

SECTION 13851

DETECTION AND ALARM SYSTEMS FOR VIVARIUMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide fire alarm and detection systems where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:
 - 1. Control panel; provide new or modified existing control panel as required.
 - 2. Remote annunciator.
 - 3. Initiating Devices
 - 4. Notification Appliances
 - 5. Magnetic door holders (unless specified in hardware section)
 - 6. Connection to related items furnished under other Sections of the Specifications, or under separate contract, such as (when required): Sprinkler flow and tamper switches; Elevator controls; Fan controls, and/or Access Control System(s).
 - 7. Connect to existing networked fire alarm command center.
- B. Interconnect alarm initiating, notification and ancillary devices with the automatic fire alarm system to operate annunciators, printers, fire controls, notify the security personnel and activate local or general audible / visible alarm signals, in accordance with the guidelines specified herein.
- C. Related work:
 - 1. The Drawings and general provision of the Contract, including General and Special Conditions and Division 1, General Requirements, apply to the work specified in this Section.
 - 2. Section 08332: Roll-up Counter Doors
 - 3. Section 08710: Door Hardware
 - 4. Section 15500: Fire Protection
 - 5. Section 15900: Building Automation System
 - 6. Section 16010: Electrical General Provisions
 - 7. Section ?????: Smoke Fire Dampers
 - 8. Section ?????: Building / Section Access Control System
 - 9. Section ?????: Elevators

1.2 CONTRACT DRAWINGS

- A. The Drawings are intended to show the areas to be protected and work to be done, to the extent necessary to prescribe the Work and provide a basis for cost estimating.
 - 1. The Drawings are not intended to relieve the Contractor of responsibility for avoiding conflicts or obstructions or proper installation of equipment.

2. Routing of conduit and wiring shall be as shown unless otherwise specified.
3. Secure written approval from the owner prior to deviating from the arrangement and layout shown on the Drawings.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of the General and Supplementary Special Conditions Sections and the Electrical Section.
- B. Shop Drawing and supplemental data are required. All plan view shop drawings shall be done using AutoCAD version R12 or later. CAD files shall be submitted along with a hard copy of Shop Drawings:
 1. Refer to Article 3.3 below, "Record Drawings," for required information
 2. OSHPD projects shall be submitted to OSHPD and the Stanford University Fire Marshal's Office (SUFMO) for Review and Approval by the Project Architect.
 3. Non-OSHPD projects shall be submitted to, and approved by, the Stanford University Fire Marshal's Office (SUFMO) prior to submittal to the local Authority Having Jurisdiction (AHJ)

1.4 QUALITY ASSURANCE / STANDARDS

- A. All additions and/or modifications to the fire alarm system shall comply with NFPA 72 and following:
 1. NFPA 72 (Latest Edition adopted by the State of California)
 2. Title 24, California Building Code, Current Edition
 3. Title 24, California Fire Code, Current Edition
 4. Title 24, California Mechanical Code, Current Edition
 5. Title 24, California Electrical Code, Current Edition
 6. ASME A17.1 Safety Code for Elevators, Current Edition
 7. Local Authority having Jurisdiction or Office of Statewide Health Planning and Development (OSHPD) as applicable.

1.5 SYSTEM DESCRIPTION AND OPERATION

A. General System Requirements

1. Provide a Siemens addressable system that utilizes intelligent alarm initiating devices throughout, and intelligent monitoring modules for connection to water flow indicators, valve supervisory devices, and other miscellaneous controls as required and as shown on the drawings to produce a complete and operational system.
 - a. All new buildings and total retrofits of existing facilities shall utilize the Model XLS/XLSV Control Panel and associated devices
 - b. All modifications/expansions of existing systems shall utilize the existing Control Panel and associated devices.

- c. Contact: Joel Reitz (510) 731-3066 or joel.reitz@siemens.com
2. System components are to be powered from life safety system panel boards or approved auxiliary DC power supplies.
3. Provide CLASS-B SYSTEM wiring.
4. System addressable loop and zone assignments shall be coordinated and approved by the Stanford University, School of Medicine, Fire Alarm Shop.
5. System design shall include provisions for maintaining 100% area smoke detection for Early Warning in all areas. Use of Duct Smoke Detectors shall be minimized and should be limited only to roof mounted air handling units and Fire Smoke Dampers installed in Duct Shafts. Utilize the appropriate method(s) noted in CBC 716.3.2.1. CHANGES TO THIS REQUIREMENT MUST BE SUBMITTED IN WRITING TO THE OWNER FOR REVIEW AND APPROVAL.
6. Provide 20% spare capacity for future expansion of Initiation and Notification Circuits.
7. The fire alarm system will transmit alarm and trouble signals, to the Networking Command Center (NCC) located in the Medical Center's Security Dispatch Office, (Room HH-0258a).

