

28 31 00 - Fire Detection and Alarm

Fire Alarm System: General:

Fire Alarm System: Manufactured by an ISO 9001 certified company and meet requirements of BS EN9001: ANSI/ASQC Q9001-1994.

In-place Campus Alarm Central Station System – Provide panel components and programming of panel to work within Campus system. The system requires telephone line communication, and communication formats in Ademco Contact ID, or Radionics Modem IIe.

Scope:

Basic Performance:

- Alarm, trouble and supervisory signals from all intelligent reporting devices: Encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
- Initiation Device Circuits (IDC): Wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.
- Notification Appliance Circuits (NAC): Wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.
- On Style 6 or 7 (Class A) configurations on a single ground fault or open circuit on the system Signaling Line Circuit: Not cause system malfunction, loss of operating power, or the ability to report an alarm.
- Alarm signals arriving at the FACP: Not lost following a primary power failure (or outage) until the alarm signal is processed and recorded.
- NAC speaker circuits: Arrange such that there is a minimum of one speaker circuit per floor of the building or smoke zone, whichever is greater.
- Audio amplifiers and tone generating equipment: Electrically supervised for normal and abnormal conditions.
- NAC speaker circuits and control equipment: Arrange such that loss of any 1 speaker circuit will not cause the loss of any other speaker circuit in the system.
- 2-way telephone communication circuits: Supervised for open and short circuit conditions.

Basic System Functional Operation: When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur.

- The system alarm LED on the system display shall flash.
- A local piezo electric signal in the control panel shall sound.
- A backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
- Printing and history storage equipment shall log the information associated with each new fire alarm control panel condition, along with time and date of occurrence.
- All system output programs assigned via control-by-event interlock programming to be activated by the particular point in the alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

Submittals:

- Product data: Submit for each item, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- Shop Drawings: Submit with manufacturer's name(s), model numbers, ratings, power requirements; equipment layout, device arrangement, wiring point-to-point diagrams, and conduit layouts; annunciator layout, configurations and terminations; sections of typical trim members; and attachments to other work.
- Operating and Maintenance Manuals: Include manufacturer's name(s), technical data sheets; wiring diagrams indicating internal wiring for each device and interconnections between the items of equipment; clear, concise description of operation to properly operate the equipment and systems. Submit with shop drawings.
- Certifications for Installation Supervisor and Maintenance Personnel: From major equipment manufacturer certifying personnel are authorized representatives of the major equipment manufacturer. Include names and addresses in the certification. Submit with shop drawings.
- Comply with Section 01 33 00 – Submittal Procedures.

Post Contract Maintenance:

Provide complete maintenance and repair service for fire alarm systems from a factory trained, authorized representative of the major equipment manufacturer for a period of five (5) years after expiration of the guaranty.

Products:

Main Fire Alarm Control Panel or Network Node

Purpose: Communicate with and control intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices. Use 2-way telephone communication circuits, supervised for open and short circuit conditions.

Standard:

- Manufacturer: Notifier by Honeywell International Inc.
- Models: ONYX Series with voice notification capabilities
- Website: <http://www.notifier.com/products/controlpanels.htm>
- Note: Fire•Lite Alarms by Honeywell will be considered by Campus Facility Services on a case-by-case basis. No other substitutions allowed.

Operator Control:

- Acknowledge Switch: Upon activation in response to new alarms and/or troubles: Silence local panel piezo electric signal and change alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of switch shall advance LCD display to next alarm or trouble condition.
- Depression of switch: Silences remote annunciator piezo sounders.

Alarm Silence Switch: Upon activation: Programmed alarm notification appliances and relays shall return to normal condition after an alarm condition. Notification circuits and relay selection silenceable by switch shall be field programmable with confines of applicable standards. PACP software shall include silence inhibit and auto-silence timers.

Alarm Activate (Drill) Switch: Shall activate notification appliance circuits. Drill function shall latch until panel is silenced or reset.

System Reset Switch: Upon activation: Electronically-latched initiating devices, appliances and software zones, plus associated output devices and circuits, shall return to normal condition.

Lamp Test: Upon activation: Local system LEDs shall activate, each segment of the liquid crystal display shall light, and panel software revision shall display.

