

PART 1 GENERAL

1.01 Scope of Standard

- A. This Standard is intended to assure that fire alarm and signaling systems at Sam Houston State University provide the highest level of life safety possible. This document is not intended to be a guide specification.

1.02 Scope of Work

- A. This standard is to be used in the development of all fire alarm and signaling system designs for buildings and structures at SHSU.
- B. This standard is to apply to all fire alarm and signaling system components and equipment installed at any SHSU campus during new construction or as part of any building rehabilitation project as defined by NFPA.
- C. The work addressed in this section consists of a fire protection system, which may include, and at least will be coordinated with all of the following building systems or components:
 - 1 Fire Suppression Systems.
 - 2 HVAC, fire, smoke, and combination fire/smoke dampers.
 - 3 Emergency power systems.
 - 4 Elevator installation. See the Texas State Elevator Code ASME/ANSI A17.1 and ASME/ANSI A17.3.
 - 5 Central Control and Monitoring System.
 - 6 Security Systems.
 - 7 Gas Detection Systems
 - 8 Mass Notification Systems
 - 9 Smoke Control Systems

1.03 System Features

- A. All system product lines shall be comprised of components capable of providing the following features when appropriate and specified by the project documents or the University:
 - 1. Floor above/floor below notification.
 - 2. Private alarm notification.
 - 3. Not Used
 - 4. Voice alarm notification.
 - 5. Not Used.

6. Elevator capture/recall.
7. Elevator power shunt trip.
8. Smoke control/fan shutdown.
9. Door release.
10. Release locks on normally locked egress doors.
11. Release and monitoring of clean agent and/or pre-action sprinkler systems.
12. Alarm Verification.
13. Monitor non-water based fire suppression systems.
14. Multiple channel digital voice. Intelligibility
15. Provisions for Mass Communication notification

B. Provide audible notification throughout the building in accordance with NFPA 72.

- 1 Acoustically Distinguishable Spaces (ADS) assignments shall be submitted for review and approval.
- 2 Each ADS shall be identified as requiring or not requiring voice intelligibility.
- 3 For Residence Life Buildings provide individually silence able general alarm horn and strobe on the building exterior

1.04 Description of Work

- A. All designs shall provide for each building a complete and working digital, addressable, closed circuit, automatic and manual fire detection / alarm and signaling system for each floor of the building to perform detection, monitoring, signaling and other alarm and control functions for the building.

1.05 Fire Alarm and Signaling System Engineering Documents and Bid Design Documents

A. Approval and Acceptance

- 1 The Authority Having Jurisdiction (AHJ) shall be notified prior to installation or alteration of equipment or wiring.
- 2 At the AHJ's request, complete information regarding the system or system alterations, shall be submitted for approval.
- 3 Neither approval nor acceptance by the AHJ shall relieve the designer(s) or installer(s) from providing a system compliant with all governing laws, codes or standards.
- 4 Deviations from requirements of governing laws, codes or standards, shall be clearly identified and documented as such. Documentation of equivalencies shall be provided in accordance with NFPA 72, Section 1.5.

B. Design Documents

1. Prior to installing new systems, replacing an existing system, or upgrading a System, preliminary design documents shall be prepared.
2. Systems that are altered shall have design documents prepared that are applicable to the portion(s) of the system being altered.
3. Preliminary design documents shall contain but not limited to the following information related to the system.
 - a. Specifications applicable to the project.
 - b. Floor plan scale shall be not smaller than 1/8" = 1' and shall include a bar scale on the respective sheets.
 - c. When devices are shown on preliminary drawings, the devices shall be located in accordance with standards, listings, and limitations of the equipment specified. When no particular product limitations are specified, the prescriptive criteria of applicable standards shall be used.
 - d. Interface between systems such as fire alarm, mass notification, security, HVAC, smoke control, elevators, access control, other fire protection systems, etc.
 - e. Input/Output matrix showing sequence of operation between actions.
 - f. Survivability of system circuits and equipment.
 - g. Input Devices
 - iii. The location of detectors used to monitor HVAC systems, close dampers and/or control smoke management systems shall be the sole responsibility of the fire alarm system engineer, and/or preliminary design professional. The engineer, and/or preliminary design professional of fire alarm system shall coordinate with the mechanical engineer to properly locate detectors used to monitor HVAC systems, close dampers and/or control smoke management systems.
 - h. Audible Notification
 - iv. The architect, engineer, and/or preliminary design professional shall identify the need for, and provide provisions for acoustical treatments required to achieve speech intelligibility.

