

# **FIRE ALARM AND EMERGENCY VOICE EVACUATION SYSTEM**

## **PART 1.0 - GENERAL**

### **1.1 DESCRIPTION:**

- A. This section of the specifications includes the furnishing, installation, and connection of a multiprocessor controlled, intelligent fire alarm and integrated emergency voice evacuation system required to form a complete coordinated system ready for operation. It shall include, but not be limited to, intelligent alarm initiating devices, alarm notification appliances, auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.
- B. The intelligent fire alarm system shall comply with requirements of NFPA 72 Standard for protected premises signaling systems. The system shall be electrically supervised and monitor the integrity of all conductors.

### **1.2 SCOPE:**

- A. A new intelligent, multiprocessor controlled fire alarm and emergency voice evacuation system shall be installed in accordance with the specifications and drawings.
- B. Basic Performance:
  - 1. Alarm, trouble and supervisory signals from all intelligent addressable reporting devices shall report to the intelligent fire alarm and emergency voice evacuation system over Class B (Style 4), or Class A (Style 6, 7) Signaling Line Circuits (SLCs).
  - 2. Initiation Device Circuits (IDCs) shall be wired Class B (Style B) or Class A (Style D).
  - 3. Notification Appliance Circuits shall be wired Class B (Style Y) or Class A (Style Z).
  - 4. Speaker/Strobe synchronization shall be provided where required with selective silence capability.
  - 5. A single ground or open on a Signaling Line Circuit (SLC) shall not cause system malfunction, loss of operating power or the ability to report an alarm.
  - 6. Alarm signals arriving at the intelligent fire alarm and emergency voice evacuation system shall not be lost following a power failure or outage.
- C. Basic System Functional Operation  
When a fire alarm condition is detected and reported by one of the system's intelligent initiating devices, the following functions shall immediately occur:
  - 1. The system Alarm LED shall flash.
  - 2. A local piezo in the control panel shall sound.
  - 3. A 240 x 64 graphical LCD display shall indicate all information associated with the fire alarm condition, including zone of origin, the type of alarm device and its location within the protected premises.
  - 4. Printing and history storage equipment shall log the information associated with each new intelligent fire alarm and emergency voice evacuation system condition, along with time and date of the occurrence.
  - 5. All system output programs assigned via software programming to be activated by the particular intelligent device and alarm shall be executed, and the associated system outputs (alarm Notification Appliances and/or Relays) shall be activated.

### **1.3 SUBMITTALS**

- A. General:
  - 1. 1 Original + 3 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

equipment (compatible ANSI/UL864, 9<sup>th</sup> Edition Listed) 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 remote annunciator(s) layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manual listing the manufacturer's name(s) including technical data sheets.2. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Certifications:

Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of 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 GUARANTEE:**

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 three (3) years from the date of purchase. The full cost of maintenance, labor and materials required to correct any defect during a one-year period shall be included in the submittal bid.

#### **1.5 MAINTENANCE:**

Maintenance and testing shall be on a semi-annual basis or as required by the local AHJ. A preventive maintenance schedule shall be provided by the Contractor that shall describe 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 and emergency voice evacuation system.
2. Each circuit in the fire alarm system shall be tested semi-annually.
3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72.

#### **1.6 POST CONTRACT EXPANSIONS:**

- A. Contractor shall consider possible future expansion of the system by not less than 10% of the original count of field devices. The same shall be included in the technical submittal for approval. This provision shall eliminate the need for major changes and alternations in the system.
- B. Submittals that do not consider an extra 10% provision for future expansions will not be accepted.

#### **1.7 APPLICABLE SPECIFICATIONS:**

The specifications and standards listed below form a part of this specification. The system shall fully comply with all applicable standards.

- A. National Fire Protection Association (NFPA):
  - No. 70 National Electrical Code (NEC)
  - No. 72 National Fire Alarm Code
  - No. 90A Standard for the Installation of Air Conditioning and Ventilating Systems
  - No. 101 Life Safety Code
- B. National Recognized Testing Laboratories (NRTL); Underwriters Laboratories Inc. (UL), Intertek (ETL), Factory Mutual (FM):
  - No. 268 Smoke Detectors for Fire Protective Signaling Systems
  - No. 864, 9<sup>th</sup> Edition 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. 1971 Visual Notification Appliances for the hearing impaired.
- No. 1711 Amplifiers for Fire Protective Signaling Systems
- C. FCC Part 15
- D. Local and State Building Codes
- E. All requirements of the Authority Having Jurisdiction (AHJ).

