program.

2. The ASD shall offer Very Early Warning Smoke Detection, Early Warning Smoke Detection, and Standard Smoke Detection settings. The ASD shall offer a wide range of sensitivity settings from 0.00029%/ft – 4.0%/ft. The detector shall be capable of operating in temperatures from 32°F (0°C) to 100°F (38°C). Sampled air temperatures shall range from –4°F (–20°C) to 140°F (60°C). Operating humidity shall range from 10-95% non-condensing.

C. Installer

1. The equipment installer shall be authorized and trained by the manufacturer and shall have the ability to design a system based on code requirements. The installer shall be capable of providing calculations, design, and testing documents upon request.

PART 2 - PRODUCT

2.1 MANUFACTURER

A. Approved aspirating smoke detection manufacturer:

System Sensor – Fire Alarm Aspirating Sensing Technology (FAAST)

System Sensor (Headquarters)
3825 Ohio Avenue
St. Charles, IL 60174

B. Manufacturer Approved Units:

1. FAAST XS Detector coverage area up to 5,000 sq. ft. (464 sq. m)
2. FAAST XM Detector coverage area up to 8,000 sq. ft. (744 sq. m)
3. FAAST XT Detector coverage area up to 28,800 sq. ft. (2,680 sq. m)

2.2 ASPIRATING SMOKE DETECTOR

A. The ASD shall allow up to 5 programmable alarm levels with time delays, including Alert, Action 1, Action 2, Fire 1, and Fire 2. The ASD shall allow for

Acclimate or Day/Night/Weekend settings to accommodate environmental changes. The Acclimate mode shall automatically adjust alarm levels within user-specified parameters to reduce nuisance alarms. It shall continually adapt to current environmental conditions when activated. Day/Night/Weekend settings shall allow the user to create specific thresholds and delays during the day, night, or weekend.

B. The ASD shall provide up to 8 form C, programmable, latching or non-latching relays or the ability to connect directly to the FACP via the SLC. It shall include a field-replaceable filter and an internal particle separator to reduce the amount of non-combustible materials reaching the detection chamber. It shall be tested and approved for coverage up to (5,000 sq. ft. /464 sq. m) (8,000 sq. ft. /744 sq. m) (28,800 sq. ft. / 2,680 sq. m). The unit shall use ultrasonic sensors to confirm proper air flow through the pipe network and store up to 18,000 events. Events shall include smoke levels, alarm conditions, operator actions, and faults. The date and time of each event shall be recorded.

2.3 DESIGN PARAMETERS

A. The ASD design shall comply with all national and local code requirements and UL and FM approved listings. The ASD shall be designed with the following parameters:

1. NFPA Classifications:

a. VEWFD: Very Early Warning Fire Detection. The sample port spacing shall not exceed 200 sq. ft. (18.5 sq. m) and shall initiate an alarm/alert in less than 60 seconds from the furthest sample port. The detector shall be programmed to pre-alarm at .2% obscuration per foot and alarm at 1% obscuration per foot at the sample port.

b. EWFD: Early Warning Fire Detection. The sample port spacing shall not exceed 400 sq. ft. (37.1 sq. m) and shall initiate an alarm/alert in less than 90 seconds from the furthest sample port. The detector shall be programmed to alarm at 1.5% obscuration per foot at the sample port.

c. SFD: Standard Fire Detection. The sample port spacing shall not exceed 900 sq. ft. (83.7 sq. m) and shall initiate an alarm/alert in less than 120 seconds from the furthest sample port. The detector shall be programmed to alarm at 3.2% obscuration per foot at the sample port.

2. Return Air Monitoring:

a. Sampling of return air grills shall comply with the requirements of NFPA-76 and manufacturer's recommendations. The sample port spacing shall not exceed more than 4 sq. ft. (0.37 sq. m) per return air grill. The sample ports must be aligned at an angle between 20 to 45 degrees in the direction of the airflow. The sample pipe shall stand-off between 2"-8" (.05 - .2 m) from the return air grill.

