Division 16 - Fire Alarm System

PREFACE

This guide is not intended to include all code requirements, design requirements or performance requirements to construct a fire alarm system. It is a design guide intended to inform of campus standards and unique requirements for UCSB fire alarm system installations. Some of the provisions of this guide may exceed minimum code requirements. Should there be a variance between this guide and any codes, the more stringent requirements should apply. Should there be a conflict between this guide and any codes, the codes shall take precedence.

1. DESCRIPTION OF WORK

A. The fire detection and alarm system shall be an addressable, automatic and manual fire alarm system complying with the current editions of the California Building and Fire codes. The fire alarm system shall tie to UCSB’s Campus Proprietary Alarm Panel via connection point indicated on the Drawings and as directed by the University’s Representative and Life Safety Services (LSS).

B. Equipment and materials furnished and installed in other work; but are a part of the fire alarm systems are the: fire sprinkler flow and tamper switches, elevators status annunciators, smoke/fire damper and HVAC system.

C. System Description and Function

i. The system shall consist of fire alarm control panel, annunciator panel(s), interface with University Police Dispatch, thermal detection, smoke detection manual pull stations, auxiliary equipment, and audible and visual alarms, and accessories including wire and conduit. The entire system shall be equipped with an emergency battery back-up system.

ii. The system shall be designed to be capable of being expanded at any time up to a 25% increase of initial capacity.

iii. The system shall be capable of operating both addressable and non-addressable, heat detection, ionization and photoelectric detecting devices, manual stations and water flow switches.

iv. The control panel shall provide power, annunciation, supervision and control for the fire detection and alarm system. The control panel shall be modular in construction, and contain all equipment necessary to operate accordingly. The system shall be designed so that alarm indications override trouble conditions. The panel shall be capable of measuring the sensitivity of the addressable ionization and photoelectric detectors connected to it. The control panel shall allow 25% of growth as part of the system.

v. The system wiring shall be a Style '4' Class "B". The DCFM (Designated Campus Fire Marshal) may require a Style '6' four wire system for certain occupancies.

vi. Alarm Sequence: The system alarm operation subsequent to the alarm activation or any area of duct detector, manual station or water flow switch shall be as follows; Cause audible and visual signals to alarm on all floors in the affected building, automatically notify the Campus Police, display individual
detector number on annunciator with University defined message, print individual detector number with University defined message, date, and time on printer terminal, light an indicating lamp on the smoke detector initiating the alarm, activate elevator return sequence when elevator lobby or elevator machine room smoke detector initiating alarm, close all magnetically held fire doors unless programmed to close on affected floor only as determined by the Designated Campus Fire Marshal (DCFM), unlock security doors, and individual HVAC units will automatically shut down upon activation of the duct detector serving that unit through the fire alarm system.

D. The alarm activation of any elevator lobby smoke detector shall, in addition to the operations listed above, cause the elevator cabs to be recalled according to the following sequence: If the alarmed detector is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress and if the alarmed detector is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the DCFM.

E. Activation of any fire sprinkler valve tamper switch shall cause a supervisory signal.

F. There shall be no limit, other than maximum system capacity, as to the number of addressable devices which may be in alarm simultaneously.

G. Smoke/fire damper shall be controlled by fire alarm system area detection or through HVAC duct detector used for smoke shutdown (consult with DCFM).

H. System shall be capable of alarm verification.

2. Codes and Standards

A. Fire alarm system, equipment, installation, and wiring materials and methods used shall comply with current adopted editions of the following: California Electrical Code, NFPA 72, including appendices, Title 19, California Administrative Code, California Building Code, California Mechanical Code, California Fire Code, California State Fire Marshal’s requirement, DCFM, UL 38, 217, 228, 268, 268A, 346, 464, 521, 864, 1481, 1638, 1730, 1971, American Disabilities Act, NFPA 90A, and National Electrical Manufacturers Association (NEMA), (a) Guide for the proper use of Smoke Detectors, and (b) Guide for the proper use of Duct Smoke Detectors.