### **1.8 APPROVALS:**

The intelligent fire alarm and emergency voice evacuation system shall have proper listing and/or approval to ANSI/UL-864 9<sup>th</sup> Edition.

## **PART 2.0 PRODUCTS**

### **2.1 EQUIPMENT AND MATERIAL, GENERAL:**

- A. All equipment and components shall be new, and the manufacturer's current model.
- 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/or 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.
- D. Equipment shall be manufactured by an ISO 9001 Certified Company.

### **2.2 WIRE:**

- A. Wire:
  1. Wiring shall be in accordance with Civil Defense Authority, 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.
  2. 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).
  4. All field wiring shall be completely supervised.
- B. Terminal Boxes, Junction Boxes and Cabinets:
  1. All boxes and cabinets shall be listed by a National Recognized Testing Laboratory for their use and purpose.

### **2.3 MAIN FIRE ALARM CONTROL PANEL:**

- A. The intelligent fire alarm and emergency voice evacuation system shall contain multiprocessors for communications with and control of equipment used to make up the system: intelligent detectors, intelligent modules, printer, annunciators, and other system controlled devices.
- B. System Capacity and General Operation
  1. Each intelligent fire alarm and voice evacuation system shall be capable of providing up to 504 intelligent analog addressable devices, and shall be networkable up to a total of 200 intelligent fire alarm and emergency voice evacuation systems.
  2. The intelligent fire alarm and emergency voice evacuation system shall include a full featured user/operator interface control and annunciation panel that shall be composed of a 240 x 64 graphical LCD display, individual system status LEDs, and an alphanumeric keypad for field programming and control of the entire system.
  3. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the intelligent fire alarm and emergency voice evacuation system.

4. The intelligent fire alarm and emergency voice evacuation system shall provide the following features; detector maintenance alert to warn of excessive dirt/dust within an individual detector, detector sensitivity read/test information, with real-time status reports capable of being viewed on the display or printed, intelligent smoke detector alarm verification and pre-signal capabilities, meeting NFPA 72 requirements, and rapid (priority) manual pull station reporting (< 3 seconds). Field programmability of various voice communications messages to meet various application requirements. An integral walk test feature shall also be provided capable of selecting with or without signals.
5. The Base Card of the system shall contain three Form-C relay contacts rated 2.0 amps @ 30VDC for: Alarm, Trouble (with or without AC delay), and Supervisory status conditions. These three contacts shall be field programmable to meet any installation requirement.
6. The Base Card shall contain two Notification Appliance Circuits (NACs) capable of being wired Class A or B (NFPA Style Y or Z). NAC circuits shall be 24VDC filtered and regulated and Listed to operate with any Listed NAC device available or previously installed.
7. The Base System shall as a minimum include a dual 40 Watt amplifier capable of being field configured for 80 Watts of power or 40 Watts of power with 100% backup. Additional amplifiers shall be capable of being added to the intelligent fire alarm and emergency voice evacuation system to meet the total wattage requirement of the installation.

#### C. Main System Microprocessors

1. The intelligent fire alarm and emergency voice evacuation system shall include a minimum of four microprocessors; one for the main system, one for each Signaling Line Circuits (SLCs), one for the intelligent amplifier, and one for each switching regulated power supply.
2. The microprocessors shall communicate with, monitor, and control all internal and external interfaces within the intelligent fire alarm and emergency voice evacuation system. Each microprocessor shall include flash memory for program storage and a "watch-dog" timer circuit to detect and report microprocessor failure.
3. The microprocessors shall contain and execute all programming for specific action to be taken based on system status changes. Such programming shall be held in non-volatile programmable memory and shall not be lost if both the system primary and secondary power supplies fail.
4. The intelligent fire alarm and emergency voice evacuation system shall provide a real-time clock for device programmable time functions, time stamping system displays, printers, and history files.
5. The microprocessors shall contain flash memory capabilities for easy upload/download of future product upgrades and enhancements.
6. All clock, date and history file information shall be maintained during AC and DC power loss.

