SECTION 13850 (28 31 00)

FIRE DETECTION AND ALARM SYSTEM

ENGINEERING SPECIFICATION
INTELLIGENT REPORTING FIRE DETECTION SYSTEM

September 2010

PART 1 GENERAL

1.1. 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, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

C. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

D. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

E. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

1.2. SCOPE:

A. A collection of NOTIFIER Fire Alarm Control Panels, Network Control Annunciators (NCA), Network Web Server (NWS), Embedded Gateway, BACnet Gateway, Modbus Gateway, and a computer based Color Graphic User Interface (ONYXWorks) shall interface together creating a network system.

B. The Network shall be a true peer-to-peer communications architecture. Each node stores its own program and communicates equally with all other nodes.

C. The network shall be based on ARCNET technology or equivalent.

D. The Network Control Annunciator and ONYXWorks Workstation shall be capable of displaying and controlling all Fire Alarm Control Panels on the network.

1.3. SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and 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 4 hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes 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.

E. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.4. GUARANTY:

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 one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5. 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 manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.

B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, tests, and repairs described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

C. Maintenance and testing shall be on a semiannual basis or as required by the AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The schedule shall include:

1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, waterflow switches and all accessories of the fire alarm system.
2. Each circuit in the fire alarm system shall be tested semiannually.
3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72 Chapter 7.

1.6. POST CONTRACT EXPANSIONS:

A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of intelligent or addressable devices by ten percent (10%). This quotation shall include intelligent smoke detectors, intelligent heat detectors, addressable manual stations, addressable monitor modules and addressable modules equal in number to one

tenth of the number required to meet this specification (list actual quantity of each type).

C. The quotation shall include installation, test labor, and labor to reprogram the system for this 10% expansion. If additional FACP hardware is required, include the material and labor necessary to install this hardware.

D. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the FACP and at each intelligent addressable device. Do not include the cost of conventional peripherals or the cost of initiating devices or notification appliances connected to the addressable monitor/control modules.

E. Submittals that do not include this estimate of post contract expansion cost will not be accepted.

1.7. APPLICABLE STANDARDS AND SPECIFICATIONS:

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

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

No. 12	CO2 Extinguishing Systems (low and high)
No. 12B	Halon 1211 Extinguishing Systems
No. 13	Sprinkler Systems
No. 13A	Halon 1301 Extinguishing Systems
No. 15	Water Spray Systems
No. 16	Foam/Water Deluge and Spray Systems
No. 17	Dry Chemical Extinguishing Systems
No. 17A	Wet Chemical Extinguishing Systems
	Clean Agent Extinguishing Systems
No. 72	National Fire Alarm Code
No. 101	Life Safety Code

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

No. 268	Smoke Detectors for Fire Protective Signaling Systems
No. 864	Control Units for Fire Protective Signaling Systems
No. 268A	Smoke Detectors for Duct Applications
No. 521	Heat Detectors for Fire Protective Signaling Systems
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
No. 2017	General-Purpose Signaling Device and Systems

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

E. The Video Display Terminal (VDT) shall comply with Swedish magnetic emission and X-radiation guidelines MPR 1990:10.

1.8. APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL Underwriters Laboratories Inc
ULC Underwriters Laboratories Canada

B. The fire alarm control panel shall meet UL Standard 864 (Control Units) and UL Standard 1076 (Proprietary Burglar Alarm Systems).

C. The system shall be listed by the national agencies as suitable for extinguishing release applications. The system shall support release of high and low pressure CO2.

PART 2.0 PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals 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 manufacturers' recommendations. Consult the manufacturer'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 requirements.
2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

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 760-55.
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, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4-inch (19.1 mm) 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 manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm).
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
5. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.