B. Sequence of Operation

1. Activation of any alarm initiating device shall:
 - a. Activate all fire alarm audible and visual notification devices in affected building until silenced at the local control panel or at the Stanford Medical Center Dispatch Office, (Room HH-0258a).
 - b. Indicate the zone or addressable device at the local control panel and at the Stanford Medical Center Dispatch Office, (Room HH-0258a).
 - c. Release all electromagnetic door hold devices throughout affected building.
 - d. Shut down air handling equipment and release (close) Fire Smoke Dampers throughout the affected building unless otherwise noted.
2. Activation of any Area Smoke Detector shall:
 - a. Perform all functions as noted in #1 above;
 - b. Cause any associated roll-down fire door(s) to close.
3. Activation of any Smoke Detector device in elevator lobbies and designated elevator mechanical areas shall:
 - a. Perform all functions as noted in #1 above,

- b. Cause elevators to return to the primary egress floor upon activation of an elevator machine room or elevator lobby Smoke Detector, except the primary egress floor elevator lobby.
 - c. Cause elevators to return to the alternate floor when the primary egress floor elevator lobby Smoke Detector is activated.
 - d. Cause the “Firemen’s Hat” to illuminate within the elevator cab(s) upon activation of an elevator machine room Smoke Detector or if provided, a Smoke Detector installed at the top of the elevator shaft.
- 4. Activation of any Duct Smoke Detector device shall:
 - a. Perform all functions as noted in #1 above.
- 5. Activation of any Thermal Detector device shall:
 - a. Perform all functions as noted in #1 above.
 - b. Thermal Detectors located in the elevator machine rooms or at the top of the elevator shaft, if provided, shall initiate elevator power Shunt Trip with the appropriate time delay.
 - c. Elevator Travel Time shall be provided by the Elevator Contractor.
- 6. Operation of any Sprinkler Waterflow Switch shall:
 - a. Perform all functions as noted in #1 above.
 - b. Sound the exterior weatherproof sprinkler alarm horn in a steady tone while water is flowing.
 - c. 24 VDC power to the Waterflow horn shall be provided and supervised by the Fire Alarm System.
- 7. Operation of any Sprinkler Supervisory Valve, Tamper Switch, Post Indicator Valve, or Backflow Preventer Valve shall:
 - a. Activate a dedicated Supervisory Signal at the local Fire Alarm Control Panel and at the Stanford Medical Center Dispatch Office, (Room HH-0258a). (Use of the Waterflow alarm circuit trouble for valve supervision is not permitted).
- 8. Activation of Fire Alarm System Trouble shall:
 - a. Activate a dedicated Trouble Signal at the local Fire Alarm Control Panel and at the Stanford Medical Center Dispatch Office, (Room HH-0258a).
- 9. System Trouble condition shall occur per the current edition of NFPA 72.

1.6 WARRANTY

- A. Provide a one year Parts & Labor Warranty. The warranty period shall commence upon the Authority Having Jurisdiction’s Final system test and sign-off of the Fire Alarm

Permit. The warranty shall cover all parts, labor, prompt field service, pick-up, and delivery.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT FURNISHED

- A. Provide new and present standard manufacturer products that match the existing Siemens MXL or XLS networked systems installed throughout the complex. OTHER MANUFACTURERS WILL NOT BE ACCEPTED.
- B. Provide products that match the existing system for renovation projects or interior completion work. Stand alone fire alarm systems will not be accepted.
- C. Provide products that are acceptable to Stanford University, School of Medicine and that comply with regulations of the State of California and Authority Having Jurisdiction.
- D. Actuating devices for Fire Smoke Dampers shall be powered by 120 VAC. Refer to Section 1.1.C.7 for additional requirements.