Signal Bypass Switch for Alarm Testing:

- Horns and strobes shall remain silent.
- Dampers shall remain open.

System Capacity and General Operation:

Control Panel and Network Nodes:

- Provide or be capable of expansion to 636 intelligent / addressable devices.
- Include Form-C alarm, trouble, supervisory, and security relays rated at 2.0 amps @ 30 VDC, minimum.
- Include Four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.
- Support 8 additional output modules with 8 circuits each, minimum (64 circuits) for signal, speaker, telephone, or relay. Circuits shall be either Class A (NFPA Style Z), or Class B (NFPA Style Y). {Note to Designer: Coordinate specifications and drawings.}
- Operator Interface Control and Annunciation Panel: Full featured with backlit Liquid Crystal Display (LCD), individual color coded system status LEDs and alphanumeric keypad with easy touch rubber keys for field programming and control of fire alarm system.
- Special Tools, PROM Programmers and PC Based Programmers: Not required to program, configure and expand system in the field.
- Memory ICs: Not required to be replaced to facilitate programming changes.
- Programming of System:
- Allow programming of an input to activate an output or group of outputs.
- Support 20 logic equations, minimum, including “and,” “or,” and “not,” or time delay equations for advanced programming.
- Logic equations shall require a PC with software utility design for programming.

- Not Allowed: Systems with limited programming (such as general alarm), complicated programming (such as a diode matrix), and requiring a laptop personal computer.
- Features:
- Drift compensation to extend detector accuracy of life, and include a smoothing feature allowing transient noise signals to be filtered out.
- Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.
- Maintenance alert, with two levels (maintenance alert / maintenance urgent), to warn of excessive smoke detector dirt and dust accumulation.
- Nine sensitivity levels for alarm to be selected by detector. Alarm level range between 0.5 to 2.35 percent per foot for photoelectric detectors, and 0.5 to 2.5 percent per foot for ionization detectors. Support sensitive advanced detection laser detectors with an alarm level range of 0.03 percent per foot to 1.0 percent per foot. Include nine levels, minimum of Pre-alarm, selected by detector, to indicate impending alarms to maintenance personnel.
- Display or print system reports.
- Alarm verification, with counters and trouble indication to alert maintenance personnel with a detector enters verification 20 times.
- PAS pre-signal, meeting NFPA 72 3-8.3 requirements.
- Rapid manual station reporting (under 3 seconds).
- Meet NFPA 72 Chapter 1 requirements for activation of notification circuits within 10 seconds of initiating device activation.
- Periodic detector test, conducted automatically by software.
- Self-optimizing pre-alarm for advanced fire warning, which allows each detector to learn its particular environment and set its pre-alarm level to just above normal peaks.
- Cross zoning with the capability of counting two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
- Walk test with a check for two detectors set to same address.
- Control-by-time for non-fire operations, with holiday schedules.
- Day/night automatic adjustment of detector sensitivity.
- Device blink control for sleeping areas.
- Coding:
- FACP shall be capable of coding main panel node notification circuits in March Time (120 PPM), Temporal (NFPA 72 A-2-2.2.2), and California Code.
- Panel notification circuits (NAC 1, 2, 3 and 4) shall support Two-Stage operation, Canadian Dual Stage (3 minutes) and Canadian Dual Stage (5 minutes). Two-stage operation shall allow 20 Pluses Per Minute (PPM) on alarm and 120 PPM after 5 minutes, or when a second device activates. (Canadian Dual Stage is the same as Two-Stage, except will only switch to second stage by activation of Drill Switch 3- or 5-minute timer.)
- Provide coding option to synchronize specific strobe lights designed to accept a specific “sync pulse.”
- Network Communication:

- Network Architecture: Local Area Network (LAN), a firmware package that utilizes a peer-to-peer, inherently regenerative communication format and protocol.

Protocol shall be based on ARCNET or equivalent. The network shall use a deterministic token-passing method.

Not acceptable: Collision detection and recovery type protocols; Master, polling computer, central file computer, display controller or other central element (weak link) in the network; cascading of CPUs or master-slave relationships at network level to facilitate network communications.