B. Materials and/or installation shall meet or exceed the above referenced standards.

C. The system including all components shall be listed by the State Fire Marshal and Underwriters Laboratories Inc. for use as a fire protective signaling system.

D. The system must have proper listing and/or approval from the following nationally recognized agencies: UL (Underwriters Laboratories, Inc.), UL categories (UUKL, PAZX, UTDZ, QVAX as well as the requirements of NFPA 90A, HVAC, and NFPA 92A and 92B Smoke Control, CSFM (California State Fire Marshal), FM – Factory Mutual, and ISO – International Standards Organization.

E. Testing shall comply with the requirements of NFPA 72.

F. F.A. Contractor (Fire Alarm Contractor) qualifications: At the time of installation, the F.A. Contractor shall hold a current California C-10 contractor’s license.

G. The F.A. Contractor shall demonstrate satisfactory installations of comparable systems within the preceding five years, including references.
H. Ability to provide emergency response to affect repair within 4 hours by factory certified personnel during the warranty period.

I. Contractor shall provide proof that the fire alarm installer is Underwriters Laboratories, Inc. (UL) listed under the classification of “PROTECTIVE SIGNALING SERVICES-LOCAL, AUXILIARY, REMOTE STATION AND PROPRIETARY (UUJS).

J. Final connections and system programming shall be performed only by NICET II or higher Technician. Name of Technician and certification number shall be recorded on the form titled; ‘CONTRACTOR’S STATEMENT OF COMPLAINT INSTALLATION AND AFFIDAVIT OF PERSONNEL QUALIFICATIONS’ (see attached form).

K. The installing contractor shall be State of California certified for fire alarm system installations.

3. SUBMITTALS

A. The following list includes but does not limit the required shop drawing and product data information that shall be submitted:

   i. Catalogue sheets of all components indicating technical data, size and capacities. Reference catalogue sheets to specification paragraphs.

   ii. Submit parts list of all equipment with manufacturer’s data sheets, the location of each component (i.e. elevation of alarm panels and cabinets), battery calculations, and proposed conduit layout diagram for both vertical and horizontal runs. Identify location and sizes of terminal cabinets.

   iii. Submittal shall include State Fire Marshal listing sheets, including listing number with annual update and expiration date, for all system components. SUBMITTALS WILL BE AUTOMATICALLY REJECTED IF COMPLETE LISTING INFORMATION DOES NOT ACCOMPANY SUBMITTAL. Complete point-to-point wiring diagram of the entire system showing interconnection of identified devices, and controls shall be submitted to, and approved by, the DCFM before installation. Complete conduit layouts at each floor and conduit riser diagrams.

   iv. Submittals shall include State of California Fire Marshal List Sheets for all components.

   v. Include UL listing Data Sheets. Including but not limited to, control panels, batteries, battery chargers, signal initiating devices, audible alarms, visual alarms, annunciators, terminals, cabinets, wiring conductors and relays. All equipment drawing alarm or supervisory current shall have documentation of the current draw highlighted in the submittal information.

   vi. Submittals for fire alarm enclosures must show gauges and finishes of the metal.

   vii. Output rating of all alarm system components, point-to-point Ohm’s Law voltage drop calculations not to exceed 3% or the maximum the equipment manufacturer allows.
viii. An Index and title sheet shall be put at the front of the product data submittal to organize and speed review.

B. Plan Submittal: Submit 5 sets of fire alarm system plans to the University Representative for review and approval prior to installation. Plan Submittal shall include all applicable information from F.A. Submittal Checklist (see attached form).

4. MATERIALS AND EQUIPMENT

A. All materials, equipment, accessories, devices and other facilities and appurtenances covered by these Design Standards are to be new, best suited for the intended use and shall conform to applicable and recognized standards for their use. The system shall be one of the following acceptable manufacturers: Notifier or Siemens.