1.06 Quality Assurance

A. Fire Alarm Contractor Qualifications:

- 1 Authorized and designated representative of fire alarm manufacturer to sell, install, and service proposed manufacturer's equipment. The contractor shall have a minimum of 2 factory trained and certified technicians for the system proposed.
- 2 Licensed by the Texas State Fire Marshal's Office to sell, install, and service fire alarm systems.
- 3 Actively engaged in business of selling, installing, and servicing fire alarm systems for at least five years with minimum of ten such installations completed and operating properly.
- 4 Equipment furnished shall be of current manufacture.

B. Fire Alarm and Signaling System Shop Drawing Designer and System Programmer Qualifications

- 1 Personnel who are factory trained and certified for fire alarm system design and emergency communications system design and programming of the specific type and brand of system and who are acceptable to the SHSU AHJ.
- 2 The programming shall be performed by NICET III technician.
- 3 The system designer and programmer shall provide evidence of their qualifications and/or certifications to the SHSU AHJ. SHSU reserves the right to disqualify any system designer and programmer.
- 4 Shop drawings shall be revised as necessary following installation to represent as-built conditions and include record drawings on all new systems and any system modifications.

C. System Installer

1. The system installer shall provide evidence of their qualifications and/or certifications to the SHSU AHJ. SHSU reserves the right to disqualify a system installer.
2. SHSU requires the installers be direct employees of the fire alarm company awarded the fire alarm contract. No third party sub-contactors shall be allowed.

- D. The equipment furnished shall be listed and approved by a testing laboratory that have been approved by the Texas Department of Insurance. This listing shall be for all functions required by this specification.

- E. The Contractor shall provide a signed "Fire Alarm and Emergency Communication System Inspection and Testing Form" for each system, consisting of completed copies of the appropriate pages from NFPA 72, at the final Acceptance Test. The fire alarm contractor shall attach the appropriate fire alarm tags to the panel as required by the State of Texas.
- F. The fire alarm contractor shall provide the Texas Insurance Code Fire Alarm System Installation Inspection Form to the SHSU FSSS & AHJ at the following intervals:
- 1 At the completion of the device back-box installation but prior to the start of cable installation;
 - 2 At the completion of cable installation but prior to the start of device installation; and
 - 3 At the completion of device installation but prior to activating the fire alarm system.

G. NOT USED

H. NOT USED

1.07 Submittals

Prior to installation, the following documents shall be provided to the Sam Houston State University AHJ and FSSS for reference and/or approval:

- A. Shop Drawings: Include manufacturer's name, model numbers, ratings, power requirements, equipment layout, conduit, device arrangement, and complete point to point wiring diagrams along with other required information including but not limited to:
1. General Drawing Notes
 2. Electrical back box requirements
 3. Control Equipment Schedules
 4. Panel Schematics showing all connections, between modules within panels, to all modules from field wiring with zones identified.
 5. Riser Diagrams indicating circuits, type of devices, number of devices, number of conductors, conduit size, junction boxes, and zones.
 6. Scaled floor plans with layout of all devices with point numbers for initiating and

- notification devices, wiring connections, zoning, wire sizes and routing.
- a. Wattage setting for each speaker labeled adjacent to the speaker.
 - b. Candela rating for each strobe labeled adjacent to the strobe.
 - c. All new devices, existing devices and devices to be removed shall be shown.
7. Detailed input/output matrix.
- B. Product Data: Provide electrical characteristics, connection requirements and compatibility listing showing that components are compatible with each other including but not limited to:
1. Full equipment list including model numbers and quantities
 2. Complete system operation
 3. Highlighted Data Sheets on Devices and Products
 - a. Fire Alarm Control Panel
 - b. Wiring
 - c. Batteries
 - d. Detectors
 - e. Manual Stations
 - f. Audible Signaling Devices
 - g. Visual Signaling Devices
 - h. Control Devices
 4. Wiring diagrams of all equipment
 5. Installation instructions for all equipment
 6. Equipment testing procedures
 7. Equipment maintenance manuals
 8. Wire data sheets.
- C. System Calculations - Complete calculations shall be provided which show the electrical load on the following system components (identify all mathematical formulas, variables, and constants used in all calculations):
- 1 Each system power supply, including stand alone booster supplies
 - 2 Standby Battery Calculations plus a 20 percent de-rating factor
 - 3 Voltage drop calculations for each type of circuit
 - 4 dB loss calculations for speaker circuits
 - 5 Speaker circuit loading and amplifier loading
 - 6 Strobe circuit loading
 - 7 Each auxiliary control circuit that draws power from any system power supply
 - 8 120VAC power requirement calculations
- D. Software and Database Information:

- 1 Proposed point numbers.
 - 2 Labels of all addressable devices.
 - 3 English action messages.
 - 4 Add Programming rules, Equations, with comments listed.
 - 5 Send a copy to FSS & PMCS Project Support Fire Protection Engineer.
- E. The submittal package shall be signed by the State of Texas Fire Alarm Planning Superintendent (NICET III) or signed and sealed by a Professional Engineer (P.E.) registered in Fire Protection in the State of Texas.
1. All Code deficiencies and/or variances shall be noted on the fire alarm submittals and/or drawings.

