

**CONSTRUCTION STANDARD SPECIFICATION**

**SECTION 13855**

**HIGH SENSITIVITY SMOKE DETECTION**

**PART 1 - GENERAL**

1.01	Summary .....	2
1.02	References .....	2
1.03	Definitions .....	3
1.04	System Description .....	3
1.05	As-Built Drawings .....	3
1.06	Submittals .....	4

**PART 2 - PRODUCTS**

2.01	General .....	4
2.02	Display Control Panel .....	4
2.03	Detector Assembly .....	5
2.04	Power Supply Assembly .....	5
2.05	Engineering Sampling Pipe Network .....	5

**PART 3 - EXECUTION**

3.01	General .....	6
3.02	Work Coordination .....	6
3.03	System Inspection And Test .....	7
3.04	System Guarantee .....	7

**PART 4 - CADD SOFTWARE GUIDELINES FOR DRAWING SUBMITTALS**

4.01	MicroStation J .....	7
4.02	AutoCAD .....	7

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**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Design and install an operational high sensitivity smoke detection (HSSD) system utilizing equipment manufactured by Fenwal, Inc., specifically the AnaLASER product line. Utilize the Fenwal "SNIFF" computer-aided design program for sample piping design.
- B. Related Sections:
  - 1. Section 16001, "Electrical Work".
- C. Related Standard Drawings:
  - 1. E-0006STD "Standard Symbols List & General Notes"
- D. Conform with applicable provisions of the General Conditions, Special Conditions, and General Requirements of the contract.

**1.02 REFERENCES**

The current editions of the following standards are a part of this specification:

- A. National Fire Protection Association (NFPA) Standards:
  - 70 National Electrical Code
  - 72 National Fire Alarm Code Systems
  - 75 Standard for the Protection of Electronic Computer/Data Processing Equipment
- B. Other Referenced Standards
  - Underwriters Laboratories (UL) Equipment Directories
  - Factory Mutual (FM) System Approval Guide

- C. For interpretation of the above NFPA standards, the “Authority Having Jurisdiction” referred to in the standards shall be the Sandia Delegated Representative (SDR).

### 1.03 DEFINITIONS

- A. FPE – Fire Protection Engineer(ing)
- B. HSSD – High Sensitivity Smoke Detection
- C. SCI. – Sandia Construction Inspector
- D. SNL - Sandia National Laboratories, New Mexico

### 1.04 SYSTEM DESCRIPTION

The high sensitivity smoke detection (HSSD) system provides early warning of a fire in its incipient stage. AnaLASER detectors shall be installed to sample the air from a protected area.

In operation, air from the protected zone is drawn through a piping network to the detector unit by an aspirating fan in the detector assembly. The air is then illuminated by a laser light source. Smoke particles scatter this light to a sensitive solid-state photo sensor. An analog signal is transmitted to the Display Control Card which displays smoke obscuration levels on a bar graph display. Each increment on the bar graph represents 10% of the full scale sensitivity of the detector.

Three independently programmable alarm points provide additional visual indication of the Display Control card and activate associated relays for additional annunciation and alarm.

Similar systems which incorporate a flashing Xenon tube light source that requires frequent replacement, unless all of the conditions of Part 2 of this specification are met, will not be considered in any manner as an equal or replacement to the AnaLASER Laser Light Source System. The light source utilized shall have a life expectancy greater than 10 years from date of system start-up.

### 1.05 AS-BUILT DRAWINGS

- A. The drawings issued for construction are representative of the work to be performed and of existing equipment. As a part of this contract, the Contractor shall provide Sandia National Laboratories with a set of “marked-up” prints, including all equipment relating to the fire protection system, both existing and contractor installed. The marked-up prints shall show all junction boxes, conduit routing, conduit sizes and types (RGS, IMC, FLEX, EMT, etc.) devices, conduit location (exposed or concealed) and any other information relevant to the as-built condition. The marked-up prints shall include a complete conduit schedule showing the number and type of conductors in each conduit installed as part of this system.
- B. Standard Sandia National Laboratories symbols as shown on E-0006STD shall be used.