3. In-Duct Sampling:

a. The ASD monitoring in-duct applications shall be installed and designed based on the manufacturer's recommendations and verified via PipeIQ software calculations.

4. Sampling point flow and pressure requirements:

a. Minimum Flow: 2 L/min.
b. Minimum Pressure: 25 Pa

B. A test port shall be provided at each pipe run located at 18" above the finished floor for under floor systems, or 5ft above the finished floor when pipe network is above the ceiling. The test port shall be constructed using a vented end cap. Provide a decal indicating the install date, detector zone, pipe number, test point ID, transport time and suction pressure (Pa).

(SPECIFIER TO EDIT INTELLIGENT CONNECTIVITY)

2.4 INTELLIGENT FIRE ALARM CONTROL PANEL CONNECTIVITY

A. The ASD shall be capable of connection to an Intelligent Fire Alarm Control Panel (FACP) via a Signaling Line Circuit (SLC) using the communications protocol native to the system, without the use of any additional hardware. The FACP shall be capable of monitoring and annunciating up to five smoke event thresholds on the ASD and ten trouble conditions. Each event threshold shall be capable of being assigned a discrete type ID at the FACP, including Aspiration Alarm, Aspiration Pre-Alarm, Aspiration Supervisory, Aspiration Non-Fire, and Aspiration Air Reference, which will determine how the event will be annunciated at the FACP. The FACP shall support flexible system programming for all event levels, and shall be capable of simultaneous activation of multiple event levels.

B. The following operations shall be able to be performed on the ASD via the FACP:

1. Disable/enable reset airflow baseline,
2. Reset.

C. Trouble conditions annunciated at the FACP shall include indications for: Low air flow, configuration (programming) fault, device in service mode, communications loss, time lost or not set, aspiration fault, filter fault, high air flow fault, detector fault, detector initializing warning, and power fault.

2.5 MONITORING:

A. The ASD shall provide up to three Fault types to indicate the priority of faults generated in the system. Fault indication shall be provided for the following:

1. Low flow – If the device has decreased in air flow, a Fault shall be generated at a user-settable decrease in air flow.
2. High flow – If the device has increased in air flow, a Fault shall be generated at a user-settable increase in air flow
3. Configuration – Device configuration failure. A Fault shall be generated if a configuration update did not transfer.

4. Sensor – If the particulate sensor is not operating properly and needs immediate replacement, a Fault shall be generated.
5. External Monitor – If the external monitor detects an open a Fault shall be generated.
6. Time – If the internal time base needs to be updated, a Fault shall be generated.
7. Communication – If the device fails to communicate to one of its peripherals and cannot function properly, a Fault shall be generated.
8. Aspiration – If the aspirator is not working and requires immediate attention, an Fault shall be generated.
9. Filter – As the filter approaches a pre-set threshold, an initial warning shall be given to change the filter and a Fault shall be generated.
10. Isolate – If the device is put into the Isolate mode, an Isolation fault shall be generated.

2.6 DISPLAYS

A. The system shall provide a user interface at the front of the detector with the following displays:

1. Air Flow/Fault Display – The air flow/fault display shall consist of 10 bicolor LEDs and operate in one of two modes: air flow or fault indication. Green segments shall indicate how close the current air flow is to the high or low air flow threshold. The default threshold for a fault condition is + or – 20% from the airflow baseline. During normal operation two adjacent indicators shall be green and correspond to the current airflow entering the detector. When airflow is at a balanced level, the two green segments shall be centered on the graph. As airflow rises and falls, the green segments shall move right and left accordingly. If a fault is activated on the device, the corresponding LEDs shall illuminate in amber and an additional “fault” LED shall be triggered to signal a fault has been generated. All 10 faults shall be indicated on the User Interface.
2. 10 particulate levels – The particulate level display shall consist of ten amber LEDs that correspond to the current level of the particulate detected. The LEDs shall illuminate in order from Level 1 to Level 10, starting from the bottom of the display and moving up as the particulate level increases. Each LED shall represent a 10% increase in the particulate level necessary to reach the Alert Alarm level.
3. (3) 5 alarm levels – All (3) 5 Alarm levels shall be indicated on the User Interface. The Alarm Level Display shall consist of (3) 5 red LEDs that correspond to the current alarm level. These LEDs shall be located directly above the Particulate Level LEDs. They shall illuminate sequentially upward as the severity of the alarm increases.
4. On/Off indication
5. Low Voltage indication