#### D. User Interface Graphical Display

1. The user interface graphical display shall provide all the controls and indicators for use by the system operator and may also be used to program all system operational parameters.
2. The user interface graphical display shall include status information and custom alphanumeric labels for all system zones and intelligent devices.
3. The user interface graphical display shall be a backlit graphical LCD (liquid crystal display) providing 240 x 64 characters. It shall provide 17 LEDs (light emitting diodes), consisting of Power, Alarm, Supervisory, System Trouble, Pre-Alarm, Test, P.A.S., Disable, NAC Silenced, NAC Trouble, NAC Disabled, Programming, and five field programmable LEDs based on installation requirements.
4. The user interface graphical display shall include a 12-button keypad and 5-button arrow/checkmark for the control, programming, and diagnostic capabilities of the intelligent fire alarm and emergency voice communication system. Entry of numeric, alphanumeric and various other character sets shall be available through these buttons. Up to twelve programmable passwords shall be available with various password access capabilities programmable based on installation needs to prevent unauthorized system access, control and/or programming.
5. The user interface graphical display shall include the following user operator buttons: RESET, ACK (Acknowledge), SILENCE, RESOUND, and DRILL.

6. The user interface graphical display shall contain eight programmable switch inputs which can be utilized for connecting project specific switches (keyed or non-keyed) for various control by-pass functions.
7. The user interface graphical display shall include a contrast adjustment feature for the backlit display, to allow optimum viewing/display. In addition, the backlit display shall minimize current consumption during AC failure, by turning off the backlit feature during AC power failures.

#### E. Signaling Line Circuits (SLCs)

1. Each SLC communications shall be 100% digital, providing power and communications for all of the intelligent detectors and intelligent modules over a single pair of wires. The SLC shall be capable of NFPA Style's 4, 6 or 7 operation. As a 100% digital circuit, each SLC shall be capable of providing optimum performance with enhanced transient false alarm protection.
2. Each SLC, in conjunction with its associated microprocessor, shall process individual intelligent device status. Intelligent device status shall be determined by the individual device's microprocessor and relayed to the SLC microprocessor. Device status shall include; normal, alarm, or trouble conditions. Each individual intelligent smoke detector shall also perform automatic detector testing and automatic drift compensation to meet strict detector maintenance requirements. If during automatic intelligent detector maintenance a problem is found, this status shall be relayed to the SLC microprocessor for processing.
3. Each SLC shall be capable of providing a minimum of .5 Amps of power for intelligent loop-powered devices such as relays, linear beam detectors, etc.
4. In real-time, proper SLC operating characteristics shall be capable of being validated by a built-in intelligent system voltage and current meter. The intelligent voltage and current meter shall be capable of displaying samples within the communication signaling of the SLC to give optimum consistency of information. Systems requiring the use of an independent voltmeter shall not be considered equal due to lack of availability, potential errors and erratic information based on SLC communication signals.
5. Each SLC shall be capable of distances of 10,000 feet (@ 12 AWG, twisted) (?). For retrofit applications, the system shall be capable of supporting untwisted, unshielded wire.
6. To avoid adverse conditions during loss of AC power, each SLC shall contain circuitry to maintain normal operating voltage levels. Systems that don't maintain normal voltage levels, but vary based on battery voltage availability shall not be considered equal.

#### F. Emergency Voice Evacuation

1. The intelligent fire alarm and emergency voice evacuation system shall include microphones, amplifiers, power supplies, switch controls, and status LED indications to meet the complete requirements of the installation.
2. To accommodate future expansion of the system the integral amplifiers of the intelligent fire alarm and emergency voice evacuation system shall be designed around a "building block" approach where the amplifier is completely flexible and scalable to accommodate small standalone to large networked system applications.
3. The amplifier shall be a dual 40 Watt amplifier capable of being field configured for 80 Watts of power or 40 Watts of power with 100% backup.
4. Each amplifier shall be capable of communicating with the intelligent fire alarm and emergency voice evacuation system via contact trigger inputs or an integral RS-485 serial port. When communicating serially, communications shall include amplifier 1 & 2 status, Speaker Circuit 1 & 2 status, on/off activation, volume, and message selection/assignment to individual channels.
5. To reduce wiring and minimize distance restrictions, amplifier booster units shall be distributed throughout the facility. To provide the ultimate in survivability, each amplifier booster unit shall be a standalone entity allowing message generation locally if communications failure with the main intelligent fire alarm and emergency voice evacuation system occurs.
6. The amplifiers of the intelligent fire alarm and emergency voice evacuation system shall be capable of providing a high quality 400hz to 4khz response across 25 Volt RMS speakers.
7. Each audio amplifier shall provided 4 industry standard message and tone combinations for fire alarm evacuation and alarm alert signaling. For customizing installations, each amplifier shall be capable of storing up to 16 messages, with a total of 20 minutes storage capacity.