2.2 STANDARD FIRE ALARM SYSTEM EQUIPMENT

- A. Existing MXL control unit expansion, if necessary:
 - 1. Provide the basic MXLR Remote Control Unit that consists of the following sub assemblies.
 - a. MMB-3 Main Board or PSR-1 Remote Power Supply as appropriate.
 - b. MPS-12 Main Power Supply;
 - c. MKB-5 Annunciator and keyboard;
 - d. MLE-6 enclosure. The MME-3 Enclosure is acceptable upon Owner's Approval
 - e. Interface with the existing Networked Fire Command Center (NCC)
 - f. Other optional modules and equipment needed for a complete operational system.
- B. New or Existing XLS Control Units:
 - 1. Provide the basic XLS Control Unit that consists of the following sub assemblies.
 - a. PMI, Person Machine Interface
 - b. DLC, Device Loop Card
 - c. ZIC-4A, Zone Indicating Card
 - d. PSC-12, Power Supply Card
 - e. NIC-C, Network Interface Card
 - f. CAB-3 Enclosures. Smaller Enclosures may be used with Owner's Approval.
 - g. Other optional modules and equipment needed for a complete operational system.

C. Manual stations:

1. Provide Model MSI-10B / HMS-S addressable Manual Pull Stations

D. Smoke Detectors:

1. Provide Model FP-11 or HFP-11 photoelectric detectors. Use of Ionization detectors shall be by special application requirements. Only and must be approved by the Owner.
2. Equip with Model DB-3S / DB-11 base or Model DB-X3RS / DB-X11RS / DB-HR relay base as appropriate.
3. Provide Model RLW-11 / RL-HW wall mount remote LED indicators for concealed detectors as appropriate when device custom message may not be sufficient to locate a concealed detector.

E. Duct Smoke Detectors:

1. Provide Model AD2-P photoelectric air duct housings.
2. If relay output required, provide AD2-HR photoelectric air duct housings.
3. Provide Model ST-10, ST-25, ST-50 or ST-100 sampling tube as appropriate. The Mechanical Contractor shall provide the required number of each tube size based upon the actual duct widths and the manufacturer's installation guidelines.
4. MXL System: Provide Model Series ILI-1B / AD-31 assemblies for installation on all rooftop or direct sunlight applications.
5. Provide Model RLW-11 / RL-HW remote alarm indicating lamps for concealed duct detectors as appropriate when device custom message may not be sufficient to locate a concealed detector.
6. Duct Detector Differential Pressure Measurements will be provided by the Mechanical Contractor.
 - a. If there is no Mechanical Contractor involved with the project, this measurement will be provided by the Installer.

E. Thermal detectors:

1. Provide FPT-11 / HFPT-11 series detectors
2. In high ambient temperature areas, use an appropriate Conventional Thermal Detector monitored with a Addressable Monitoring Module.

F. Water flow switches:

1. Refer to 1.1.C.4

G. Addressable Interface Modules:

1. Provide TRI / HTRI series modules that interface to water flow switches, supervisory switches, special systems equipment and similar devices with Form-C contacts.
2. TRI-R / HTRI-R series Addressable Relay Modules will be used where Control interface is required.

H. Audible and Visual Notification Devices:

1. All Notification devices shall be provided with RED finish
2. Wheelock Model CH series Chime/Strobe devices may be used in application specific areas upon Owner's approval.
3. Wheelock Model HSR series electronic Horn/Strobe will sound in a synchronized three-pulse temporal pattern, commonly referred to as TEMPORAL CODE 3.
4. Audible/visual extender panel/power supply Wheelock Model PS-12 / 24-8MC is acceptable for use, provided the input is controlled directly from the fire alarm control panel and all other wiring and installation guidelines are met as described herein.
5. Activation of fire alarm system notification device circuits or audible/visual extender panel by field driven devices such as TRI-R / HTRI-R or ICP / HCP modules is NOT acceptable unless approved by the Owner.

I. Fire Doors and Electronic Door Hold Open Devices:

1. Reference 1.1.C.2 and 3
2. Door Holder Power shall be 24 VDC. Provide a minimum of one (1) Altonix Model AL 1024ULM per floor for door holder circuits.

J. System software programming shall be performed by the Stanford University, School of Medicine Fire Alarm Shop. Vendor programming of system software is not permitted without prior approval by Stanford University, School of Medicine Fire Alarm Shop.

K. Provide other materials, not specifically described but required for a complete and proper installation, as approved by Owner.

