

CONSTRUCTION STANDARD SPECIFICATION

SECTION 13855

HIGH SENSITIVITY SMOKE DETECTION

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PART 1 - GENERAL

1.01 SUMMARY

- A. Design, install, and commission a high sensitivity smoke detection (HSSD) system utilizing equipment manufactured by Fenwal, specifically the AnaLASER II product line. Utilize the Fenwal “SNIFF” computer-aided design program for sample piping design and calculations.
- B. Related Construction Standard Specifications
 - 1. Division 1, Section 01065, “ES&H for Construction and Service Contracts”.
 - 2. Division 1, Section 01330, “Submittal Procedures”.
 - 3. Division 7, Section 07270, “Firestopping”.
 - 4. Division 13, Section 13852, “Intelligent Fire Alarm System”.
 - 5. Division 16, Section 16001, “Electrical Work”.
- C. Related Standard Drawings:
 - 1. E-0006STD “Standard Symbols List & General Notes”

1.02 REFERENCES

- A. The current editions of the following standards are a part of this Section:
 - 1. International Building Code
 - 2. NFPA 70 – National Electrical Code
 - 3. NFPA 72 – National Fire Alarm Code
 - 4. NFPA 75 – Standard for the Protection of Electronic Computer/Data Processing Equipment
 - 5. NFPA 318 – Standard for the Protection of Semiconductor Fabrication Facilities

B. Other Referenced Standards

Underwriters Laboratories (UL) Equipment Directories

Factory Mutual (FM) System Approval Guide

1.03 DEFINITIONS

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

1.04 SUBMITTALS

A. General Submittal Requirements:

1. Provide the following submittals for acceptance by SNL Fire Protection Engineering:
 - a. Pre-Construction Submittals
 - (1) Equipment Data Sheets (PDF files acceptable)
 - (2) Shop Drawings (full size drawing set and electronic CAD files)
 - (3) “SNIFF” Program Calculations (hard copy and electronically in PDF format)
 - b. Pre-Acceptance Test Submittals
 - (1) As-build shop drawings or copy of red-lined as-build drawings.
 - (2) Completed Fenwal AnaLASER II HSSD Commissioning Check Sheet.
 - c. Contract Close-Out Submittals
 - (1) As-build shop drawings (electronic files in AutoCAD 2000 format and in 11” x 17” PDF files). Deliver to the designated SNL Fire Protection Engineer.
2. Acceptance of submittals by the SNL FPE is required prior to proceeding with the installation or modification of any SNL HSSD system.

B. Equipment Data Sheets:

1. Equipment data sheets shall be submitted for all equipment and devices used in the HSSD system. Identify the specific model or part that will be installed on

the submittal. If options are listed on the data sheets, the specific option for the project shall be clearly marked.

C. Shop Drawings:

1. Submit shop drawings using either AutoCAD or Bentley MicroStation. If using MicroStation, following the requirements in the Facilities CADD Standards Manual for preparing drawings.
2. For each HSSD system installation or modification to an existing HSSD system, the shop drawings shall include, as a minimum, the following:
 - a. Floor Plans.
 - b. Isometric drawings.
 - c. Plan and elevation drawings.
 - d. Calculation report.
 - e. General Notes, Summary of Work, etc. Drawing
 - f. Detail drawings (as required to delineate the work).

1.05 QUALITY ASSURANCE

- A. The HSSD system designer shall be factory trained and certified to design the specific type and brand of HSSD system being installed.
- B. The HSSD system installer shall be factory trained and certified to install the specific type and brand of HSSD system being installed.

1.06 SYSTEM DESCRIPTION

The air sampling system, referred to as a high sensitivity smoke detection (HSSD) system, provides early warning of a fire in its incipient stage. HSSD systems are typically installed in semiconductor facilities, under raised floors containing combustible materials, computer facilities, locations with high air-flow environments requiring smoke detection, and other locations where conventional spot-type smoke detectors are not appropriate for the application.

The standard AnaLASER II detector has a dynamic sensitivity range of 0.00075% to 0.3%/ft. that utilizes laser particle-counting technology. Smoke concentration is determined by counting the number of discrete particles of a specific size in a given time period. The detector's particle size discrimination features allows only a specific range of particle sizes (between 0.01 and 10 microns) to be measured and counted as products of combustion. Anything above or below this range is generally ignored and does not contribute to smoke signal calculations. This discrimination band corresponds to the center of the range of all particles of combustion. Dust particles, which are typically larger than 10 microns, are ignored.