8. The available 16 messages shall be prioritized where message 1 has a higher priority than message 2 and message 2 has a higher priority than message 3, etc.
9. Amplifier cascading (booster wiring) shall provide for automatic synchronization of all audio output channels. Systems that do not synchronize all audio channels throughout the system and peer-to-peer network shall not be considered equal.
10. Each amplifier shall have the capability of broadcasting background music via one of the audio inputs. Background music input shall be an analog 1 Volt RMS signal.
11. Detailed status and trouble indications shall be available at each amplifier with further troubleshooting diagnostic information available at the intelligent fire alarm and emergency voice evacuation user graphical display.
12. Switch controls shall be available to select individual speakers, speaker circuits, zones and/or groups/areas for options such as: All Call, General Evacuation and General Alert across the entire (networked) system.
13. Local and/or remote microphones to allow and to provide live, voice commands at a priority over any stored recorded message(s).

#### G. Fire Fighter Phone Jacks

1. The intelligent fire alarm and emergency voice evacuation system shall have the capability of generating a local phone riser for use with remote addressable fire fighter telephone modules allowing phone-to-command center and party-line communications.
2. The phone riser shall accommodate any number of addressable fire fighter telephone modules as required for the installation.
3. The system shall be capable of communicating with a minimum of 5 remote fire fighters phones simultaneously in a party-line format.
4. When a fire fighters phone is plugged into a remote fire fighters phone jack the addressable fire fighter telephone module shall send a call-in signal to the intelligent fire alarm and emergency voice evacuation system command center. The call-in signal shall sound a distinct tone and indicate via an LED the specific remote fire fighter phone jack calling in. Pressing the associated addressable fire fighter telephone module button will silence the call-in tone, and allow for communications with the remote fire fighters phone.
5. It shall be possible to selectively patch-in any fire fighters telephone to the intelligent fire alarm and emergency voice communications system's speaker circuits.

#### H. The system shall feature an auto dialing which would initiate an automated phone call to local fire brigade.

#### I. IP Internet Interface

1. An intelligent IP Internet Interface shall be provided that will gather real-time information from a standard web browser giving visual and audible indication of the status of the complete intelligent fire alarm and emergency voice evacuation system, including all associated network nodes.
2. The state of each network node, including alarms, troubles, supervisory conditions as well as the status of individual devices (such as analog values of intelligent smoke detectors) on the network shall be capable of being displayed at any time in a user-friendly clear and concise manner
3. From the web browser all installation event logs shall be capable of being viewed, saved, and/or printed as needed without the need to be physically at the installation site.
4. In addition to providing real-time remote access to the intelligent fire alarm and emergency voice evacuation system and its network nodes, the IP Internet Interface shall be capable of being configured to provide email notification based on various system/installation status changes. Status events such as alarms, pre-alarms, troubles, disables, etc. shall be capable of being sent via email to various designated email accounts based on time-of-day and day-of-week settings. Specific custom user text messages shall be configurable for any email, providing precise and accurate information immediately to critical personnel.

#### J. Network Interface

1. The intelligent fire alarm and emergency voice evacuation system shall have an integral RS-232 port for interfacing the intelligent fire alarm and emergency voice evacuation system to a National Recognized Listed Electronic Data Processing (EDP) peripheral or other local/remote serial devices. The RS-232 port shall allow for the use of printers, local/remote virtual panel

software, and for PC connection to upload/download field configuration programming of the system. In addition to the RS-232 port, the intelligent fire alarm and emergency voice evacuation system shall have an integral USB port for upload/downloading of field configuration programming.