PART 2 PRODUCTS

2.01 Fire Alarm Control Units (FACU)

- A. Acceptable Manufacturers models Edwards EST3. No Substitutions will be allowed.
1. All Fire Alarm System components shall be keyed alike.
 2. All initiating devices shall be Edwards System Technology (EST).
- B. NOT USED
- C. NOT USED
- D. NOT USED
- E. NOT USED
- F. Panels shall have provisions for smoke detector "Alarm Verification" for Signaling Line Circuits shall be provided.
- G. Manufactured terminal boxes labeled "FIRE ALARM TERMINAL BOX" Space Age TC2 series or equal.
- H. With each installed field device affix a label to indicate the devices full address on its signaling line circuit.
- I. Legibly mark each cable or wire to designated terminal with labeling tool. All Labels must include both source and destination at each end of the cable or wire.
- J. All FACUs shall provide twenty percent (20%) excess power supply, input circuit, and output circuit capacity at final acceptance to allow for future expansion by the owner.

- K. Zone labeling shall be textual by alpha-numeric display at the FACU and remote annunciator to allow “first response” by persons not trained in fire alarm technology.
- L. Textual (alpha-numeric) language shall be conventional, concise, clear and accurate to facilitate rapid response. The label shall contain the device type, floor location, equipment or area served, and an exact device location,
- M. Where a clean agent fire suppression system and/or pre-action sprinkler system is specified for the project, the FACU shall be UL listed for releasing service of the pre-action and/or clean agent system specified in Section 5.21.20. Initiating devices shall be connected to a UL listed releasing panel. All initiating, output and releasing circuits shall reside in one fire alarm control panel.

2.02 Remote Monitor

- A. All systems shall be capable of interconnection to the Campus-Wide Proprietary Supervisory Signaling System
- B. The programming of the campus wide supervisory signaling system shall be done by a fireworks factory certified technician approved by SHSU FSSS and AHJ.
- C. Communication shall be via internet protocol (IP) “Edwards” Ethernet network.

2.03 Distributed Power Supplies

- A.

2.04 Manual Pull Stations

- A. All manual pull stations shall be of the "double-action" type to reduce unintentional or vandal alarms. Pull stations required to break glass to activate are not acceptable. Provide pull stations that utilize the same key as FACU for resetting.
- B. Each manual pull station shall have a unique digital address on the SLC.
- C. Where separate addressable monitor modules are used for monitoring conventional type manual pull stations, the modules are required to be installed within the manual pull station back box.

3.01 Signaling Line Circuits (SLC)

A NOT USED

B. All the following devices/appliances shall be individually addressed on the SLC:

1. Smoke detectors.
2. Heat detectors.
3. Manual stations.
4. Monitor devices.
5. Control devices.
6. IDCs.
7. Audio NACs.
8. Visual NACs.

3.02 Initiating Device Circuits (IDC)

A. Initiating Device Circuits (IDCs) shall be monitored at a level of Class B.

3.03 Notification Appliance Circuits (NAC)

A. All Notification Appliance Circuits (NACs) shall be monitored at a level of Class B.

B. Direct current notification appliance power provided from a distributed power supply shall be controlled by a digital addressable control device on the SLC.

3.04 Auxiliary Functions

3.05 Positive Alarm Sequence

3.06 Voice Alarm Notification

A. Provide speakers for annunciation of voice messages. Signals generated shall be the Distinctive Evacuation Signal (three-pulse temporal pattern) alternated with the custom message listed below in 3.07B.

B. Audible message required for voice evacuation shall be pre-programmed or upon approval of the SHSU FSSS & AHJ recorded as specified by SHSU.

C. Digitized audible evacuation messages shall sound once and shall be preceded by a minimum of two cycles of the three pulse temporal pattern emergency evacuation signal.

D. NOT USED

3.07 Fan Shutdown, Dampers, and Smoke Control

3.08 Automatic Door Control

3.09 Wiring

A. All wiring shall be run square and plum to building structure. All plenum rated wiring not run in conduit shall utilize a manufactured wiring management system.

B. All system wiring shall be color coded in accordance with the following:

1. Exposed Fire Alarm System wiring shall not be painted over
2. All wiring shall be RED.

PART 4 SPECIAL CONDITIONS

4.01 General

A. It is the responsibility of the Contractor to assure that there is no disruption of the University's normal functions during construction such as studying, testing, class, research or administration.