The air sampling pipe network is a system of pipes extended into the protected area with strategically placed sampling holes. The Fenwal "SNIFF" computer program is used to dynamically balance the pipe network to insure equal sensitivity at each sampling hole. Each sample hole can be considered an equivalent spot-type detector with a maximum coverage of 900 ft². The protected area monitored by each AnaLASER II detector can not exceed 20,000 ft².

Each AnaLASER II detector is equipped with six relays (Pre-Alarm 1, Pre-Alarm 2, Alarm 1, Alarm 2, Trouble, and Isolate). The Alarm 2 and Trouble relay outputs are monitored by the building fire alarm system for evacuation of the facility upon an alarm event and to provide notification when the AnaLASER II detector has a trouble event. The alarm relay outputs are typically configured to be non-latching with a 0 – 60 seconds delay used to eliminate unwanted alarms caused by transient conditions.

The detector has an optional Display Module provided for each AnaLASER II detector to provide user interface for visual indication of the detector's alarm and trouble status on a LCD screen. The Display Module provides the ability to 1) reset the detector after latching alarms or troubles have been cleared, 2) disable alarm outputs to allow the detector to be tested without generating alarms, 3) perform detector sensitivity tests, and 4) to silence the internal sounder.

Supervised 24 VDC power with 24-hour backup is provided to up to four AnaLASER II detectors by a Multi-Zone Power Supply. For locations where the AnaLASER II detector is utilized with a FM-200 release panel, the detector may utilize the backup power capability of the release panel.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All HSSD 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.

2.02 HSSD DETECTOR

- A. Fenwal, AnaLASER II Standard High Sensitivity Smoke Detector, 0.00075 – 0.3%/ft sensitivity.
- B. Fenwal, Display Module, for AnaLASER II Detectors.
- C. LaserNET Software, latest version, for AnaLASER II Detectors.

2.03 POWER SUPPLY ASSEMBLY

- A. Fenwal, Multi-Zone Power Supply for AnaLASER II detectors.

2.04 SAMPLING PIPE NETWORK

- A. Piping shall be intermediate metal conduit (IMC) or Blazemaster, sized as specified on drawings.
- B. All connections and joints shall be made with standard connections designed to be compatible with the pipe material.

PART 3 - EXECUTION

3.01 GENERAL

- A. Do not proceed with any HSSD installation or modifications work without drawings stamped and approved by SNL Fire Protection Engineering.
- B. 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 EQUIPMENT INSTALLATION

- A. Detector: Locate the detector in a location that is accessible for servicing and testing. Where possible, locate the detector outside clean rooms and other areas that are difficult to gain access.
- B. Display Module:
 - 1. Where the AnaLASER II Detector is readily accessible, integrate the Display Module with the detector.
 - 2. Where the AnaLASER II Detector is not readily accessible, mount the Display Module in an accessible location to a standard 2-gang, 4" backbox. Mount the Display Module between 54" – 60" AFF. Locate the Display Module within 1000 feet of the detector.
- C. Power Supply:
 - 1. Mount the Power Supply adjacent to the HSSD Detector in a location that is accessible for servicing and testing.
 - 2. Mount the Power Supply between 48" – 60" AFF.

3.03 SAMPLING PIPE NETWORK

- A. Piping network(s) shall be laid out to provide detection points with spacing as indicated on drawings.
- B. 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.

- C. All joints shall be airtight to prevent air leakage or infiltration, which may adversely affect the desired venturi effect in the piping.
- D. 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.
- E. Sample pipe network shall be of the closed end engineered design. Systems using "Open End" design will not be allowed.
- F. Maximum air sample transport time from the farthest sampling port to the detector shall not exceed 120 seconds.
- G. Sampling system piping shall be conspicuously identified as "SMOKE DETECTOR SAMPLING TUBE – DO NOT DISTURB" at the following locations.
 - 1. At changes in direction or branches of piping.
 - 2. At each side of penetrations of walls, floors, or other barriers.
 - 3. At intervals of piping that provide visibility within the space, but no greater than 20 feet.

3.04 WORK COORDINATION

- A. Coordinate with the Fire Alarm Installation Contractor to identify where fire alarm monitor modules are required in order to interface the HSSD system with the building fire alarm system.
- B. 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.
- C. 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.

3.05 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 SCO.

- B. A Fenwal AnaLASER II HSSD Commissioning Check Sheet shall be completed upon commissioning of every AnaLASER II HSSD system and signed by a Sandia representative signifying acceptance of the HSSD system. This form documents proper operation of the system and acceptance by the Authority Having Jurisdiction.

3.06 SYSTEM GUARANTEE

- A. The entire AnaLASER HSSD System, components, parts, and labor shall be guaranteed for 12 months from the date of completion and acceptance by the Authority Having Jurisdiction.

- END OF SECTION -