2. The intelligent fire alarm and emergency voice evacuation system shall also include an internal RS-485 port for the connection of audio amplifiers, switch modules, I/O annunciator drivers and various other optional modules.
3. A Network Card (Style 4 or 7) shall be available for the connection of peer-to-peer network devices such as; additional intelligent fire alarm systems, additional intelligent fire alarm and emergency voice evacuation systems, remote graphical displays (with or without control capabilities), IP Gateways and other network Interfaces.
4. It shall be possible to interrogate the peer-to-peer network wiring from any graphical display connected to the network. Interrogation shall include network ground voltage monitoring, data packets received, bad packets, number of communication failures, and number of Style 7 communication failures at each individual network node. This interrogation feature shall be historical from the date of installation, with technician reset capabilities while troubleshooting issues. Networks that do not provide a means for technicians to interrogate network wiring and problems shall not be considered equal.

K. Enclosures:

1. The intelligent fire alarm and emergency voice evacuation system shall be housed in a listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion resistive.
2. The door shall provide a key lock (equivalent with installed intelligent manual pull stations) and shall include a glass or other transparent opening for viewing of all indicators, switches and graphical display.
3. An optional semi-flush trim ring shall be available for a neat cabinet dress.

L. All interfaces and associated equipment shall be protected so that they will not be affected by voltage surges or line transients consistent with ANSI/UL standard 864.

M. Optional components shall be provided for NFPA 72 auxiliary and remote station fire alarm systems as well as a Digital Alarm Communicator Transmitter for NFPA 72 Central Station systems. The DACT shall meet all current Nationally Recognized Listing requirements for delayed AC fail reporting, communicate general system status and provide the option of communicating the zone or point status of any SLC device to the Central Station.

N. Power Supply:

1. The intelligent fire alarm and emergency voice evacuation system shall include two switching power supplies capable of operating on 120 VAC, 60 Hz, and shall provide all necessary power for the system. Voltages of 240 VAC, 50 Hz shall also be accommodated with the standard switching power supply.
2. The power supplies shall provide a minimum of 5.0 amps of filtered and regulated power for Amplifiers, Notification Appliance Circuits (NACs), resettable, and non-resettable power requirements.
3. It shall be possible to expand system power requirements as needs require. Power supply expansion shall be an integral part of the overall system. All monitoring and control of the expansion power supplies shall be performed by the intelligent fire alarm and emergency voice evacuation system.
4. Where required power supplies shall provide temperature compensated battery charging for 24 or 60 hours of standby using dual-rate charging techniques for fast battery recharge. The temperature compensated circuitry shall extend the life of the system batteries by minimizing/maximizing the charger current based on ambient temperature surrounding the batteries. In addition, the batteries shall be continuously load tested by the power supply/charger to confirm optimum performance when required. Chargers that do not temperature charge the batteries, test the batteries and recognize battery cell failures shall not be considered equal.
5. The power supplies shall be power-limited using fuse-less, quick-acting electronic circuitry meeting the latest ANSI/UL-864 9<sup>th</sup> Edition requirements.