B. The user interface shall offer an interactive panel. The panel shall have a security passcode system to prevent unauthorized access if chosen. The panel shall allow the following features to be activated at the device:

1. Test
2. Reset

3. Isolate
4. Information Generation – the detector shall provide the local device address and the IP address of the device through a coded sequence or via the LCD interactive function.
5. Password input if required to activate detector.

C. Liquid Crystal Display for FAAST XS and XT models shall provide detailed information of the device status and configuration. The LCD will enter a sleep state if the screen has remained unchanged for a period of 30 seconds. The home screen shall display the device's current state which includes local address, date, time, current percent of smoke, and the highest priority state. The LCD shall support multiple languages. Navigation through the menus shall be done with the keypad located on the right hand side and shall be able to perform the following functions:

1. Isolate
2. Disable
3. Reset Baseline
4. Monitor Airflow per pipe
5. Test
6. Sounder Test
7. Reset IP Network
8. Password input if required to activate detector.

2.7 SOFTWARE

A. The software shall be based on a single program, PipeIQ, which provides pipe network design, ASD configuration, and system monitoring. The software shall provide the ability to remotely monitor the system and provide the following functions:

1. Test, reset, and isolate functions from remote locations
2. Bill of Materials for the pipe network
3. Pipe layout of the pipe network
4. Generate transportation time from the sampling holes to the detector and sampling hole pressure
5. Live event monitoring
6. Historic event retrieval
7. Custom message function to input messages about a device or site
8. Configuration settings
9. Network settings
10. Trend graph reflecting obscuration over time
11. Shall support up to 255 devices.

2.8 NETWORK CONNECTIVITY

A. The ASD shall include an onboard Web server interface to enable remote monitoring. Connection to the device shall be through an RJ45 Ethernet jack. A password shall be required to access the Web server. The software shall include the ability to enter up to six (6) e-mail addresses to send automatic updates for alarms and/or faults. Each e-mail address shall have the ability to select the type of notification desired.

B. The ASD shall communicate Modbus protocol using the onboard Ethernet connection. The device shall be able to receive remote configuration, as well as be monitored remotely, when the Modbus function is employed.

C. The Modbus/TCP communications shall be enabled through port 502 without inhibiting the functions of the PipeIQ server, the e-mail service (port 25), or the device's integral web server. Each of these communication capabilities shall be available simultaneously.

D. Modbus communications shall be enabled without inhibiting the functions of the PipeIQ server or the device's integral web server. Each of these communication capabilities shall be available simultaneously.

2.9 SAMPLE PIPE NETWORK

A. The ASD shall consist of a pipe network to transport air to the detection system supported by calculations from a computer-based design modeling tool.

1. The internal pipe diameter of the network may range from 0.59 inches to 1.03 inches (15-26 mm) with a smooth bore internal surface.
2. The ASD shall accept both nominal 3/4 inch and 25 mm pipe diameters.
3. Inflow and Exhaust pipes shall enter the device from either the top or the bottom of the unit so that the unit does not have to be inverted.
4. The system exhaust must be located back into the room being monitored. If the ASD is located within the same room being monitored, no exhaust pipe is required to be connected to the ASD.
5. Material for pipe and fittings shall be orange chlorinated polyvinyl chloride (CPVC) PIPE. The pipe shall be UL Listed as an accessory for plenum use as per UL 1887 standard.
6. The pipe shall be identified as "Smoke Detector Sampling Tube" along its entire length, in requirements per local codes and standards and manufacturer's recommendations.
7. Pipe material substitution may be acceptable to accommodate environments where pipe network will be installed but must be approved by the specifying engineer and authority having jurisdiction, and if applicable, insurance underwriters.
8. The substitution pipe must comply with both inner and outer pipe diameter requirements.
9. All joints and sampling pipes must be glued and connected, free of any air gaps using solving cement throughout the pipe network, with the exception of the pipe connected to detector.