B. The Campus’ Fire Alarm System Standards stipulates the requirements for an analog addressable, multiprocessor-based fire alarm control panel and combined fire alarm/voice evacuation/relocation system. Non voice evacuation systems may be acceptable based upon building type, use, size and approval from the DCFM. This system shall include, but not be limited to; system cabinets, control and communication equipment, power amplifiers, switching power supply unit, system control unit, analog loop unit or keyboard display unit, audible and visual notification appliances, together with associated peripheral devices, programming, wiring and other relevant components to provide a complete and operable system.

5. CONTROL EQUIPMENT

A. The control panel shall provide power, annunciation, supervision and control for the detection and alarm system. The control panel shall be modular in construction, and contain all modules necessary to operate in compliance with the schedule in the “System Description and Function” paragraph of these Standards and the approved drawings. The system shall be capable of reading and displaying at the control panel the sensitivity of remote addressable ionization and photoelectric detection devices. Individual, addressable detection device alarm threshold shall be adjustable from the control panel. The detection system shall remain 100 percent operational and capable of responding to an alarm condition while in the routine maintenance mode. Addressable detection devices shall be individually identified by the system, and the system shall be capable of having any quantities of addressable detection devices in alarm up to any quantity of addressable detection devices in alarm at any time up to the total number connected to the system.

B. The annunciator panel shall be a min. 80 character alpha-numeric display, which shall provide an optional University definable message associated with each detection device or zone as approved by LSS and DCFM. All annunciator panels shall be located on the exterior of the building in a location approved by the DCFM.

C. The dynamic supervision of the system electronics, wiring, detection devices and software shall be provided by the control system. Failure of the system hardware or wiring shall be indicated by type and location on the alphanumeric annunciator. Software and processor operation shall be monitored by an independent hardware watchdog, which will indicate their failure. The system will provide failsafe operation, i.e. incoming alarms shall automatically override all other modes of operation, and the panel shall automatically return to normal operating mode from any operator initiated mode.
D. Ground fault detection shall be provided for all signaling line and notification appliance circuits. Lamp test capability shall be provided to test all visual panel indicators and associated software. Provisions shall be made for remote trouble and remote alarm silencing switches. The control panel shall be equipped with a silence before reset feature, designed to prevent accidental system reset during an alarm condition. The system alarm lamp shall flash upon receipt of any alarm condition. Operation of the silence switch shall silence the audible alarm and cause the alarm lamp to light steadily. Receipt of subsequent alarms shall cause the audible devices to resound and the alarm lamp to flash.

E. The system trouble lamp shall flash and an integral trouble buzzer shall sound upon the occurrence of any trouble condition. Acknowledgment of the trouble condition shall silence the audible alarm and cause the trouble lamp to light steadily. Receipt of subsequent troubles shall cause the trouble buzzer to resound and the trouble lamp to flash.

F. Individual input and output device addressability as well as remote sensitivity measurement shall all be performed on the same pair of wires. An unlimited number of wiring branches shall be permitted with no loss of supervision.

G. The service mode/walk test mode shall permit the disabling and enabling of individual detection or output devices as well as manually operating output devices. Status of these devices shall be displayed upon command from the control panel. The panel shall automatically return to the normal mode in the event the panel remains unattended in the service mode.

H. The panel shall be capable of receiving and processing alarms even when in the service mode.

I. The control panel shall operate from a three wire 120 VAC power supply and internal 24VDC back-up battery. All power connections, both AC and DC, shall be separately fused within the control panel. Light emitting diodes (LED’s) shall be included to indicate (green) system power, (yellow) trouble, and (red) alarm; trouble and alarm shall also be annunciated on an alpha-numeric display which will give device number and location plus diagnosis of trouble. An audible device shall sound within the control panel for alarm, supervisory or trouble. This device shall have a distinct sound and shall be silenceable by the acknowledge/silence switch. Alarms shall override any trouble condition.