O. Operators Controls

1. Acknowledge Button:
    - a. Activation of the intelligent fire alarm and emergency voice evacuation system Ack (acknowledge) Button in response to new Alarms, Supervisory and/or Troubles shall silence the local panel piezo and change the Alarm, Supervisory and Trouble LEDs from flashing to steady-ON.
    - b. Depression of the Ack (Acknowledge) Button shall also silence all network remote graphical displays and/or additional intelligent fire alarm system piezo sounders if programmed for this functionality.
  2. Silence Button
    - a. Activation of the intelligent fire alarm and emergency voice evacuation system Silence Button shall cause all programmed notification appliances and relays to return to their normal state. The selection of notification appliance circuits and relays that are silenceable by the Silence Button shall be field programmable within the confines of all applicable standards. The intelligent fire alarm and emergency voice evacuation system software shall include silence inhibit, auto-silence timers, and an option to silence various other system functions, as deemed necessary.
  3. Resound Button
    - a. Activation of the intelligent fire alarm and emergency voice evacuation system Resound Button shall cause all silenced notification appliances and relays to return to their programmed alarm functionality.
  4. Reset Button
    - a. Activation of the intelligent fire alarm and emergency voice evacuation system Reset Button shall cause all latched initiating devices, appliances or zones, as well as all associated output devices and circuits, to return to their normal state.
  5. Drill (Evacuate) Button
    - a. Pressing and holding the intelligent fire alarm and emergency voice evacuation system Drill Button shall activate all programmed notification appliance circuits. The Drill function shall latch until the intelligent fire alarm and emergency voice evacuation system Silence Button is activated.
  6. The intelligent fire alarm and emergency voice evacuation system shall include a programmable password access menu that shall allow users with proper password to:
    - a. View various system status events including; off-normal conditions, input/output device status, history logs, network diagnostics, and panel input/output circuit voltages and currents
    - b. Disable I/O groups of devices, zones, or individual device points.
    - c. Enable I/O groups of devices, zones, or individual device points.
    - d. Test zones, devices, display, system piezo, and RS-232 peripheral device.
    - e. Print I/O status, troubles, disabled devices, and history logs.
    - f. Program the intelligent fire alarm and emergency voice evacuation system.
- P. Printer
1. A printer may be connected internally or externally to the fire alarm panel(s) to 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 capable of receiving Standard, Standard +, and Diagnostic printing. Standard printing shall print all status changes from normal, and any acknowledge, silence, reset or drill button activations. Standard + shall print all Standard printing plus print automatic restoral's of non-latching devices. Diagnostic printing shall include all Standard and Standard + printing, in addition to any event change of an analog/addressable device even when not confirmed by the system. The printer shall communicate with the intelligent fire alarm and emergency voice evacuation system using the Base Card interface complying with Electrical Industries Association standard EIA-232D.
- Q. Field Programming
1. The intelligent fire alarm and emergency voice evacuation system and its respective devices (i.e. intelligent smoke detectors and modules) shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of any electronic circuitry.



2. All programming may be accomplished through the intelligent fire alarm and emergency voice evacuation system user interface graphical display, as well through the use of a standard PC with configuration software.
3. All field-defined programs shall be stored in non-volatile memory and shall not be lost if AC mains and/or battery is lost.
4. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Four levels of password protection shall be provided in addition to a key-lock on the cabinet. Level One (Untrained User) allows restricted access to basic system controls. Level Two (Authorized User) allows full access and control of system functions such as zone disable or manual on/off commands. Level Three (Programming) allows programming of all system features and functions. Level Four (Firmware Upgrade) is the highest level, which permits flash programming of system firmware. The intelligent fire alarm system shall have a minimum of 12 passwords which shall be freely programmable for Level access capabilities and Level functionalities.
5. Programming the intelligent fire alarm and emergency voice evacuation system shall not interfere with normal operation and fire protection. If an alarm condition is detected during programming operation, the system shall perform all fire protection functions as programmed.
6. A special program check function shall be provided to detect common operator errors and non related input to output relationships.
7. An Auto-Learn function shall be provided to quickly program initial functions of the system within several seconds. During this operation, intelligent devices connected to the Signaling Line Circuits shall be automatically installed without labor intensive operator key commands and the using of additional electronic equipment to program each individual device. Auto-Learn programming shall be capable of being imported to a standard PC using field configuration program. In addition, if future devices are added or deleted from the system the Auto-Learn feature shall be capable of reading these changes without deleting the existing system programming. Systems that delete existing programs during Auto-Learn shall not be considered equal.
8. For flexibility, an optional off-line programming tool, with upload/download capabilities, shall be available.

