



FLORIDA ATLANTIC UNIVERSITY

FIRE ALARM SYSTEM INSTALLATION MANUAL

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PART ONE: GENERAL

I. CODE REQUIREMENTS

The latest editions of the following codes and standards shall apply as a minimum, but not be all-inclusive, to the design and installation of fire alarm systems:

- Florida State Fire Prevention Code
- National Fire Protection Association (NFPA) 101 – Life Safety Code
- Florida Building Code (FBC)
- NFPA 1 - National Fire Prevention Code
- NFPA 70 - National Electrical Code
- NFPA 72 - National Fire Alarm Code
- NFPA 80 - Fire Doors and Windows
- NFPA 90A - Standard for Air Conditioning and Ventilating Systems
- NFPA 170 - Fire Safety Symbols
- ANSI/ASME A17.1 - Safety Code for Elevators and Escalators as adopted by the State of Florida.
- Americans with Disabilities Act (ADA)

II. SYSTEM DESCRIPTION

- All new fire alarm and detection systems shall be analog/addressable systems.
- The system and components shall be compatible.

III. QUALITY ASSURANCE

The system and all components shall be listed by Underwriters Laboratory (UL) for fire protective signaling service (local and remote station, emergency communication and relocation equipment, and protective signaling systems) under UL 864.

IV. SEQUENCE OF OPERATION

A. Manual Pull Station

Activation of any manual pull station shall automatically operate all audible and visual appliances and produce an alarm signal at the control unit and the remote annunciators. All manual pull station signals shall be automatically transmitted to Florida Atlantic University Police Department (FAUPD) as a “FIRE” signal.

B. Smoke Detector

Activation of any smoke detector shall start the alarm verification mode. When the smoke detector latches into the alarm mode, the fire alarm system shall automatically operate all audible and visual appliances and produce an alarm signal at the control unit and at the remote annunciators. All smoke detector alarm signals shall be automatically transmitted to FAUPD as a “FIRE” signal.

1. **Elevator Recall**

Smoke detectors at elevator landings, in elevator machine rooms, and in elevator shafts shall also recall the elevator to the designated floor or to the designated alternate floor as required by the elevator safety code.

2. **Door release**

Smoke detectors used to shut smoke or fire doors shall release the detector’s associated door. Smoke detectors used to shut a door in a fire rated stair enclosure shall release all of the doors in the stair enclosure. Smoke detectors used to release doors shall be provided with an alarm verification feature and shall indicate a supervisory signal only.

3. **Suppression System Activation**

Smoke detectors used to activate a fire suppression system (pre-action sprinkle system, deluge system, special extinguishing system) shall be cross-zoned. Cross zoning of detectors reduces the allowable spacing for the smoke detectors by half.

C. Heat Detector

Activation of any heat detector shall automatically operate all audible and visual appliances and produce an alarm signal at the control unit and at the remote annunciator. All heat detectors’ alarm signals shall be automatically transmitted to FAUPD as an “ALARM” signal.

1. **Elevator Shunt-Trip**

Heat detectors in elevator shafts and in elevator machine rooms shall also operate the shunt trip circuit breaker for the elevator main line in accordance with elevator safety code.

2. Suppression System Activation

Heat detectors may be used in conjunction with smoke detectors to activate a fire suppression system (pre-action sprinkler system, deluge system, or special extinguishing system).

D. Water Flow Alarms

Activation of a water flow alarm shall automatically operate all audible and visual appliances and produce an alarm signal at the control unit and at the remote annunciator. Each individual water flow switch shall have a distinct address. All water flow signals shall be automatically transmitted to FAUPD as a “FIRE” signal.

E. Valve Tamper Switch

Activation of a valve tamper switch shall initiate a supervisory alarm at the system control panel and at the remote annunciator. Supervisory audible and visible alarms at these locations shall be distinct from either alarm or trouble conditions involving the same or related devices. Each individual tamper switch shall have a distinct address. All valve tamper alarms shall be transmitted to FAUPD as a “SUPERVISORY” signal.

F. Duct Smoke Detector

Activation of a duct smoke detector shall initiate a supervisory alarm at the system control panel and at the remote annunciator. Duct smoke detector activation shall also initiate an air handler unit shutdown as required by NFPA 90A. All duct detector alarms shall be transmitted to FAUPD as a “SUPERVISORY” signal.

G. Fire Pump Supervisory Signals

In buildings with fire pumps, individual supervisory signals shall be provided for the following conditions:

- I. **Fire Pump running.**
- II. **Fire Pump loss of power in any phase.**
- III. **Fire Pump phase reversal.**

Activation of a fire pump supervisory signal shall initiate a supervisory alarm at the system control panel and at the remote annunciator. Each set of contacts in the fire pump controller shall have a distinct address. All fire pump supervisory signals shall be transmitted to FAUPD as a “TROUBLE” signal.

H. High/Low Pressure Signal

Buildings with dry pipe or pre-action sprinkler systems shall provide a supervisory signal for system high or low air pressure. Activation of a high/low air signal shall initiate a supervisory alarm at the system control panel and at the remote annunciator. Each pressure switch shall have a distinct address. All high/low air supervisory signals shall transmit to FAUPD as a “TROUBLE” signal.