J. The control panel shall be capable of measuring and adjusting the sensitivity of detectors. An alpha-numeric display shall be provided to display custom messages and give readings of the detector sensitivity, detector by detector. Each device on an addressable initiating circuit shall be checked continuously to include the following: sensitivity, response, opens, shorts, ground faults, functionality and status.

K. The control panel shall report, by specific device number, any device removed from a signaling line circuit and all other devices shall continue to function.

L. The control panel shall allow changing the status of configured circuits (disabling and enabling and changing status of relays). If any change in status degrades system operation as configured, a trouble condition shall be reported and remain until system operation again meets configured status.

M. The control panel shall have the ability to support a serial port (i.e.; EIA-232C) printer terminal. This terminal shall be used for permanent records of the system’s status and
detector chamber voltages, and shall also be capable of system programming. The printer shall be UL listed for use with the control panel.

N. The control panel shall allow for expansion and shall also be configurable without system inter-wiring.

O. The system shall automatically indicate the total quantity of alarms and of troubles which have occurred prior to reset at the control unit.

P. No alarm or trouble indication shall be re-settable until it has been acknowledged. It shall not be possible to reset the system until all alarms have been acknowledged.

Q. It shall be capable of displaying up to 100 alarms and trouble conditions at any one time on the annunciator.

R. Each addressable device shall report a fault condition to the system control unit within (4) seconds in a manner such that failure of the connections or internal electronics of the device will result in trouble signal which identifies the specific device involved.

S. Addressable photoelectric type smoke detector sensitivity shall be reported at the control panel when requested. It shall be possible to change the detector sensitivity from the control panel within maximum and minimum values as defined by the UL listing of the detectors.

T. The system shall be capable of displaying detector chamber settings or sensitivity.

U. Water-flow switches, tamper switches and manual stations, shall be equipped with an addressable monitor module which shall be supervised.

V. Water-flow switch alarm operation and automatic sprinkler system supervisory switches shall be wired and annunciated in conformance with the National Fire Codes.

W. Secondary Power: The system power supply shall be provided with an integral uninterruptible power source ‘UPS’. This UPS shall provide continuous power to the system in the event of a commercial power failure. Transfer from commercial to standby power shall be instantaneous to insure proper processor operation, and indicated by flashing the system power LED. A dual rate battery charger shall be provided which is capable of recharging the batteries to 80 percent capacity in 12 hours. Loss of commercial power shall be annunciated as a system trouble. System trouble shall be indicated for any abnormal power condition. The system shall automatically reset upon the return of normal power. No operator intervention shall be required.

X. The control panel enclosure shall be suitable for surface or semi-flush mounting. A locked door shall be provided to limit access to individuals authorized access to the panel.

Y. All panel components shall be plug-in, dynamically supervised and easily replaceable. Field wiring shall be connected to the panel with removable multi-conductor connectors to facilitate rapid removal and replacement of both the components and wiring for ease of servicing the panel.

Z. Visual indicators shall be long life LED’s. Modules capable of initiating a system trouble shall display individual trouble indications on the alpha-numeric annunciator.
AA. Batteries

i. Battery shall be 12 volt, sealed lead acid type.

ii. Battery shall have sufficient capacity to power the fire alarm system for not less than 24 hours plus 15 minutes of alarm for voice evacuation and 5 minutes of alarm for non voice evacuation upon a normal AC power failure.

iii. All system batteries shall be labeled with the installation dates.

6. SIGNALING LINE CIRCUITS

A. Signaling line circuits shall be provided by an analog loop unit.

B. Each signaling line circuit shall consist of a two wire circuit, allowing multiple taps. Each signaling line circuit shall accommodate up to 198 addressable/programmable signaling devices. Each circuit shall be Style ‘4’ wiring.

C. Upon activation of any device installed in the circuit, the system shall automatically report the status of the device and initiate the sequence of operations specified for that device. Alarm shall have priority over trouble. Trouble conditions shall be reported to include the device number, location and type of trouble.