#### R. Specific System Operations

1. Alarm Verification: The intelligent fire alarm and emergency voice evacuation system shall have the ability to alarm verify any individual or all intelligent smoke detectors.
2. Disable: Any zone, programmed group, or individual device connected to the system shall be capable of being Enabled or Disabled through the intelligent fire alarm and emergency voice evacuation system user interface graphical display, through switches allocated for such functionality and/or through input devices programmed for enable/disable functionality.
3. Point Read: The intelligent fire alarm and emergency voice evacuation system shall be able to display or print the following point status diagnostic functions; Device Status, Device Type, Device Label, Device Zone Assignments and Program Parameters.
4. System Status Reports: Upon command from an operator with proper password access system status report shall be generated and printed.
5. Device Sensitivity Reports: Upon command from the operator, intelligent detector sensitivity can be read and printed.
6. System History Event Log: The intelligent fire alarm and emergency voice evacuation system shall contain a History Event Log capable of storing up to 1,500 system events, of the 1,500 events the log shall dedicate 500 of these events to fire alarm status to avoid critical alarm events being overwritten by non-critical status events.
7. Automatic Detector Maintenance Alert: The intelligent smoke detectors shall automatically interrogate themselves and analyze for proper detector responses over a period of time. If any intelligent smoke detector on an SLC loop reports a reading that is below or above normal limits, then the intelligent fire alarm and emergency voice evacuation system will enter a maintenance Warning mode, and the particular detector will be annunciated on the system graphical display, and printed on the optional printer if so provided. 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. Individual intelligent detector maintenance information shall remain with the intelligent detector, even if the intelligent detector is removed from its present location and placed in another location in the facility.
  9. Software Zones: The intelligent fire alarm and emergency voice evacuation system shall be capable of being programmed for up to 200 software zones (networked systems 1000 software zones). All intelligent devices may be field programmed, to be grouped into these zones for control activation and annunciation purposes. Systems that utilize limited programmability, such as general alarm operation, are unacceptable.
- S. Intelligent System Maintenance
1. Input/output circuit voltages/currents are critical diagnostic tools during installation and maintenance of any fire alarm system. For this reason, the system shall include an integral real-time intelligent multi-meter (voltage/current) with the capability of monitoring NAC circuits, batteries, charger, grounds, auxiliary supply voltages, and SLC circuits (out/in for Style 6/7).
  2. In addition to the intelligent multi-meter, the system shall include status monitoring of main system switch inputs and relay outputs. This status monitoring shall be viewable at any time by a qualified service technician for diagnostic and troubleshooting assistance.
  3. Remote diagnostic tools shall be available for use over a dedicated phone line or IP internet. Remote diagnostic display shall be PC based, to avoid confusion the remote diagnostic display shall look and operate identical to the diagnostic display available when standing in front of the system.

## **2.4 SYSTEM COMPONENTS:**

- A. Programmable Electronic Sounders
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 (Temporal Pattern) with an output sound level of at least 90 dBA measured at 10 feet from the device.
  3. Shall be flush or surface mounted as shown on plans.
- B. Strobe Lights:
1. Shall operate on 24 VDC nominal.
  2. Shall meet the requirements of the ADA (Americans with Disabilities Act) as well as UL Standard 1971.
- C. Audible/Visual Combination Devices:
1. Shall meet the applicable requirements of Section A listed above for audibility.
  2. Shall meet the requirements of Section B listed above for visibility.
- D. Intelligent Manual Pull Station
1. Intelligent manual pull stations shall be provided to connect to the intelligent fire alarm and emergency voice evacuation system Signaling Line Circuit (SLC) Loops. Up to 126 intelligent manual pull stations may be connected to each SLC loop. Intelligent Manual Pull Stations shall be either of the single or dual action type, as shown on the plans.
  2. The intelligent manual pull station shall send data to the intelligent fire alarm system representing the state of the manual switch associated with the pull station. The intelligent manual pull stations 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 by the use of the key. The intelligent manual pull station key shall be the same key as that required for the intelligent fire alarm system access. All operated stations shall provide the option of a red LED which illuminates steady to indicate a positive, visual indication of operation.
  3. Intelligent manual pull stations shall be constructed of die-cast metal with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters.
  4. Intelligent manual pull stations shall be suitable for surface mounting, or semi-flush mounting as shown on the plans, and shall be installed in accordance with ADA and local codes.
  5. The intelligent manual pull station shall provide address-setting means using DIP switches with binary addresses already stamped on the PCB to eliminate installation confusion.
  6. Intelligent manual pull stations shall have an alarm interrupt feature built in, allowing the manual pull station to alarm in less than 3 seconds.