- C. Note: As-built drawings shall be given to the SCI and the SNL FPE at the time of final testing/acceptance. Submit drawing in electronic media to the SNL CADD Coordinator.

#### 1.06 SUBMITTALS

- A. System shall be installed per all manufacturer's drawings, details, and instructions. The authorized distributor shall provide all required installation drawings as part of the submittal package for approval.
- B. Provide as part of the submittal package for approval a computer printout showing all sample points based on engineered calculations per Fenwal design program "SNIFF."
- C. Drawings in the submittal package shall include sample pipe layouts and any deviations from contract drawings shall be specifically noted.
- D. The finished drawings included with the submittal package shall be stamped "Approved" by an authorized Fenwal AnaLASER design distributor.
- E. Refer to Part 3.02 of this specification for other requirements in the submittal package.
- F. SNL Facilities Management and Operations Center utilizes MicroStation J for Windows/NT as its standard CADD software. If MicroStation J is not utilized, use AutoCad 2000 or later version. Refer to Part 4 of this Section for description of CADD software submittal requirements.

### PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. All fire alarm system devices shall be tested and listed by UL and/or FM.
- B. The system shall include the sample piping, mounting hardware, and all other accessories and miscellaneous items required to complete the installation.
- C. Basic materials and methods shall be as specified in other sections of these specifications.

#### 2.02 DISPLAY CONTROL PANEL

- A. The display Control Panel shall be manufactured by Fenwal. The Display Control Panel shall consist of an enclosure assembly, installation kit, and required number of Display Control Cards as shown on the contract drawings. Each Display Control Panel shall be powered from a 24 VDC source and monitored for alarm and trouble condition by the building fire alarm system. The panel shall have the following light indications: 10 light bar graph, 3 alarm level lights, air flow fault light, detector fail light, CPU fail light, normal operation indicator, power supply trouble light, isolate light, signal offset light, and signal averaging indicator light.

- B. The control unit shall incorporate all of the following features:
  - 1. Built-in data and event logger.
  - 2. Programmability via a PC or terminal.
  - 3. Signal averaging.
  - 4. Signal offset.
  - 5. Remote test capability.
  - 6. Remote real-time display.
  - 7. System integration with FN 2000 control equipment via an intelligent interface card.

#### 2.03 DETECTOR ASSEMBLY

- A. The Detector Assembly shall be manufactured by Fenwal.
- B. The AnaLASER Detector is mounted in an enclosure, which contains a fan that draws air through the piping network and into an air chamber in the detector.
  - 1. The detector shall examine particles drawn in by the fan by illuminating them in a small chamber using a laser and a photo detector to capture the light scattered by the particulate matter. The sensitivity level shall be 0.006 to 0.06 percent obscuration per foot.
  - 2. The particle size discriminator shall inhibit the output whenever a particle pulse exceeds a predetermined amplitude, thus permitting the detector to ignore large pulses commonly produced by dust or other airborne contaminant.
  - 3. A logic pulse associated with each particle detected shall be used to produce an analog signal that shall be proportional in value to the amount of particulate matter detected.

#### 2.04 POWER SUPPLY ASSEMBLY

- A. The Power Supply Assembly included as part of the control equipment shall be mounted directly beneath the Display Control Panel.
- B. The Power Supply shall provide 24-hour battery back-up along with battery supervision and ground fault protection on power circuits. The power supply consists of an enclosure containing the power supply module and two 300 amp-hour batteries. One power supply assembly will provide power for two zones of control.

#### 2.05 ENGINEERING SAMPLING PIPE NETWORK

- A. Piping shall be intermediate metal conduit (IMC) or Blazemaster, sized as specified on drawings.
- B. Piping network(s) shall be laid out to provide detection points with spacing as indicated on drawings. Refer to Part 3.02 of this specification for additional information.
- C. Pipes shall be supported from floor slab using unistrut and clamps at intervals of no more than four (4) feet on center to ensure stability of the piping and reduce the possibility of cracks or breaks at the joints. Pipe shall be supported at no less than three (3) inches above subfloor.
- D. All connections and joints shall be made with standard connections designed to be compatible with the pipe material.
- E. All joints shall be airtight to prevent air leakage or infiltration, which may adversely affect the desired venturi effect in the piping.
- F. Sampling points shall be at locations shown on contract drawings, or as shown, on approved shop drawings. Sampling points shall be configured per manufacturer's approved shop drawings. Provide all sampling point pipe caps with predrilled holes per manufacturer's shop drawings.
- G. Sample pipe network shall be of the closed end engineered design. Systems using "Open End" design will not be allowed.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. The high sensitivity smoke detection system shall be provided where indicated on the drawings, and shall be installed in accordance with the manufacturer's recommendations, the approved shop drawings, and these specifications.