I. Trouble Signals

Loss of primary power, short circuit, open faults, ground faults, missing detectors, abnormal detector status (e.g., dirty detector, replacement incompatible with the defined address), disabled devices and abnormal control functions shall initiate audible and visible trouble signals at the control unit and remote annunciator. Audible trouble signals shall sound until silenced. Silenced trouble signals shall be continuously indicated by a textual message and a trouble LED until restored to normal operation. The trouble LED shall remain illuminated until all abnormal conditions are cleared. Upon return to normal operation, the audible trouble signal shall resound until restored to normal position. Subsequent trouble events shall resound audible trouble signals until silenced. All trouble events shall automatically be transmitted to FAUPD as a “TROUBLE” signal.

J. Smoke Control Systems

1. Stair Pressurization System

Stair Pressurization Systems shall be activated for any alarm signal in the building. Stair Pressurization systems shall also be manually activated at the annunciator panel with a key operated switch.

2. Atrium Smoke Removal Systems

Atrium Smoke Removal Systems shall be activated by any atrium water flow switch or atrium smoke detector. Atrium Smoke Removal Systems may also be manually activated at the atrium smoke removal control panel with a key operated switch.

K. Special Door Locking Arrangements

1. Delayed Egress Locks

Doors with delayed egress locks installed in accordance to NFPA 101 shall unlock upon activation of the fire alarm system.

2. Stair Enclosure Doors

Stair enclosure doors that do not permit re-entry in accordance to NFPA 101 shall unlock upon activation of the fire alarm system.

PART TWO: COMPONENTS

I. COMPONENTS

A. Control Panel

The fire alarm and detection system shall be a microprocessor based, power limited, supervised, 24 VDC, non-coded system. The system shall be capable of providing the following functions:

1. **Integral clock/calendar**
2. **Alarm verification (assigned by detector address)**
3. **Three pulse temporal pattern evacuation signals**
4. **The following manufacturers and systems, shall be acceptable:**
 - a. **Cerberus Pyrotronics**
 - b. **Simplex Time Recorder**
 - c. **Notifier**

B. Fire Alarm Annunciator

Textual annunciation shall be provided at the control unit and remotely in a location designated by the architect and approved by the State Fire Marshal. The connection between the remote annunciator and the system control panel shall be electrically supervised. A building graphic shall be provided above each remote annunciator. Each building graphic shall include the building outline, all stairs, all exterior doors, all elevators, the location of the fire department connection, the location of the fire alarm panel, and the location of the main sprinkler valve.

C. Supervision

Style 4 (class B) supervision of all initiation devices is required. Notification appliance wiring shall also be style Y (class B).

D. Power Supply

The primary power supply shall consist of a two wire 120 VAC branch circuit from the emergency power distribution panel. The branch circuit disconnect shall be arranged and protected to prevent inadvertent disconnection and ensure optimum reliability. Standby power consisting of rechargeable batteries shall be provided. Batteries shall be

capable of powering the system in the normal mode for 24 hours followed by five minutes of operation in the alarm mode. The **battery box** is located adjacent to the FACP. Auxiliary batteries shall be stored in a battery box.

E. Voice/Alarm Systems

Each voice/alarm system shall be capable of providing the following functions:

1. **User defined automatic voice evacuation message. Message shall be in a female voice.**
2. **Public address at control unit.**

F. Alarm Initiating Devices

Alarm initiating devices consist of conventional analog detectors and manual stations connected to the system control unit via style D or style 6 (class A) circuits.

1. **Duct Smoke Detector Assemblies**

Duct smoke detector assemblies shall consist of an analog duct detector (ionization or photoelectric) and an air duct sampling assembly with sampling tube and detector housing. Each duct smoke detector shall be provided with a remote alarm lamp and keyed test switch located in a visible and accessible location.

2. **Addressable Manual Station**

Manual station shall be red in color, non-coded, and mounted in a listed back box. Manual station covers shall be hinged and secured with a lockset. A listed manual pull stations cover shall be installed in areas subject to damage, vandalism, and/or false alarms.

3. **Addressable Heat Detectors**

Addressable heat detectors shall be a plug-in type with base. The detector base shall be the twist lock type with screw terminals for field wiring. Addressable heat detectors shall be the rate compensated type.

G. Notification Appliances

Alarm Notification Appliances shall consist of audible and visual signals for public signaling of fire. All notification appliances subject to damage and/or vandalism shall be protected. All exterior devices shall be properly listed for out side installation.

PART THREE: EXECUTION

I. INSTALLATION

A. Qualifications

An experienced fire alarm technician or fire protection engineer with no less than five years experience with fire alarm systems shall supervise the system design and installation. The technician or engineer constitutes an affidavit that the statements, representations, and information presented in the submittal constitute a complete operational system confirming with the applicable codes and recognized engineering practices.