D. The signaling line circuits shall maintain complete reporting of device status while in trouble, due to any addressable device having it active transmitting component fail, open or shorted. The signaling line circuits shall detect a line break and provide information to the control panel allowing the user to determine between which two devices the break has occurred.

7. OUTPUT CIRCUIT

A. An output circuit for operation of notification appliances, leased line, city tie, or a fire suppression agent release shall be provided by a programmable module.

B. The module shall be supervised by the control unit for open and shorted circuits.

C. Output circuits may be user controlled. If such control degrades system configuration, a trouble condition shall be reported.

8. RELAY MODULE

A. A programmable relay module shall be provided for control of door holders.

B. The module shall be system interconnected and operable by the control unit or manually.

C. The module shall be Underwriters’ Laboratories, Inc. and California State Fire Marshal listed.

9. ALARM INITIATING DEVICES

A. The addressable photoelectric smoke detector shall be listed by Underwriters Laboratories, Inc. and California State Fire Marshal. The detector shall contain a long life light-emitting diode (LED) as its light source, and a photo diode as a light receiver. An automatic gain control circuit shall be provided to maintain correct sensitivity by
compensating for detector aging and dirt accumulation. The detector shall be a plug-in twist/lock unit which allows for each connection to its mounting base.

i. It shall be possible to adjust and/or electronically measure the sensitivity of each individual addressable detector from the control panel. Relative sensitivity or manual methods which check the detector at the maximum allowable obscuration will not be considered as being equivalent.

ii. The addressable photoelectric detector shall provide complete supervision of the detector optics. The detector shall be supervised for complete failure of the LED light source or a critical reduction in the light output of the automatic gain control circuit.

iii. The detector mounting base shall be of the twist/lock type with screw terminals for field wiring. Pig-tails or in line connectors will not be permitted.

B. The addressable thermal detectors shall be of the rate of rise or fixed temperature type and shall be listed by U.L. and CSFM. The addressable thermal detector shall be individually annunciated on the control panel. The addressable thermal detectors shall contain an integral alarm lamp.

C. The addressable programmable interface module shall provide an interface for direct shorting contact devices to the addressable input. This unit is used with water-flow switch; tamper switch and OS&Y valves, etc.

D. The duct smoke detector shall operate on a cross-sectional air sampling principle to overcome stratification and the skin effect. The duct smoke detector shall consist of an addressable smoke detector mounted in an air duct sampling assembly and sampling tube that protrudes across the duct of the ventilating system.

E. Manual stations, non-coded and double action, shall be of rugged construction designed for semi-flush mounting. The station shall mechanically latch upon operation and remain so until manually reset by opening with key common to the fire alarm control panel to which they are connected.

10. AUDIBLE AND VISUAL NOTIFICATION APPLIANCES

A. Audible/visual notification appliances shall be synchronized per ADA requirements and have a minimum 15 candela intensity flashing light and alarm as an integral unit. Visual notification appliances shall operate from the 24V DC polarized notification appliance circuits. All devices shall mount in 4” x 4” electrical boxes. Light will flash at the rate of one flash per second, minimum and two flashes per second maximum. Install notification appliances per ADA requirements.

B. Audible Notification appliances (horns) shall be capable of producing a synchronized temporal three patterns at a minimum dBA level of 89 dBA at 10’. All devices shall mount in 4” x 4” electrical boxes.

C. Audible Notification appliances (speakers) shall be capable of producing a minimum dBA level of 89dBA at 10’ and shall be field selectable for operating 1/8, ¼, ½, and 2 watts. All devices shall mount in deep 4” x 4” electrical boxes (extension rings may be necessary).
11. DOOR HOLDER AND RELEASE UNITS

A. Provide semi-flush wall and door mounted door holders. The armature section shall be mounted on the door per the Contract Documents. The electromagnetic section shall be semi-flush mounted in the wall. Coordinate device locations with the Contract Documents prior to installation. Door holder units shall be released by the control panel.