4.02 Connecting to or Modifying Existing Systems

A. Operating, modifying, and connecting to existing fire alarm systems shall be supervised and/or coordinated by the SHSU Fire Safety Systems Shop (FSSS) staff. Documentation indicating all changes shall be provided at the FACU before the changes are made.

B. Existing systems shall remain operational during modifications or additions to the existing system throughout the duration of the project.

C. Where part or all of the existing fire alarm system is required to be demolished, remove the existing fire alarm components only after the new system installation is complete and accepted by FSSS and SHSU AHJ where feasible.

D. Existing equipment that is required to be salvaged by the University shall be stored in a secure area designated by the University.

PART 5 TESTING

5.01 General

- A. Upon completion of the system, the Fire Alarm Contractor shall perform a complete and comprehensive test of the entire system in accordance with the provisions of NFPA 72. The Fire Alarm Contractor shall document their testing electronically using building reports.com. This test shall be under the direct supervision and participation of SHSU FSSS. This test shall be a 100% activation of all initiating, supervisory and notification devices.
- B. It is the responsibility of the Fire Alarm Contractor to demonstrate to the University that the system is installed and functions in accordance with the project documents and applicable codes.
- C. Prior to substantial completion, SHSU will use SHSU personnel and/or an independent third party inspection as required by State Fire Marshal. Contactor shall fix any deficiencies to the satisfaction of the third party at no cost to SHSU.

D. Fix Deficiencies:

A copy of the formatted check list shall be transmitted to the contractor to serve as a punch out list for the correction of the noted deficiencies, The Contractor shall notify the verifying party in writing that the deficiencies have been corrected along with a copy of the punch out list with the corrected deficiencies initialed by the Contractor to indicate the corrections. The Fire Alarm Contractor shall provide updated certification forms as set forth in Section II Certification of this document.

5.02 Specific Tests

- A. An acceptance test will be conducted at the completion of each project. The test will be the responsibility of the Fire Alarm Contractor and shall be performed in strict compliance with the provisions of NFPA 72. This test shall be under direct supervision of SHSU FSS. This test shall be 100% test of all devices.
- B. In addition to the provisions of NFPA 72 and/or the above paragraph, it is the responsibility of the Fire Alarm Contractor to provide all of the following:
 - 1 Smoke detector sensitivity report.
 - 2 Pressure differential readings for duct detector sample air flow.
 - 3 Closed loop resistance and EOL resistance readings for all field wiring.
 - 4 Provide field dB measurements on as-built drawings.
 - 5 Creation of an account on Building Reports.com

PART 6 DOCUMENTATION

6.01 Warranty and Maintenance

- A. The contractor shall warranty all materials, installation and workmanship for two (2) years from date of acceptance by the SHSU, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with closeout documentation and included with the operation and installation manuals.
- B. Materials, installation or workmanship found to be defective during that period shall be replaced without cost to the SHSU. This Contractor shall initiate repair of any warranty defects within 8 hours of notification of such defects and shall be repaired within 24 hours.
- C. The warranty or any part of the warranty shall not be made void by any required operation or inspection of the system after acceptance during the warranty period.
- D. If the Owner experiences more than two Nuisance alarms or unexplained false alarms or troubles in any 24-hour period while the system is under warranty, the Contractor shall provide the necessary labor, materials, and technical expertise to promptly correct the problem(s) at no cost to the SHSU.
- E. The fire alarm contractor shall maintain a service organization with adequate spare parts stock within 75 miles of the installation.
- F. Spare Parts - The Contractor shall supply the following spare parts:
 - 1 Automatic detection devices - Two (2) percent of the installed quantity of each type.
 - 2 Manual fire alarm stations - Two (2) percent of the installed quantity of each type.
 - 3 Modules - Two (2) percent of the installed quantity of each type.
 - 4 Audible and visible devices - One (1) percent of the installed quantity of each type and color, but no less than two (2) devices.
 - 5 Keys - A minimum of three (3) sets of keys shall be provided and appropriately identified.
 - 6 FACP parts to include FACP modules required to get a failed system back up and operating 100%. No more than 2 panel device modules and no less than 1 panel device modules.

6.02 Training

- A. Provide services of manufacturer's representative to instruct Owner's personnel in operation and maintenance of system for a minimum of two 4 hour sessions.
- B. Factory training if necessary at the expense of the Fire alarm contractor for two SHSU FSSS Personnel is required for the installed system. Expenses shall include all travel, hotel, meals, training and training materials.

6.03 Supervising Station Programming

- A. Upon completion of the fire alarm system and the final acceptance test, the contractor shall program the new building alarm system into the University's central monitoring station.
- B. The programming shall be coordinated with and supervised by SHSU FSSS.
- C. A signal verification test shall be conducted to verify communication between the FACU and the central monitoring station.

END OF STANDARD