

PART I- GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 and 16 Specifications, apply to this section.

1.2 DESCRIPTION

- A. This section of the specification includes the furnishing; installation, connection and testing of the microprocessor controlled intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, control panel, modules, alarm initiating devices, alarm notification appliances, auxiliary control devices, annunciators, and wiring as shown on the drawings, and specified herein.
- B. The fire alarm system shall comply with requirements of 2002 edition of NFPA Standard 72 National Fire Alarm Code except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.
- C. The peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).
- D. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for the fire alarm applications and shall be in compliance with the UL listing.

1.3 SCOPE

- A. New intelligent reporting, microprocessor controlled fire detection and notification devices shall be installed in accordance to the project specification and drawings.

B. Basic Performance:

1. Alarm, trouble, and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B) as part of an addressable device connected by the SLC Circuit.
3. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y) as part of an addressable device connected by the SLC Circuits.
4. Digitized electronic signals shall employ check digits or multiple polling.
5. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage). The alarm signal shall be processed and recorded.

C. BASIC SYSTEM FUNCTION OPERATION

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

1. The system alarm LED on the FACP shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. A backlit 80 character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. Printing of the FACP and history storage equipment shall log the information associated each new fire alarm control panel conditions, along with the time and date of occurrence.
5. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system output (alarm notification appliances and/or relays) shall be activated.
6. Report sent to DDC Panel (Division 15)

1.4 SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.

2. All references to manufacture's model numbers and other pertinent information herein are intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufactures may be substituted for the specified equipment as long as the minimum standards are met. The Notifier shall be an authorized engineered distributor for Eastern Washington, Northern Idaho, and Northeastern Oregon. Any other manufacture must obtain prior approval per Section 00610.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacture's name (s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and approvals.
3. Show annunciator layout, configurations, and terminations.
4. Include an operational matrix per NFPA 72 with attachments of power load calculations for battery sizing, and voltage drop calculations for each notification appliance circuit.
5. Include typical wiring connection diagrams and mounting details as necessary for project.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufactures name (s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnection between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate equipment and or the system.

D. Software Modifications:

1. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades, or changes. Response time of the technician to the site shall not exceed four (4) hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modifications include addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

Modifications of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

E. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacture indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance are an authorized representative of the major equipment manufacture. Include names, NICET certification number and addresses for those certified.

1.5 **GUARANTEE**

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least twelve (12) months from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this eighteen-month period should be included in the submitted bid.

1.6 **POST CONTRACT MAINTENANCE**

- A. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacture for a period of five (5) years after expiration of the guaranty. Owner will decide at contract completion whether to obtain a quote.

APPLICABLE STANDARDS AND SPECIFICATIONS

The specification and standards listed below form a part of this specification. The system shall fully comply with the latest form of these standards.

A. National Fire Protection Association (NFPA)-USA:

No. 12	CO2 Extinguishing Systems
No. 12A & 12B	Halon Extinguishing Systems
No. 15	Water Spray Systems
No. 16	Foam/Water Deluge and Spray Systems
No. 70	National Electrical Code
N. 72-1996	National Fire Alarm Code
No. 90A	Standard for Installation of Air Conditioning and Ventilating Systems 2002 Edition
No. 92A	Mechanical Code 1996
No. 101	Life Safety Code 1996

B. Underwriters Laboratories, Inc. (UL)-USA:

No. 268	Smoke Detectors for Fire Protection Signaling Systems
No. 864	Control Units for Fire Protection Signaling Systems
No. 268A	Smoke Detectors for Duct Applications
No. 521	Heat Detectors for Fire Protection
No. 464	Audible Signaling Appliances
No. 38	Manually Actuated Signaling Boxes
No. 346	Waterflow Indicators for Fire Protective Signaling Systems
No. 1076	Control Units for Burglar Alarm Proprietary Protective Signaling Systems
No. 1971	Visual Notification Appliances

- C. Local and State Building Codes, and adopted municipal fire codes.
- D. All requirements by the local Authority Having Jurisdiction (AHJ).

1.7 APPROVALS

- A. The system shall have proper listing and/or approval from the following nationally recognized agencies:
 - UL Underwriters Laboratories, Inc.
 - FM Factory Mutual
- B. The fire alarm control panel shall meet UL Standard 864 (Control Units).