II. FIRE ALARM CONTROL PANEL (FACP)

A. The FACP shall be located in the following areas:

1. In buildings with automatic sprinkler system, the FACP shall be located in the same room as the sprinkler system valve.
2. In buildings without sprinkler systems, the FACP shall be located in the main electrical room.
3. In areas approved by the authorities having jurisdiction.

III. ANNUNCIATOR PANEL

Annunciator panels shall be located at the main entrance of the building, in a public area such as a lobby, and in plain view, unobstructed by the opening of doors or other parts of the building. The annunciator panel lockset shall be keyed the same as for the FACP.

IV. INITIATING DEVICES

A. Manual Pull Stations shall be provided at the following locations:

1. Each floor's stairway enclosure exits, on the corridor or room side, located not more than 5 feet from the stairway door.
2. All doors opening to the exterior of the building.
3. Exits from high hazard occupancies. (High hazard as defined by NFPA101)
4. Exits with Class A&B Assembly Occupancy.
5. Where required by NFPA 72 standards.

6. Manual pull stations shall be located so the travel distance to any station from any point in the building does not exceed 200 feet.
7. Manual Pull Stations shall be installed 42 to 54 inches above the finished floor, and must be readily accessible, unobstructed and visible.

B. Smoke Detectors

Analog smoke detectors shall be installed in accordance with NFPA 72 at the following locations:

1. Elevator lobbies as required by the elevator safety code.
2. Elevator machine rooms as required by the elevator safety code.
3. Top and bottom of each sprinkled elevator shaft as required by the elevator safety code.
4. Atriums with smoke removal systems as required by NFPA 101.
5. High-value and high-risk areas such as art galleries, archival records storage rooms, library stack areas, and computer rooms.
6. Doors with magnetic hold-open devices.
7. At each FACP.
8. As required for activation of a pre-action sprinkler system and other special fire suppression systems.
9. All smoke detectors shall be programmed for a 30 second alarm verification cycle.

C. Duct Smoke Detectors

Duct smoke detectors shall be provided for mechanical unit shut down as required by NFPA 90A.

D. Heat Detectors

Heat detectors shall be provided in accordance with NFPA 72 at the following locations.

1. In all sprinkled elevator machine rooms within two feet of the sprinkler head as required by the elevator safety code.
2. The top of each sprinkled elevator shaft, and the bottom of each elevator shaft within two feet of the sprinkler head as required by the elevator safety code.

3. In any un-sprinkled storage room, mechanical room and electrical room.
4. As required for activation of a pre-action sprinkler system and other special fire extinguishing systems.

E. Interface Modules (Monitor)

Addressable interface modules shall be provided to monitor any conventional (non-addressable) alarm notification appliance such as:

1. Non-addressable smoke detectors.
2. Non-addressable heat detectors.
3. Valve tamper switches and sprinkler system butterfly valves.
4. Water flow switches.
5. Pressure switches.
6. Fire pumps supervisory alarms.
7. Kitchen suppression system activation.

F. Interface Modules (Control)

Addressable interface modules shall be provided within three feet of the specific device for the control of the following auxiliary functions:

1. HVAC Shutdown: Turns off the respective air handler upon activation of associated smoke detector.
2. Door Holders: releases doors automatically upon activation of associated smoke detector.
3. Door Lock Release: Unlocks all doors with special locking arrangements as required by NFPA 101.
4. Elevator Recall: Recalls elevators as required by the elevator safety code.
5. Elevator Shunt Trip: operates the shunt trip circuit breaker for the elevator main line in accordance with the requirements of the elevator safety code.

G. Water Flow Detectors

Water flow detectors shall be provided to monitor sprinkler systems for water flow and shall be provided the following:

1. Each alarm check valve. (pressure switch).
2. Each dry pipe valve. (Pressure switch).
3. Each pre-action system valve. (Pressure switch).
4. Each sprinkler or standpipe riser.
5. Each sprinkler system zone on a floor, one flow switch per zone.

H. Sprinkler/Standpipe Valves

Provide supervision for each sprinkler/standpipe system control valve.

I. Fire Pump Supervision

Provide individual supervision of each fire pump for the following fire pump alarms:

1. Fire pump running.
2. Fire pumps loss of power in any phase.
3. Fire pumps phase reversal.

J. High/Low Air Pressure Supervision

Provide supervision of low and high air pressure for each dry pipe system and each pre-action system.

V. OFF-SITE SUPERVISION

Provide in or adjacent to the control panel, all equipment and wiring necessary to connect system to the campus police. Activation of any of the following signals shall automatically be reported to FAUPD via telephone line.

A. ALARM

B. SUPERVISORY

C. SYSTEM TROUBLE

VI. WIRING

All field wiring shall be installed in conduit. Conduit and boxes shall be sized according to National Electrical Code requirements based on the number of conductors.

VII. IDENTIFICATION

Fire alarm circuits shall be identified by red junction box covers stenciled in white letters "FIRE ALARM" and circuit breakers shall meet NFPA 72.

VIII. SYSTEM TESTING

All initiating and notification appliances, control equipment, accessories, and auxiliary functions shall be tested in accordance with NFPA 72 acceptance test procedures.

IX. TRAINING

Provide training for a minimum of two university representatives.