12. TRANSMITTERS

A. Provide and install a digital alarm communications transmitter capable of communicating with UCSB via Ethernet lines. Coordinate with the University Representative and LSS to insure compliance with UCSB reporting requirements and to insure compatibility with UCSB receiving equipment.

B. Provide a radio alarm transmitter capable of communication with UCSB. Coordinate with University Representative and LSS to insure compliance with UCSB reporting requirements and to insure compatibility with UCSB receiving equipment.

13. CONDUCTORS

A. All conductors shall be stranded copper with UL THHN 600 volt, insulation, minimum size #14 AWG or larger. The cable shall be plenum fire rated with red outer jacket when not installed in conduit. Two conductor cables shall be used with two wire devices and four conductor cables shall be used for four wire devices. Two conductor cables shall consist of one red and one black wire. Four conductor cables shall have an additional yellow and blue wire.

14. SPARE PARTS

A. Spare parts of all devices shall be provided to the University for repairs or expansion of the system to a maximum of 10% or 10 of each type. This shall include all initiating and indicating devices, control panel zone and signaling cards and any other equipment which may not be readily available to the University.

15. GENERAL

A. Control and other panels shall be mounted with clearances for observation and testing. All fire alarm terminal cabinets shall be labeled with the following; “FIRE ALARM TERMINAL CABINET.”. Flexible connectors shall be used for all devices mounted in suspended lay-in panels. All conduits, mounting boxes and panels shall be hung and fastened with fittings to insure positive grounding throughout the entire system.

B. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be permitted in fire alarm conduits. Wiring splices shall be avoided. If needed, they shall be made only in junction boxes. Splices shall be made to terminal strips, securely fastened within the junction box enclosure. Minimum acceptable size for a junction box shall be 6”x6” (4-square boxes are not considered junction boxes). All junction boxes shall be clearly identifiable in the field. Transposing or changing color coding of wires will not be permitted. All conductors shall be labeled on each end with “E-Z markers.” Conductors in cabinets shall be formed and harnessed so that each drops off directly opposite to its terminal. F.A. terminals shall be labeled. All controls, function switches, etc., shall be labeled on all equipment panels. All wiring shall be checked and tested to insure that there are no grounds, opens or shorts.
C. Paint all Fire Alarm boxes read and identify F.A. conduits with red paint every 3'-0" on center.

16. INSTALLATION

A. Locate and install equipment and accessories per approved drawings.

B. Mount control panels and terminal cabinets such that terminals are located between 42 and 66 inches above the finish floor.

C. Minimum wire size shall be No-12 AWG (No. 14 AWG permitted for circuits not exceeding 25 volts), type THHN, 600 volt, and stranded copper, installed in metallic conduit. Wire size shall be increased appropriately to maintain voltage and current capacity. All wires shall be identified with substantial markers. Spare conductors are to be provided on a ten percent (minimum two conductors) schedule per riser; annunciator panels shall be wired for full capacity. No splicing will be allowed in terminal or device boxes. All connections shall be made on terminals. There shall be no below-grade splicing. Below-grade wiring shall be listed for that intended use.

D. Conduit shall be EMT above grade and in buildings; schedule 40 PVC to be used underground. All fire alarm system wiring shall be installed in conduit independent of all other electrical conduits. Magnetic door holding circuits and other non-power limited circuits shall be in separate raceways.

E. Exposed flexible conduit as used for attachment to water-flow and valve tamper switched or similar application shall be metal-core liquid tight and shall be minimum length required for neat and secure installation. Flexible conduit lengths shall not exceed three feet. Flexible conduit shall not be buried nor located closer than 12 inches to grade.

F. In areas where smoke detectors are shown, smoke detector quantity and spacing shall be as required by the manufacturer and NFPA.

G. All fire alarm system equipment shall be installed in NEMA 1 enclosures for interior locations. Equipment shall include proper mounting boxes, hardware, and fittings for the respective building surfaces and finishes.

H. All equipment and devices installed in exterior and/or wet locations to be NEMA 4 enclosures or enclosures otherwise approved for weatherproof use.