PART 2-PRODUCTS

2.1 EQUIPMENT AND MATERIAL

- A. All equipment and components shall be new, and the manufacture's current model. The materials appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.
- B. All equipment and components shall be installed in strict compliance with manufacture's recommendations. Consult the manufacture's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.2 CONDUIT AND WIRE

A. Conduit:

1. Conduit shall be in accordance with the National Electrical Code (NEC), local and state amendments.
2. All wiring shall be installed in metallic conduit or raceway. Conduit fill shall not exceed percent of interior cross sectional area where three or more cables are contained within a single conduit. PVC is permitted only for underground use.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes where conduit entry is specified by the FACP manufacture.
6. Conduit shall be 3/4" minimum.

B. Wire:

1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes; e.g. NEC article 760 and as recommended by the manufacture of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm panel system manufacturer.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wiring used for SLC multiplex communication loop shall be twisted and shielded and support a minimum wiring distance of 10,000 feet. The system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication loop.
5. All field wiring shall be completely supervised.
6. All fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems, which do not allow or have restriction in, for example, the amount of t-taps, length of t-taps etc., are not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets:

All boxes and cabinets shall be UL Listed for their intended use and purpose.

- D. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.
- E. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as "FIRE ALARM". Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded per the NEC to the building safety grounding system. Provide lockout on breakers in Panel.

2.3 FIRE ALARM CONTROL PANEL

- A. The FACP shall be a Notifier NFS-640 and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up a system: intelligent addressable smoke sensors, addressable modules, printer, annunciators, and other system control devices.
- B. Operator Display: shall consist of five (5) control keys, 80 character display and programming keypad.
- C. Acknowledge Switch:
 1. Activation of the control panel acknowledge switch in response to new alarm and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next alarm or trouble condition.
 2. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
- D. Alarm Silence Switch:
 1. Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
- E. Alarm Activate (Drill) Switch:
 1. The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

F. System Reset Switch:

1. Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal state.

G. Lamp Test:

1. The Lamp Test switch shall activate all system LEDs and light each segment of the liquid crystal display.

H. System Capacity and General Operation:

1. The control panel shall provide, or be capable of expansion to 636 intelligent/addressable devices.
2. The system shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 3.0 amps @ 30 VDC. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable notification appliances.
3. The system shall support up to 8 additional output modules (signal, speaker, telephone, or relay), each with 8 circuits for an additional 64 circuits. These circuits shall be either Class A (NFPA Style Z) or Class B (NFPA Style Y) per the project drawings.
4. The fire alarm control panel shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.
5. All programming or editing of the program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm panel control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.
6. The system shall allow the programming of any input to activate any output or group of outputs, programming (such as a diode matrix), or require a laptop personal computer are not considered suitable substitutes.
7. The FACP shall provide the following features:
 - a. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
 - b. Detector sensitivity test, meeting requirements of NFPA 72 Chapter 5.
 - c. Maintenance alerts, with three levels (maintenance, alert/maintenance, and urgent), to warn of excessive smoke detector dirt or dust accumulation.
 - d. Nine sensitivity levels for alarm, selected by detector. The system shall also include up to nine levels of prealarm, selected as a percentage of the alarm level, in steps from 90% down to 50%.
 - e. System status reports to display or printer.

- f. Alarm verification, with verification counters.
- g. PAS presignal, meeting NFPA 72 6-8.3.1 requirements.
- h. Rapid manual station reporting (under 3 seconds).
- i. Non-alarm points for general (non-fire) control.
- j. Periodic detector test, conducted automatically by the software.
- k. Self optimizing pre-alarm for advanced fire warning, which allows each detector to learn its particular environment and set its prealarm level to just above normal peaks.
- l. Cross zoning with the capability of counting: two detectors in alarm, two software zones in alarm, or one smoke detectors and one thermal detector.
- m. Walk test, with a check for two detectors set to the same address.
- n. Control-by-time for non-fire operations, with holiday schedules.
- o. Day/night automatic adjustment of detector sensitivity.
- p. Device blink control for sleeping areas.
- q. UL-1076 security monitor points.

I. Central Microprocessor

- 1. The microprocessor shall be a state-of-the-art, high speed, 16 bit RISC device an it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, non-volatile memory for building-specific program storage, and a “watch dog” time circuit to detect and report microprocessor failure.
- 2. The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
- 3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real-time clock may also be used to control non-fire functions as programmed time-of-day, day-of-week, and day-of-year.
- 4. A special program check function shall be provided to detect common operator errors.
- 5. An auto-program (self learn) function shall be provided to quickly install initial functions and make the system operational.
- 6. For flexibility and to ensure program validity, an optional *Windows*TM based program utility shall be available. This program shall be used to off-line program the system with both upload/download. This program shall also have a verification utility, which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in compliance with NFPA 72 Chapter 10 requirements for testing after system modifications.