2.3 SPARE PARTS

A. New Construction project's (when a new FACP is provided): deliver directly to the Fire Alarm Shop the following quantities of Spare Parts at the completion of the project:

Part	% of Installed Qty	Maximum
1. Smoke Detector with Base	10%	10
2. Heat Detector with Base	10%	5
3. Pull Station	10%	5
4. Duct Detector Housing Assy.	5%	1
5. Addressable Module, Dual	10%	5
6. Addressable Module, Relay	10%	5
7. Addressable Module, Single	10%	5
8. Addressable Module, Mini	10%	5
9. Horn/Strobe	10%	10
10. Strobe	10%	10

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with Section 1.1.C.6
- B. Mount control or other panels with sufficient clearance for observation, service and testing. Comply with NFPA 70, current edition.
- C. Paint fire alarm junction box covers red and clearly identify boxes using a printed label complying with 3.1.K
- D. Install all wiring in conduit.
 - Flexible conduit is permitted for short connection to devices installed in lay-in ceilings (6 feet max.)
- E. Securely hang and fasten all conduit, boxes and panels to insure positive grounding throughout the system.
- F. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions is permitted in fire alarm conduits.
- G. Avoid unnecessary wire splices.
 - 1. If splices connections are required in junction boxes, use a permanent soldered connection only.
 - 2. Wire nut or crimp type connectors are not permitted.
 - 3. Interconnect field wiring at individual devices whenever possible using manufacturer provided terminal strips.
 - 4. Interconnect field wiring in terminal cabinets using standard terminal strips.
- H. When installing a smoke detector base:
 - 1. Follow manufacturer's installation instructions.
 - 2. Provide a back-box with a depth of 2-1/8" or greater for all applications
 - 3. When required, provide smoke detector trim ring(s)
- I. Transposing or changing conductor color coding is not permitted
- J. Label each circuit at fire alarm control panel or remote power supply panel using "E-Z" Code type markers.
- K. All devices shall be labeled with device address or device count as appropriate. Label shall be sticky back type, self-adhesive with a minimum of 1/4" font size width. Provide RED lettering on a WHITE label background. The label shall be attached to the base of the device. Label identification shall be consistent with As-built Record Drawings.

- L. When connection to existing systems is required, coordinate tie-in with the Owner's Project Manager and fire alarm shop personnel. Organize work so that there will be minimum disruption to the building functions.
1. Existing systems must remain operable during all Work of the Contract.
 2. Upon request, portions of the system may be put out of service by authorized SHC personnel during each working day, but must be restored to full operation at the end of each working day, unless otherwise scheduled and approved by the Project Manager.

M. Wiring

1. Network cabling requires the use of #16 AWG twisted / shielded pair cable, run in separate raceway.
2. Addressable initiating device circuits; use #16 AWG THHN/THWN insulated, solid conductors.
3. Notification circuits; Use #12 AWG, THHN/THWN insulated, stranded conductor wire.
4. Door holder circuits; use #12 AWG, THHN/THWN insulated, stranded conductor wire.
5. All stranded wire must be terminated with soldered-on spade terminals. Crimp-type connectors are not permitted.

N. Riser size and fill requirements:

1. New fire alarm system risers will be sized adequately to accommodate no less than two initiating circuits and two notification circuits and one door hold circuit per floor, plus 10% expansion capacity for future use. Comply with NFPA 70, current edition.
2. The required number of conductors will be installed during the initial installation of fire alarm risers and any unneeded wires will be labeled "spare" for future use.

O. Color Coding for MXL and XLS System installations:

CIRCUITS:	COLOR:
Alarm Initiating Horns,	Blue (+) Brown (-)
24V DC Audible Ckts (on a 4-wire system)	Yellow (+) Black (-)
24V DC Visual Ckts (on a 4-wire system)	White (+) Purple (-)
24V DC Audible/Visual Ckts (on a 2-wire system)	Yellow (+) Black (-) or match existing
DC Power	Red (+) Black (-)
System AC Power	Black / White
Water Flow	Orange / Orange
Tamper Switch	Yellow / Yellow

3.2 SYSTEM ACCEPTANCE

A. Required Test: After complete installation of the equipment and with the FACP reading “Normal” with no “Troubles”, the Contractor shall perform three (3) complete tests of the system.