I. Breaker panels shall be provided with lockdown clips for circuit breakers supplying fire protection circuits. Circuit breakers shall be permanently and clearly identified.

J. All duct mounted smoke detectors shall be mounted and weatherproofed to the ductwork, as required. Access panels shall be provided for all duct mounted detectors per NFPA 90A. Sampling tubes shall be accessible via DCFM approved access panels.

K. Smoke Control System Operation

i. On/Auto/Off switches and status indicators (LEDs) shall be provided for monitoring and manual control of each fan, damper, HVAC control unit, stairwell pressurization fan, and smoke exhaust fan. To ensure compliance the units supplied shall meet the following UL categories: UUKL, PAZX, UDTZ, QVAX as well as the requirements of NFPA 90A, HVAC, and NFPA 92A and
92B, Smoke Control. The control system shall be field programmable for either 90A operation or 92A/B operation to allow for future use and system expansion.

ii. The ‘OFF’ LED shall be yellow, the ‘ON’ LED shall be green, the ‘Trouble/Fault’ LED shall be amber/orange for each switch. The Trouble/Fault indicator shall indicate a trouble in the control and/or monitor points associated with that switch. In addition, each group of eight switches shall have two LEDs and one momentary switch which allow the following functions: An amber LED to indicate an ‘OFF-NORMAL’ switch position, in the ‘ON’ or ‘OFF’ position; a green LED to indicate ‘ALL AUTO SWITCH POSITION’; a local acknowledge/lamp test momentary switch.

iii. Each switch shall have the capability to monitor and control two addressable inputs and two addressable outputs. In all modes, the ‘ON’ and ‘OFF’ indicators shall continuously follow the device status not the switch position. Positive feedback shall be employed to verify correct operation of the device being controlled. Systems that indicate on/off/auto by physical switch position only shall not be acceptable.

iv. All HVAC switches (i.e., limit switches, vane switches, etc.) shall be provided and installed by the Contractor.

v. If required by the DCFM, utilize wall mounted custom graphics annunciators.

17. TESTS AND REPORTS

A. In addition to tests required in these standards, the Contractor shall perform all electrical and mechanical tests required by the equipment manufacturer, the University’s Representative and the DCFM. In addition, provide a printout of the sensitivity readings of each addressable ionization or photoelectric detector connected to the control panel. The sensitivity readings shall be for each detector at its operational location under environmental conditions.

B. The final test report shall be prepared by the Contractor. Submit 2 copies as required of the report to the University’s Representative and one copy to the DCFM. The report shall include, but not be limited to the following:

i. A complete list of equipment installed and wired.

ii. Certify that all equipment is properly installed, functions and conforms to this Campus Standard.

iii. A print out of all devices connected to the system.

iv. Sensitivity settings for each ionization and photoelectric detector as measured in place with the HVAC system operating.

v. Technician’s name, certificate number and date.

C. After completion of all the tests listed above, and reviewed and approved by the DCFM and University’s Representative of the data and test report, the Contractor shall submit the following information to the University’s Representative.
i. ‘As-built’ conduit layout diagrams including installed wiring, color coding, wire tag notations for exact locations of all installed equipment, internal wiring of equipment and battery calculations of the installed system (on permanent reproducible Mylar originals). Provide AutoCAD 2006 files to the University.

ii. Complete ‘as-built’ wiring diagrams (on permanent reproducible Mylar originals).

iii. Detailed catalog data on all installed systems components 3 copies.

iv. Final copies of the test report described above 3 copies.

D. Prior to requesting a final test, the Contractor shall conduct a 100% pre-test of all system components to insure complete operation. Once the pre-test is complete, the Contractor shall provide a signed copy of the print-out of the pre-test with a signed letter verifying that the Contractor has performed the 100% pre-test and that the system is ready for the acceptance test.