D. 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 securely to either a cold water pipe or grounding rod.

2.3. Network Node:

A. Network Communication

1. The network architecture shall be based on a Local Area Network (LAN), a firmware package that utilizes a peer-to-peer, inherently regenerative communication format and protocol. The protocol shall be based on ARCNET or equivalent. The network shall use a deterministic token-passing method. Collision detection and recovery type protocols are not acceptable substitutes due to life safety requirements. In addition, there shall be no master, polling computer, central file computer, display controller or other central element (weak link) in the network which, on failure, may cause complete loss of network communications or cause

major degradation of network capability. There shall be no cascading of CPUs or master/slave relationships at the network level to facilitate network communications. Failure of any node shall not cause failure or communication degradation of any other node 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 not less than 312 KBPS (kilo bits per second). A node may be an intelligent Fire Alarm Control Panel (FACP), ONYXWorks Workstation (ONYXWorks), Embedded Gateway, Network Control Annunciator (NCA), BACnet Gateway, Modbus Gateway, or Network Web Server (NWS). The network shall be capable of expansion to at least 103 nodes.

2. Each network node address 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.
3. The network shall be capable of communicating via wire or fiber optic medium. A wire network shall include a fail-safe means of isolating the nodes in the unlikely event of complete power loss to a node.
4. A network repeater shall be available to increase the twisted-pair distance capability in 3,000 ft. increments. As an option, a repeater shall be available for fiber optics that increases the wire distance in 8 dB increments. A mix (hybrid) fiber/wire network repeater shall also be supported. Systems that have distance limitations, and have no available means to regenerate signals are not suitable substitutes.
5. Fiber Optic Network Communication: The network shall support fiber optics with the following specifications:

    a. Size =62.5 micrometers / 125 micrometers Type=Multimode, Dual fiber, Plenum rated Distance=maximum 8 dB total attenuation between network nodes Connector type=ST

    or

    b. Size =50.0 micrometers / 125 micrometers Type=Multimode, Dual fiber, Plenum rated Distance=maximum 4.2 dB total attenuation between network nodes Connector type=ST

B. Network Control Annunciator

1. A network control annunciator shall be provided to display all system intelligent points. The NCA shall be capable of displaying information for all events on a fully utilized network, at least 300,000 points. A network display devices, which are only capable of displaying a subset of network points, shall not be suitable substitutes.
2. The NCA shall include a minimum of 640 characters, backlit by a long life, solid state LCD display. It shall also include a full QWERTY style keypad with tactile feel. Additionally, the network display shall include ten soft-keys for screen navigation and the ability to scroll events by type (i.e. Fire Alarm, Supervisory Alarm, Trouble, etc).
3. The network control annunciator shall have the ability to display up to eight events in order of priority and time of occurrence. Counters shall be provided to indicate the total number of events by type.
4. The NCA shall mount in any of the network node fire alarm control panels. Optionally, the network display may mount in a backbox designed for this

use. The network shall support a minimum of 103 network control annunciators (not to exceed total node capacity) and shall connect to the network over either a wire or fiber interface.

5. The network control annunciator shall have an event history buffer capable of storing a minimum of 1000 events in non-volatile memory. Additionally, the NCA shall have a fire alarm history buffer capable of storing a minimum of 200 events in non-volatile memory. Systems that do not protect fire alarm events from being overwritten by other events are not suitable substitutes.
6. The NCA shall include two optically isolated, 9600 baud, industry standard EIA-232 ports for UL864 listed printers and CRT's. These peripheral devices shall print or display network activity.
7. The network control annunciator shall include control switches for system wide control of Acknowledge, Signal Silence, System Reset, Drill, and local Lamp Test. A mechanical means by which the controls switches are "locked out", such as a key, shall be available.
8. The NCA shall include long life LEDs to display Power, Fire Alarm, Pre-Alarm, Security Alarm, System Trouble, Supervisory, Signals Silenced, Disabled Points, Other (non-fire) Events, and CPU Failure.
9. The network control annunciator shall include a Master password and up to nine User passwords. Each password shall be up to eight alpha-numeric characters in length. The Master password shall be authorized to access the programming and alter status menus. Each User password may have different levels of authorization assigned by the Master password.
10. The NCA shall allow editing of labels for all points within the network; control on/off of outputs; enable/disable of all network points; alter detector sensitivity; clear detector verification counters for any analog addressable detector within the network; clear any history log within the network; change the Time/Date settings; initiate a Walk Test.
11. The network control annunciator shall support an optional Windows® based program utility. This utility shall allow the user create an NCA database, upload/download an NCA database, and download an upgrade to the NCA executive. To ensure program validity, this utility shall check stored databases for errors. A compare function shall be included to identify differences between databases.
12. For time keeping purposes the NCA shall include a time of day clock.
13. Each NCA shall support up to 32 additional 80 character remote display annunciators for displaying network activity. These "Terminal Mode" displays will mimic the activity appearing on the corresponding NCA.