#### 3.02 WORK COORDINATION

- A. All work concerning the active portions of fire protection systems shall be coordinated with the SCI to prevent false alarms and avoid unnecessary loss of protection.
- B. The Contractor shall endeavor to maintain existing fire alarm equipment in service at night and over weekends. If unable to do so, the Contractor shall notify the SCI.
- C. The Contractor shall refer to all bid documents including, but not limited to, the SNL Standard and Special Specifications applicable to this project, all contract drawings, standard provisions, and special provisions of the contract, and other conditions of the contract in order to identify all possible conflicts which may directly or indirectly affect installation of this system prior to bid.
- D. The contractor shall be responsible for coordination with the General Contractor and all other trades performing work under this contract. Any and all conditions

which directly or indirectly affect the installation of this system shall be addressed prior to submitting shop drawings for approval. Submittals shall show all offsets in the sample piping along with all deviations from the conditions shown on the contract drawings which result from these offsets. Design calculation shall account for the changes in airflow which result from these offsets. Such offsets shall be kept to a minimum.

### 3.03 SYSTEM INSPECTION AND TEST

- A. The system shall be tested by an authorized Fenwal distributor according to manufacturer's recommendations, in the presence of the SCI.
- B. A Fenwal AnaLASER System field installation check-out sheet must be used when conducting final tests prior to commissioning. Failure to complete and register this check sheet with Kidde-Fenwal, Inc., voids any and all warranties on the product or system. Refer to Part 1.05 - As-Built Drawings for other acceptance requirements.

### 3.04 SYSTEM GUARANTEE

- A. The entire AnaLASER HSSD System, components, parts, and labor shall be guaranteed for 12 months from the date of installation, not to exceed 18 months from date of shipment.

## PART 4 – CADD SOFTWARE GUIDELINES FOR DRAWING SUBMITTALS

### 4.01 MicroStation J

- A. SNL Facilities maintains MicroStation J for Windows/NT, release 05.07.01.14 (vector) as its standard CADD software. When future upgrades occur, it is required that the Fire Alarm Designer utilize the new workspace and MicroStation software. To maximize efficiency, SNL will provide a custom MicroStation J workspace environment, which includes toolboxes, tool frames, macros, MicroStation Development Language (MDL) application, user commands, help routines, and menu bars to help in the production of facilities CADD files. Refer to the Facilities CADD Standards Manual for further instructions.

### 4.02 AutoCAD

- A. AutoCAD 2000 or later versions may be used in lieu of MicroStation J under the condition that the following requirements will be met:
  - 1. The translated MicroStation architectural floor plan must be referenced into AutoCAD model. Each AutoCAD model will show the Fire Alarm Design for a given floor.
  - 2. The SNL standard border files must be referenced into all project sheets (layout tabs). Each layout tab will contain border, keyed notes, general notes, details, and title block information. Each layout tab will be identified (labeled) with correct SNL plotted file name.

3. All data, designs, records, graphics and supporting tools generated during project creation shall be included in the deliverable file package.
4. Any fonts, line styles, or blocks used to generate these files that are not AutoCAD 2000 standard must be submitted as part of the deliverable package.
5. All layers will follow CAD Layer Guidelines, 2nd edition or newer, established by the American Institute of Architects.
6. A table, listing all line, text, and block information will be created within each design file just outside of the plotted area. Information to include: layer names, color, pen width association, line style, description, text size, block names and identification of frozen layers.
7. When design is completed, all deliverables must be in MicroStation J format. Any assistance or questions should be directed to and from the SNL CADD Coordinator.

END OF SECTION