B. FAAST XS

1. The pipe network shall be designed based on a multi-branch system from a single pipe inlet. The system shall have the ability to cover up to 5,000 sq. ft. (464 sq. m) per detector. Final square footage shall be based on classification requirements per NFPA.
2. A single pipe network cannot exceed a maximum of 180 linear ft (54.8 m) on a single run and 225 ft (68.5 m) on an aggregate pipe network. Final pipe lengths shall be verified with PipeIQ software and comply with NFPA classifications.

C. FAAST XM

1. The pipe network shall be designed based on a multi-branch system from a single pipe inlet. The system shall have the ability to cover up to 8,000 sq. ft. (744 sq. m) per detector. Final square footage shall be based on classification requirements per NFPA.
2. A single pipe network cannot exceed a maximum of 262 linear ft (80 m) on a single run and 328 ft (100 m) on an aggregate pipe network. Final pipe lengths shall be verified with PipeIQ software and comply with NFPA classifications.

D. FAAST XT

1. The pipe network shall be designed based on a four (4) pipe multi-port system from a single detector. The system shall have the ability to cover up to 28,800 sq. ft. (2,000 sq. m) per detector. Final square footage shall be based on classification requirements per NFPA.
2. A single pipe network cannot exceed a maximum of 400 linear ft. (123 m) on a single run and 1,050 feet (320 m) on an aggregate pipe network. Final pipe lengths shall be verified with PipeIQ software and comply with NFPA classifications.

2.10 SAMPLING PORT

A. Sample port spacing shall comply with the requirements of NFPA classifications and manufacturer's recommendations.

B. The minimum sample port diameter must not be less than 5/64" and shall not exceed a diameter larger than 1/4".

C. All sample ports must be identified in accordance with NFPA.

D. In areas with a suspended ceiling the pipe network shall be installed above the ceiling utilizing a 3/8 inch diameter, flexible capillary tubing attached to an approved manufacturer's capillary sample port supported by the ceiling.

E. The size of sample ports shall be verified and confirmed with PipeIQ calculations software.

2.11 SYSTEM OPERATING POWER

A. Provide power supply/charger to convert 115 VAC/60 Hz input into a single 12 VDC or 24 VDC Class 2 Rated power limited output, with UL listing UL1481.

B. Power supply shall be provided with appropriately sized batteries to accommodate the system's power requirements in the event main AC power is interrupted.

C. Upon loss of AC power, the external battery shall have sufficient capacity to power the fire alarm system for not less than 24 hours plus 5 minutes of alarm.

2.12 FILTER ASSEMBLY

A. Internal non-replaceable particle separator shall remove larger contaminates before entering the detection chamber and filter.

B. Multi-stage 30 micron field-replaceable filter. A fault shall be generated when the filter needs replacement due to a reduction of air of more than 20%.

2.13 WIRING

A. Wire gauge shall range from 24 to 12 AWG (0.5-2.05 mm). Wire or conduit shall enter the detector from either the top or the bottom of the device. Pluggable terminals shall be used to wire the detector.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. The entire system shall be installed in accordance with national and local codes and per the manufacturer's installation manual.

B. Aspirating Smoke Detector Installation

1. ASD shall be mounted on a secured wall at a height of approximately 36 to 60 inches (0.9- 1.5 m) above the finished floor.

2. ASD shall be located in an unobstructed location and shall maintain 36 inches (0.9 m) clearance in front of the unit.

3. All pipes and fittings shall be glued using solvent cement, except at entry of the ASD.

C. Sampling Pipe Network

1. Sampling pipe network shall be installed and designed so that the transport times from the most remote sample port location complies with the classifications of NFPA; (VEWFD) (EWFD) (SFD).