Nodes may be an intelligent Fire Alarm Control Panel (FACP), Network Control Station PC (NCS) or Network Control Annunciator (NCA).

Network shall be capable of expansion to 103 nodes, minimum.

Failure of a node shall not cause failure of communication degradation of other nodes or change the network communication protocol among surviving nodes located within distance limitations. Each node/panel shall communicate on the network at a baud rate of 312 KBPS (kilo bits per second), minimum.

- Network node addresses shall be capable of storing Event equations. The event equations shall be used to activate outputs on one network node from inputs on other network nodes.
- Network shall be capable of communicating via wire or fiber optic medium. A wire network shall include a fail-safe means of isolating nodes in event of complete power loss to a node.
- Network Repeaters: A network repeater shall be available to increase twisted pair distance capability in 3000-foot increments, minimum. Optionally, a repeater shall be available for fiber optics to increase the wire distance in 10 dB increments, minimum. A mix (hybrid) fiber/wire network repeater shall also be supported.

Not acceptable: Systems with distance limitations, and no means to regenerate signals.

Fiber Optic Network Communication: Network shall support the following:

- Size: 62.5 micrometers / 125 micrometers.
- Type: Multimode, Dual Fiber, and Plenum Rated.
- Distance: 10 dB, maximum total attenuation between network nodes.
- Connector Type: ST.

Central Microprocessor:

- State-of-the-art, high speed, 16-bit RISC device capable of communicating with, monitoring and controlling external interfaces.
- Include an EPROM for system program storage, Flash memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.

Capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs).

Systems that do not allow t-taps, or have restrictions (for example, in the amount of t-taps, length of t-taps, etc.) are not acceptable.

System Components

- Programmable Electronic Sounders
- Speakers
- Strobe lights meeting requirements of 2001 CBC and UL 1971, fully synchronized.
- Manual Fire Alarm Stations.
- Conventional Photoelectric Area Smoke Detectors.
- Conventional Ionization Type Area Smoke Detectors
- Duct Smoke Detectors.
- Projected Beam Detectors
- Automatic Conventional Heat Detectors
- Water Flow Indicator
- Sprinkler and Standpipe Valve Supervisory Switches
- Alphanumeric LCD Type Annunciator
- Portable Emergency Telephone Handset Jack
- Fixed Emergency Telephone Handset
- Universal Digital Alarm Communicator Transmitter (UDACT)
- Field Wiring Terminal Blocks.
- Printer
- Video Display Terminal (VDT)

Equipment and Material:

- New and manufacturer's current model.
- Materials, appliances, equipment and devices: Tested and listed by a nationally recognized approval agency for use as part of a protective signaling system, and meeting the National Fire Alarm Code.
- Fasteners and supports: Adequately sized to support the required load.

Conduit: Sized to provide 40 percent, maximum fill of interior cross sectional area.

Wire:

- Initiating Device Circuits and Signaling Line Circuits: New 18 AWG, minimum.
- Notification Appliance Circuits: 14 AWG, minimum.
- Meet local, state and national codes (e.g., NEC Article 760).
- Meet fire alarm system manufacturer recommendations.
- Listed and approved by a recognized testing agency for use with a protective signaling system.
- Wire and Cable not installed in conduit:

- Fire resistance rating suitable for the installation as per NFPA 70 (e.g., FPLR).
- Not be exposed (visible).

Wire for multiplex communication circuit (SLC):

- Twisted and unshielded, and support 12,500 feet, minimum.
- System designed to permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit.

Field Wiring: Electrically supervised for open circuit and ground fault.

Terminal Boxes, Junction Boxes and Cabinets: UL listed for purpose and use.

Capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs).

Execution:

- Initiating Circuits: Arranged to serve like categories, such as manual, smoke, and water flow.
- Mixed Category Circuits: Not allowed.
- Exception: Signaling line circuits connected to intelligent reporting devices.

Fire Control Panel:

- Connect to separate dedicated branch circuit; 20 amperes, maximum.
- Label circuit at main power distribution panel as "FIRE ALARM."
- Primary wiring: 12 AWG.
- Ground panel.