E. Final tests and inspections shall be held in the presence of the University Representative, DCFM and LSS. The Contractor shall supply personnel and required auxiliary equipment (smoke generator, decibel meter, digital manometer) for this test without additional cost to the University. The completed alarm and detection system shall be tested to ensure that it is operating properly.

F. All system testing shall be documented on forms consistent with those found in NFPA-72. At the conclusion of the system installation and acceptance testing, the contractor shall provide a ‘Record of Completion’ in accordance with the requirements of NFPA-72.

This test shall consist of:

i. Activation of all detection devices on each loop or zone. All devices of each type, ionization detector, photoelectric detector, manual pull station, thermal detectors, water flow and tamper switches shall be activated per loop or zone, and verified for proper function per the approved plans and custom message location at the control panel alpha-numeric display.

ii. Smoke detectors shall be tested using a smoke generator or a SOLO Smoke Detector Testing Tool or approved equal. Thermal detectors shall be tested using a SOLO Heat Detector Testing Tool or approved equal. Magnets are not an acceptable means of testing.

iii. Verification that all audible-visual devices operate and that the audibility of the devices is at the proper sound level (per manufacturer’s specifications) throughout the building using decibel meter.

iv. Transmit alarm and trouble signal to University Police Dispatch and confirm receipt of alarms with dispatcher.

v. The 24 Hour Battery Test shall be performed per NFPA 72.

G. If the system does not perform to the above criteria it will not be accepted and the Contractor shall correct all deficiencies and shall re-test the system at Contractor’s expense in the presence of the DCFM and LSS using the same test criteria.
H. Before final acceptance of the work, the Contractor shall deliver to the University's Representative three (3) bond copies of a composite "Operating and Shop Maintenance Manual". Each manual shall contain the following:

   i. A statement of guarantee including date of termination.

   ii. Name and twenty-four hour telephone number of the repair facility to call in the event of equipment failure.

   iii. Individual factory issued manuals containing all technical information on each specific piece of equipment installed ("typical" data sheets on manuals covering various items are not acceptable).

   iv. Copy of the system program and installed software

   v. Record drawings of the system installation.

I. It shall be the responsibility of the Contractor to obtain the above items, from factory, or elsewhere. Advertising brochures or operational instructions shall not be used in lieu of the required technical manuals. All information shall be for the specific installation for the current project.

18. Training/Software

   A. Provide (2) two full days (16 hours) of training by a field engineer employed by the equipment manufacturer. Training shall be provided at the Project site after completion of the fire alarm system installation. Provide all training necessary to factory certify (1) one University personnel in programming, maintenance and trouble-shooting of the system. Provide software of same version as installed on original disks. No copies of disks will be accepted unless authorized by the manufacturer in writing.

19. WARRANTY

   A. The contractor shall provide a one (1) year written warranty for all equipment and wiring free from inherent mechanical and electrical defects per the project's warranty requirements.

   B. The contractor shall conduct the first annual test during the warranty period in order that any discrepancies noted during the testing can be corrected as a part of the system warranty. This testing shall be included as part of the initial system installation costs.
CONTRACTOR’S STATEMENT OF COMPLIANT INSTALLATION AND AFFIDAVIT OF PERSONNEL QUALIFICATIONS

PROJECT NAME: ________________________________________________________________

PROJECT NUMBER: ___________________________________________________________

I, the undersigned California Contractor’s License C-10 licensee or agent, attest under penalty of perjury that the following information is true and correct:

1) The fire alarm system shall be installed in the project noted above and meets the requirements of the approved design documentation of the 1999 edition of the National Fire Alarm Code (NFPA 72), and shall be fully tested in accordance with Chapter 7 of NFPA 72 – 2002.

2) That the following personnel shall participate in the installation of the fire alarm system as described above:

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* Level of Qualification: AB931 Journeyman Electrician, AB931 Fire/Life Safety Technician, AB931 Apprentice, NICET II or higher, other. If other, please specify qualifications level.

Use additional sheets if necessary.

Date: __________________________ Signature: __________________________________

C-10 License #: __________________ Print Name: __________________________________