2. Sampling pipe shall be installed within 4 to 12 inches (0.1-0.3 m) from the ceiling in smooth ceiling applications.

3. All pipes shall be supported by mechanical hangers attached to the structure of the building, at no greater than five foot centers.

4. All pipes must be labeled throughout its entire length, as required per NFPA.

5. Piping network(s) shall be installed/design to provide detection points and spacing as indicated on the drawings (or as required). All changes to the direction of the pipe shall be made with standard elbows or tees. Piping shall be verified per manufacturer's modeling software.

D. Sampling Port

1. Sample port spacing shall comply with the requirements of NFPA classifications and manufacturer's recommendations.

2. All sample ports shall be drilled directly at the bottom of the pipe and equal the diameter as indicated per the PipeIQ reports.

3. In high air flow environments being used as plenums the sample ports must be aligned at angle between 20 to 45 degrees in the direction of the airflow, as per manufacturer's recommendations.

3.2 SYSTEM INSPECTION:

1. Perform a visual inspection of the physical installation, checking adequate size batteries are used, piping is securely connected and installed, and all sample ports comply with the design.

2. Verify ASD communicates to fire alarm control, and if applicable, has the ability to network via a dedicated IP address and Modbus protocol.

3. Check the controller to ensure the following functions are operational and programmed in accordance with the specification:

a. Alarm Levels and Indicators
b. Time Delays
c. Particulate Level Display
d. Detector Fault Test Indicator
e. Detector Test and Indicator
f. Isolate/Reset Function
g. Air Flow Fault Indicators
h. Configuration Fault
i. Sensor Fault
j. External Monitor Fault
k. Time Fault
l. Communication Fault
m. Aspirator Fault
n. Filter Fault

3.3 COMMISSIONING

A. The system shall be commissioned in the presence of the manufacturer or installing contractor representative and client representative. The contractor shall provide the following necessary instrumentation, equipment, materials, and labor for the test:

1. PipeIQ Pipe Layout Report

2. Aerosol smoke (Home Safeguard Industries Model 25S or equivalent)

3. Stopwatch capable of measuring 1 second intervals

4. A total of two (2) qualified personals when testing is being performed

B. Acceptance testing shall be conducted in front of specifying engineer or client representative, and if required, in front of the Authority Having Jurisdiction using the following testing methods:

1. Introduce canned smoke (Home Safeguard Industries Model 25S or equivalent) directly into the sampling hole in to farthest sample hole for a duration of 2 seconds at a distance of 6 inches from the sample hole. Start the timer once the smoke has been introduced.

2. Stop the timer once the first particulate bar is illuminated on the front of the device, above what was displayed during normal device operation. The device need not go into alarm to verify the transport time – an increase on the particulate meter is a successful measurement of transport time.

3. Compare the observed transport time with the results on the Pipe Layout report from PipeIQ. If there is more than a 20% discrepancy, verify the sample hole quantity, sizes, location, and the integrity of pipe and that the installed pipe network is identical to the PipeIQ Pipe Layout report.

4. Once transport times for the farthest sample points are verified, test the remaining holes for airflow by introducing smoke into each hole and verifying a response at the device or panel. Transport times are not required on each of the remaining holes, only a verification that air is flowing.

5. Document test results as required per NFPA to include the client's contact information, transport times, and sensitivity levels.

6. Upon completion of a successful test, installer shall so certify the system in writing to Owner's Representative.

3.4 WARRANTY

A. The manufacturer shall guarantee the product by warranty for a period of three years. All components of the detector shall be replaced with the exception of regular maintenance accessories: replaceable micron filter. Any damage to the ASD due to poor handling or operating outside of the listed criteria will void any such warranty. The installation and programming of the ASD shall be completed by factory-trained installer.

3.5 TRAINING

A. The contractor shall provide complete training to the Owner by factory-trained technicians.