J. Display

- 1. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

2. This display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
3. The display shall include an 80 character display with backlit Liquid Crystal Display (LCD).
4. The display keypad shall be an easy to use QWERTY type keypad, similar to a PC keyboard. This shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
5. Information displayed on the screen will include the following; detector zone identifier, time and date, addressable definition, specific geographic location, values (percent of alarm and percent of prealarm), action/status (very clean), and peak value.

K. Signaling Line Circuits (SLC)

1. The system shall include up to two (2) SLC circuits. Each SLC interface shall provide power to and communicate with up to 159 intelligent detectors (ionization, photoelectric, or thermal) and 159 intelligent modules (monitor or control) for a system capacity of 636 devices. Each SLC loop shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. The Loop Interface board (LIB) shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, prealarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
3. The detector software shall meet NFPA 72, Chapter 7 requirements and be certified by UL as a calibrated sensitivity test instrument.
4. The detector software shall allow manual or automatic sensitivity adjustment.

L. Serial Interfaces

1. The system shall include two serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Electronic Data Processing (EDP) peripherals.
2. One EIA-232 interface shall be used to connect an UL-Listed 40 or 80-column printer. Printers, which are not UL-Listed, are not considered acceptable substitutes.
3. The second EIA-232 interface shall be used to connect an UL-Listed CRT terminal. This interface shall include special protocol methods that allow off-site monitoring of the FACP over standard dial-up phone lines. This ancillary capability shall allow remote readout of all status information including analog values, and shall not interfere with or degrade FACP operations when used. It shall allow remote FACP Acknowledge, Reset, or Signal Silence in this mode. It shall also allow adjustment of the detector sensitivity and readout of the history file.
4. The system shall include an EIA-485 port for the serial connection of optional annunciators and remote LCD displays.
5. The EIA-485 interface may be used for network connection to a proprietary receiving unit.

- M. Notification Appliance Circuit (NAC) Module
1. The notification appliance circuit module shall provide four (4) fully supervised Class A or B (NFPA Style Y or Style Z) notification circuit. An expansion circuit board shall allow expansion to eight circuits per module.
 2. The notification circuit capacity shall be 3.0 amperes maximum per circuit and 6.0 amperes maximum per module.
 3. The module shall not affect other module circuits in any way during a short circuit condition.
 4. The module shall provide eight green ON/OFF LEDs and eight yellow TROUBLE LEDs.
 5. The module shall also provide a momentary switch per circuit that may be used to manually turn the particular circuit on or off or to disable the circuit.
 6. Each notification circuit shall include a custom label inserted to identify each circuit's location.
 7. The notification circuit module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal strips shall be UL listed for use with up to 12 AWG wire.
 8. Each circuit shall be capable of, through system programming, deactivating upon depression of the signal silence switch.
- N. Control Relay Module
1. The control relay module shall provide four Form-C auxiliary relay circuits rated at 5 amperes, 28 VDC. An expansion circuit board shall allow expansion to eight Form-C relays per module.
 2. Each relay circuit shall be capable of being activated (change in state) by any initiating device or from any combination of initiating devices.
 3. The expansion module shall provide 8 green ON/OFF LEDs and 8 yellow indicating disabled status of the relay.
 4. The module shall provide a momentary switch per relay circuit that may be used to manually turn the relay ON/OFF or to disable the relay.
 5. Each relay circuit shall include a custom label inserted to identify its location. Labels shall be created using a standard typewriter or word processor.
 6. The control relay module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal blocks shall be UL listed for use for up to 12 AWG wire.
- O. Enclosure
1. The control panel shall be housed in an UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant primer coat, and manufacturer's standard finish.
 2. The back box and door shall be constructed of .060 steel with provision for electrical conduit connections into the sides and top.
 3. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be selected either right or left hand hinging.
- P. Power Supply
1. The main power supply for the fire alarm control panel shall provide 6.0 amperes of available power for the control panel and peripheral devices.

2. Provision will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger for use with batteries up to 55 AH or may be used with an external battery and charger system (s). Battery arrangement may be configured in the field.
4. The main power supply shall continuously monitor all field wires for earth ground condition, and shall have the following LED indicators: Ground Fault LED, Battery Fail LED, AC Power Fail LED.
5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
6. The main power supply shall provide a battery charger for 24 hours of standby using dual-rate-charging techniques for fast battery recharge.
7. The main power supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.
8. The main power supply shall provide meters to indicate battery voltage and charging current.
9. All circuits shall be power-limited, per 1995 UL864 requirements.