1. TEST #1 (Contractor’s Test):
 - a) Shall be performed by the installing contractor and the manufacturer’s representative. The test shall include proper operation of the fire alarm control panel and indicating components in accordance with factory recommended procedures. Audible testing of all notification appliances shall be measured and recorded in all affected areas. In rooms less than 200 sq. ft., minimum of one audible reading shall be recorded with all doors and windows closed. Tests shall also include proper operation of visible indicating devices as needed. Checks of each initiating circuit or device address for correct indications at the control unit, and any remote Annunciator.
 - b) Send written confirmation via fax or e-mail to the Stanford University Fire Marshal’s Office addressing the following:
 - Fire Alarm Control Panel is in Normal status
 - All the Fire Alarm devices are installed and functioning per manufacturer’s installation instructions.
2. TEST #2 (Pre-Test):
 - a) Shall be performed by the installing contractor and manufacturer’s representative in the presence of SUFMO representative(s). Coordination of testing shall be by the contractor providing at least one-week advanced notice to SUFMO.
 - b) The test shall include proper operation of the fire alarm control panel and notification devices in accordance with factory recommended procedures. Record of all audible/visual testing of notification devices shall be made available to the SUFMO representative(s) during this test. Tests shall include sound level (decibel readings) and light intensity (lumens), as needed. Checks of each initiating circuit or device address for correct indications at the control panel, and any remote Annunciator. Test shall include ground fault and open troubles on each notification/initiating loop per manufacturer’s requirements and a print out of all smoke detector sensitivity readings.
 - c) A punch list will be developed by SUFMO and the Contractor shall correct all items prior to final acceptance test (Test #3). There will be a re-inspection of punch list items. If additional re-inspections are found necessary to assure compliance with the Contract, they shall be made at the Contractor’s expense.
3. TEST #3 (Final Test):
 - a) After Test #1 and #2 have been completed, the Contractor shall request a final acceptance inspection by coordinating the final test with the Project

Manager, SUFMO representatives and the Santa Clara County Fire Marshal (SCCFM), or other AHJ as appropriate. Coordination of testing shall be by the contractor providing at least one week advanced notice to SCCFM and SUFMO.

- b) 24-hours prior to the Final Test date, SUFMO will remove AC power from the FACP and auxiliary power supplies to facilitate the Battery Test during the Final Test.
- c) Test #3 shall include proper operation of the fire alarm control panel and notification devices in accordance with factory recommended procedures, Audible/Visual testing of all notification devices shall be performed on Battery Power for five (5) minutes. A copy of the contractor's audibility tests shall be made available to the AHJ during this test. Test shall include sound level (decibel readings) and light intensity (lumens), as needed. Checks of each initiating circuit or device address for correct indications at the control panel, and any remote Annunciator. A print out of all smoke detector sensitivity readings shall be provided. Duct Detectors shall be tested under full airflow (dynamic) conditions.
- d) The Manufacturer's representative shall provide an NFPA 72 Certificate of Completion for the AHJ's review and signature.
- e) Connection to the existing Medical Center Fire Alarm Network shall be made upon completion of the AHJ's final acceptance. The Stanford University School of Medicine Fire Alarm Shop and manufacturer's representative shall ensure the FACP is communicating properly with the Stanford Medical Center Security Dispatch Office, (room HH-0258a).

B. The Contractor shall supply the Owner with:

- 1. A complete and accurate fire alarm system drawing revised to show exact list of equipment as installed and as wired.
- 2. Signed NFPA 72 Certificate of Completion report certifying that all work has been completed in accordance with SOM Facilities standards and specifications.
- 3. Warranty Letter. Warranty period shall commence on the date the final acceptance was granted by the AHJ.

3.3 RECORD DRAWINGS

- A. Project Record Documents and Record CAD Files: Upon completion of the installation and final acceptance, provide one set of reproducible As-built Record Drawings and one set of CAD files using Auto CAD version R12, or later.
 - 1. All final Fire Alarm System As-built Record Drawings shall be produced by a Siemens-Cerberus branch office.
 - 2. Drawings shall reflect the entire system; consisting of existing components as well as components added as a result of this project. The Record Drawings shall

be complete and accurate, revised to show the exact list of equipment as installed and as wired.

3. Provide one reproducible set of approved Shop Drawings to the Owner

B. Drawings shall include the following:

1. Plot planes and building floor plans, showing location of devices
2. Point-to-point wiring diagrams
3. Connection details
4. Arrangement of control panel modules
5. Conduit routing, including conductor type and quantity
6. When applicable, provide a site plan showing all conduit runs to exterior devices, i.e., Post Indicator Valves (PIV) and Backflow Preventer Valves.

C. Operation and Installation Manuals:

1. Operation and Installation Manuals are NOT required.
2. Equipment Data Sheets are NOT required UNLESS the product is being provided to the facility for the first time.
3. Provide one (1) CD containing all applicable product information.

END OF SECTION