C. ONYXWorks Workstation

1. The ONYXWorks workstation shall utilize a Microsoft® operating system. Each workstation shall be capable of graphically annunciating and controlling all network activity. Network display devices that are only capable of displaying a subset of network points shall not be suitable substitutes.
2. The ONYXWorks workstation shall be an IBM (or compatible) personal computer with the following minimum requirements: Intel® Dual Core processor, operating at a minimum of 2.16 GHz, 3.2 GB of RAM, 64 Mbytes Video RAM, two 160 GB hard disks, mouse, 32X CD-ROM, 3PCI / 1 ISA

expansion slots, sound card, 300 watt power supply, and SVGA graphics with a screen resolution of 1024 x 768. The ONYXWorks workstation shall include a 19” wide-screen LCD monitor.

3. The ONYXWorks workstation shall be capable of storing over 100,000 network events in a history file. Events shall be stored on hard disk and shall be capable of back-up storage to a tape drive. The history buffer allows the operator to view events in a chronological order. A filter shall be available for displaying chronological events by operator, date, time, fire alarms, troubles (including security, supervisory and system/device), disabled points/zones, system programming, operator response and operator log in/log out. The ability to print history files shall also be available.
4. The ONYXWorks workstation shall use a Windows® dialog box technology to address, interrogate, control, and/or modify intelligent points on each fire alarm node. This shall include, and not be limited to: Activating outputs, enabling or disabling points, adding or removing intelligent points, viewing intelligent detector sensitivity levels and modifying point information (custom messages, detector type, verification, day/night selection etc).
5. The ONYXWorks workstation shall include the ability to display system information in a graphical (floor plan) format. Each view, created using standard Windows® bitmap files, shall include icons created for intelligent devices. These icons shall blink and change to the appropriate programmed icon when an event occurs. When the device has been acknowledged, the icon shall become steady. Once the point has returned to normal, the normal icon is displayed. In addition to the graphical representation of the device, the user shall be able to link pictures, documents, and sound files to the device. The ONYXWorks workstation shall also provide the ability to auto-vector to the floor plan (screen) of the device that is active. By selecting a device in the graphic presentation, the operator of the NCS shall have the ability to log onto the corresponding node and interrogate the associated intelligent point.
6. The ONYXWorks workstation shall have the ability to provide the following information through a Windows® pull down menu: An Event Counter that contains the number of new and total events on the network. The information that is displayed shall consist of Fire Alarms, Pre-Alarms, Security Alarms, Supervisory Alarms, and Troubles. Detailed Event window that contains all Off-Normal events, both unacknowledged and acknowledged that are present in the system.
7. The ONYXWorks workstation shall have the option, from a Windows® pull down menu, to connect to a third party paging service that allows the ONYXWorks workstation to automatically send text-based messages regarding system status to a typical text pager.
8. The ONYXWorks workstation shall be UL-Listed for fire protection (UL864) and burglary (UL1076).
9. The ONYXWorks workstation shall meet FCC regulations (Part 15, subpart J) regardless of its connection means to the network.
11. The ONYXWorks workstation shall have a flexible way of assigning operator passwords. There shall be an unlimited number of possible operators, each with specific levels of control. Each operator shall have his/her own password. Operator password and control selection shall be

available to a high level "administrator" who shall have complete control over levels of control.

12. The ONYXWorks workstation shall include an industry-standard EIA-232 port for a UL864 listed printer.

D. NOTI-FIRE-NET Web Server

1. The NOTI-FIRE-NET Web Server shall utilize a Microsoft® CE operating system. A fire alarm network web server shall be provided to remotely display off-normal conditions for all system intelligent points.
2. The web interface shall allow access to fire alarm control panel event history, event status, and device properties using Microsoft® Internet Explorer.
3. Event counters shall be provided to indicate the total number of events by event type.
4. Email notification of off-normal conditions, configurable by event type, shall be supported.
5. The NWS shall have a web interface that is accessible through the Internet or an Intranet.
6. A standard CAT-5 Ethernet connection to a local area network shall be supported.
7. The NWS shall support operator and administrator accounts and password. The administrator password shall be authorized to access the programming and configuration of the NWS.
8. Multiple users shall be able to access the NWS simultaneously.
9. The NWS shall mount in any of the network node fire alarm control panels.
10. The NWS shall have a UL ancillary listing for fire protection (UL864) as a minimum.