Q. Field Charging Power Supply

1. The FCPS-S6 or FCPS-S8 is a device designed for use as either a remote 24-volt power or used to power Notification Appliances.
2. The FCPS-S6 shall provide 6 amperes while the FCPS-S8 will provide 8 amperes of power at 24 VDC.
3. The FCPS-S6 and S8 series remote power supply shall provide the following features:
 - Built-in synchronization
 - Four Class B (NFPA Style Y, or four Class A (NFPA Style Z with NAC module.)
 - Fully supervised power supply, battery, and NACs.
 - Built-in battery charger for charging up to 18AH battery set.
 - Sync Follower capabilities.
 - Form C normally closed trouble relay
4. The field charging power supply shall include the ability to delay the AC fail per 1996 NFPA requirements.
5. The FCPS includes power limited circuitry, per 1995 UL standards.

R. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.
2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 5 to 30 seconds and each detector shall be able to be selected for verification cycle. These counters may be displayed and reset by the proper operator commands.

3. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
4. Point Read: The system shall be able to display or print the following point status diagnostic functions:
 - Device Status
 - Device Type
 - Custom device label
 - View analog detector values
 - Device zone assignment
 - All program parameters
5. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all systems status.
6. System History Recording and Reporting: The fire alarm system control panel shall contain a history buffer that will be capable of storing up to 1000 events. 200 events shall be dedicated to alarm and the remaining events are general purpose. Each of these activations will be stored and time and date stamped with the actual time of the activations. The contents of the history buffer may be manually reviewed one event at a time, or printed in its entirety.
7. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above the or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display, and printed on the system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
9. Software Zones: The FACP shall provide 99 software zones and 10 additional special function zones.
10. The fire alarm control panel shall include a walk test feature. It shall include the ability to test initiating device circuits and notification appliance circuits from the field without returning to the panel to reset the system. Operation shall be as follows:
 - Alarming an initiating device shall activate programmed outputs, which are selected to participate in walk test, for 3 seconds.
 - Introducing a trouble into the initiating device shall activate programmed outputs, which are programmed outputs for 8 seconds.
 - Walk test shall be selectable on a per device/circuit basis. All devices and circuits which are not selected for walk test shall continue to provide fire protection and if an alarm is detected, will exit walk test and activate all programmed alarm functions.

- All devices tested in walk test shall be recorded in the history buffer.

11. Waterflow Operation:
An alarm from a waterflow detection device shall activate the appropriate alarm message on the 80-character display, turn on all programmed notification appliances circuits and shall not be affected by the signal silence switch.
12. Supervisory Operation:
An alarm from a supervisory device shall cause the appropriate indication on the 80 character display, light a common supervisory LED, but will not cause the system to enter the trouble mode.
13. Signal Silence Operation:
The FACP shall have the ability to program each output circuit (notification, relay, speaker, etc.) to deactivate upon depression of the signal silence switch.
14. Non-Alarm Input Operation:
Any addressable initiating device in the system may be used as a non-alarm input to monitor normally-open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.

2.4 SYSTEM COMPONENTS

- A. Programmable Electronic Sounder/Horns:
 1. Electronic sounders shall operate on 24 VDC nominal.
 2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of a least 90 dBA measured at 10 feet from the device.
 3. Shall be flush or surface mounted as how on plans.
- B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:
 1. The maximum pulse duration shall be 2 10th of one second.
 2. Strobe intensity shall meet the requirements of UL 1971.
 3. The flash rate shall meet the requirements of UL 1971.
- C. Combination Sounder/Strobes-per A & B above.
- D. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.
- E. An optional plug-in module shall be provided for NFPA 72, Chapter 8 transmitters as well as a Digital Alarm Communicator/Transmitter (DACT). The DACT shall be an optional plug-in module, which supports up to 9 different transmission formats. The UDACT shall have the ability to annunciate each and every addressable point at the central station receiver.
- F. Field Wiring Terminal Blocks
For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for 18 to 12 AWG wire. Terminal blocks, which are permanently fixed, are not acceptable.
- G. Printer

1. The printer shall provide hard-copy printout of all changes in status of the system and shall time-stamp such printouts with the current time-of-day and date. The printer shall be standard carriage with 80-character per line and shall use standard pin-feed paper. The printer shall be enclosed in a separate cabinet suitable for placement on a desktop or table. The printer shall communicate with the control panel using an interface complying with Electrical Industries Association standard EIA-232D. Power to the printer shall be 120 VAC@ 60 Hz. Provide 1000 VA Uninterruptable Power Supply for the printer (APC or equal).

2.5 SYSTEM COMPONENTS-ADDRESSABLE DEVICE

- A. Addressable Devices-General
 1. Addressable devices shall use simple to install and maintain decade (numbered 1 to 10) type address switches.
 2. Addressable device which use a binary address setting method, such as DIP switch, are difficult to install and subject to installation error. This type of device is not allowed as a substitute.
 3. Detectors shall be multisensor type integrating three sensing technologies to minimize false alarms and provide detection accuracy and early response to all types of fires. Detection shall utilize photoelectric, ionization, and heat sensing technologies, all included in the same detector.
 4. Intelligent detectors shall utilize onboard intelligence to reduce the amount of information sent between the detector and panel. Other than regular supervisory polling responses, the detector shall only communicate with the panel when it has something new to report to ensure very fast response time.
 5. Smoke detector sensitivity shall be set in the fire alarm control panel and shall be adjustable in the field through the field programming of the system. Sensitivity may be automatically adjusted by the panel on a time-by-day basis.
 6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
 7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base shall include a sounder base with a built-in (local) sounder rated at 85 dBa minimum, a relay base and isolator base designed for Style 7 applications.
 8. The detector shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
 9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device.
 10. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog values of each detector.
 11. Detectors shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify

the type of device, LEDs shall be provided which will flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

12. A magnet test switch shall be provided to test each detector for 100% obscuration, reported to the FACP. Provide FSP-851 with B710LP base as required.

B. Addressable Pull Box (Manual Stations)

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except with the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the station in raised letters, 1.75 inches or larger. Provide NBG series.
4. Stations shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches, or more than 48 inches to center of pull bar above the finished floor. Provide NBG-12LX double action type pull station as required.

C. Intelligent Duct Smoke Detector

1. The in-duct smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel. Detector provided shall be photoelectric type.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.
3. Provide all circuitry, relays, etc. as required to shut down the associated mechanical unit when an alarm condition occurs at a duct detector. Provide FSD series as required.

D. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact devices) to one of the fire alarm control panel SLC loop.
2. The monitor module shall mount in a 4-inch square, 2 1/8 inch deep electrical box.
3. The IDC zone may be wired for Style D or Style B operation. An LED shall be provided that flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no longer than 2 3/4 inch x 1 1/4 inch x 1/2 inch. This version need not include Style D or an LED. Provide FMM-101 miniature monitor module as required.

E. Two Wire Detector Monitor Module

1. Addressable monitor module shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2. The two-wire monitor module shall mount in a 4-inch square, 2 1/8 inch deep electrical box or with an optional surface backbox.
3. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel. Provide FZM-1 interface module as required.

F. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate on a dry contact relay.
2. The control module shall mount in a standard 4-inch square, 2 1/8 inch deep electrical box, or to a surface mounted backbox.
3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
4. Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, UL listed remote power supply.
5. The control module shall be suitable for pilot duty applications and rated for a minimum of .6 amps at 30 VDC. Provide FCM-1 control modules as required.

G. Isolator Module

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
4. The isolator module shall mount in a standard 4-inch deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operation and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated. Provide ISO-X fault isolator module as required.

2.6 SMOKE FIRE DAMPERS

- A. Smoke/fire dampers shall be interlocked with their associated air handler so that they close whenever the air handling equipment is de-energized. All smoke/fire dampers shall close on given floors or areas in general alarm.
- B. Provide relays and 120 volt contacts to control damper circuits.

2.7 SMOKE CONTROL DOORS

- A. Smoke control doors held open by electromagnetic door holders shall release upon alarm to allow smoke control doors to close. Door holders shall be provided on all smoke control doors. Smoke detectors shall be provided in accordance with NFPA 72, chapter 6.
- B. Roll-up doors, coiling doors, etc. shall be wired to close only on local detector alarm.

2.8 ADDITIONAL MATERIALS

- A. Provide (5) each additional smoke detector, horn/strobes, strobes, and pull stations. Install as directed by Owner. Include cost of installation. Turn all unused additional devices over to Owner at completion of contract.

END OF SECTION