E. Embedded Gateway

1. The Embedded Gateway shall utilize a Microsoft® CE operating system. The system shall provide an Embedded Gateway interface for remote connections of the Notifier Network containing the following panels via Ethernet (TCP/IP infrastructure): AFP-1010, AM2020, AFP-200, and the AFP-300/400 as well as ONYX® series control panels.
   The NFN Gateway and the Embedded Gateway will:
   a. Serves as a bridge between an ONYXWorks® Workstation and a NFN network, and it uses that Workstation as the primary reporting station for the NFN network.
   b. Translates a NFN network's panel and device data into data that can be interpreted by the ONYXWorks® Workstation software application
   c. Monitors NFN networks using ARCNET network architecture.
2. This system shall also support up to 50 Embedded Gateways, which shall be connected via Ethernet. The network shall have the ability to use fiber optic cable (single-mode and multi-mode), wire (twisted pair copper media in a style 4 or style 7 configuration), or combination wire/fiber communications with support of up to 103 nodes on the Notifier Network.

   a. Wire networks shall support 12 AWG, 1 Pair Shielded to 24 AWG, 4 Pair Unshielded following the manufacturer's guidelines.

b. Fiber optic networks shall support 62.5/125µm multimode cable 8dB limit, 50/125µm multimode cable 4.2dB limit.
c. Wire to fiber conversions using repeaters.

3. Data communications of 312,500 bps on the Notifier Network.

F. BACnet Gateway

1. The BACnet Gateway shall utilize a Microsoft® CE operating system. The BACnet Gateway shall provide an interface between Notifier Fire Alarm Control Panels and clients using BACnet/IP communications protocol.
2. The clients will be required to subscribe to Event Notification objects per FACP and will receive device information as BACnet objects via the subscription.
3. The BACnet Gateway shall be compatible with the ONYX Series panels and the following NOTI-FIRE-NET devices:
    a. NCA-2
    b. DVC
    c. ONYXWorks
    d. AFP-1010/AM2020 panels
4. The BACnet Gateway shall monitor a single ONYX FACP via the NUP port or monitor up to 14 nodes on the NOTI-FIRE-NET with a maximum combined object count of 15,000. Multiple BACnet Gateways can be used for networks with more than 15 nodes total.
5. The BACnet Gateway shall be PC programmable using the BACnet Gateway Configuration Tool on a compatible computer that is using Windows® XP Operating System.

G. Modbus Gateway

1. The Modbus Gateway shall utilize a Microsoft® CE operating system. The Modbus Gateway provides a communications link between networks that use the Modbus/TCP communications protocol and the Notifier FACP resident on an NFN network. The Modbus protocol will be consistent with Modbus Application Protocol Specification v1.1b.
2. The Modbus Gateway shall be compatible with the ONYX Series panels.
3. The Modbus Gateway shall monitor up to four compatible HS-NFN nodes and provide data such as event type, active/inactive, enabled/disabled, acknowledged/unacknowledged, device type, analog value (4-20mA module only) and system troubles.
4. The Modbus Gateway will support reads of up to 100 registers at a time for digital values and 10 registers reads at a time for analog values.
5. The Modbus Gateway Configuration Tool, using a Windows® XP Operating System compatible computer, will be used to configure the Modbus Gateway.

PART 3.0 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.2. TEST:

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

C. Verify activation of all waterflow switches.

D. Open initiating device circuits and verify that the trouble signal actuates.

E. Open and short signaling line circuits and verify that the trouble signal actuates.

F. Open and short notification appliance circuits and verify that trouble signal actuates.

G. Ground all circuits and verify response of trouble signals.

H. Check presence and audibility of tone at all alarm notification devices.

I. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

J. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

K. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3. FINAL INSPECTION:

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.4. INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation".

END OF SECTION