#### E. Intelligent Photoelectric Detectors

1. Intelligent photoelectric detectors shall be analog addressable and shall connect with two wires to the intelligent fire alarm and emergency voice evacuations system Signaling Line Circuit. Up to 126 intelligent detectors may connect to each SLC.
2. The intelligent detectors shall use the photoelectric (light-scattering) principal to measure smoke density.
3. The intelligent detectors shall be low profile ceiling-mount and shall include a twist-lock base.
4. The intelligent detectors shall be self contained and not dependent upon the intelligent fire alarm system for alarm monitoring, sensitivity adjustment, environmental compensation or self testing. Analog/addressable detectors that require fire alarm system intervention for detector status monitoring and control shall not be considered equal.
5. The intelligent photoelectric detectors shall be addressed via the intelligent detector base, by means of an "Xpert" card. The Xpert card shall remain with the detector base when the detector head is removed, thereby maintaining detector address location. Detectors that are addressed in the detector head rather than in the detector base shall not be considered equal due to the errors that can occur during detector removal and cleaning.
6. Xpert card programming shall be a simple pip removal based on address number. Addressing schemes utilizing binary jumpers, dip switches or decimal switches shall not be considered equal due to the errors that can occur during system installation and maintenance.
7. The intelligent photoelectric detectors shall store within its individual microprocessor an identifying code that the intelligent fire alarm and emergency voice evacuations system shall use to identify the type of intelligent detector.
8. The intelligent photoelectric detectors shall provide two LEDs for alarm and power indication. The LEDs shall be field programmable on a device basis, to flash under normal condition, indicating that the detector is operational and in regular communication with the intelligent fire alarm and emergency voice evacuation system. When in alarm the LEDs on the intelligent detectors shall illuminate steady. Control of these LEDs during alarm shall be controlled by the individual intelligent detector. Systems requiring fire alarm system commands to illuminate detector alarm LEDs shall not be considered equal. An individual sub-addressable output shall be available from each intelligent photoelectric detector. This output shall be field programmable to act as a remote alarm LED for the individual associated intelligent detector or as a remote LED for any indication required of the intelligent fire alarm and emergency voice evacuation system.

#### F. Intelligent Multi Sensor Detectors [Combination Photoelectric and Thermal Technology]

1. Intelligent multi sensor detectors shall be analog addressable and shall connect with two wires to the intelligent fire alarm and emergency voice evacuation system Signaling Line Circuit. Up to 126 intelligent multi sensor detectors may connect to each SLC.
2. The intelligent multi sensor detectors shall use a combination of photoelectric (light-scattering) principle and thermal sensing technologies to monitor two types of fire signatures (smoke and heat). This type of detector technology offers increased immunity to potential false alarms from standard detectors and shall be utilized in all areas indicated on the plans. Detectors that do not offer these features and functionalities shall not be considered equal.
3. The intelligent multi sensor detectors shall be ceiling-mount and shall include a twist-lock base.
4. It shall be possible to have only the thermal sensor portion of the multi sensor active during specific times, or events when the standard operating functions of the multi sensor may create potential false alarms.
5. The intelligent multi sensor detectors shall be self contained and not dependent upon the intelligent fire alarm system for alarm monitoring, sensitivity adjustment, environmental compensation or self testing. Analog/addressable detectors that require fire alarm system intervention for detector status monitoring and control shall not be considered equal.
6. The intelligent multi sensor detectors shall be addressed via the intelligent detector base, by means of an "Xpert" card. The Xpert card shall remain with the detector base when the detector head is removed, thereby maintaining detector address location. Detectors that are addressed in the detector head rather than in the detector base shall not be considered equal due to the errors that can occur during detector removal and cleaning.

7. Xpert card programming shall be a simple pip removal based on address number. Addressing schemes utilizing binary jumpers, dip switches or decimal switches shall not be considered equal due to the errors that can occur during system installation and maintenance.
8. The intelligent multi sensor detectors shall store within its individual microprocessor an identifying code that the intelligent fire alarm system shall use to identify the type of intelligent detector.
9. The intelligent multi sensor detectors shall provide two LEDs for alarm and power indication. The LEDs shall be field programmable on a device basis, to flash under normal condition, indicating that the detector is operational and in regular communication with the intelligent fire alarm and emergency voice evacuation system. When in alarm the LEDs on the intelligent multi sensor detectors shall illuminate steady. Control of these LEDs during alarm shall be controlled by the individual intelligent detector, systems requiring fire alarm system commands to illuminate detector alarm LEDs shall not be considered equal. An individual sub-addressable output shall be available from each intelligent multi sensor detector, this output shall be field programmable to act as a remote alarm LED for the individual associated intelligent detector or as a remote LED for any indication required of the intelligent fire alarm and emergency voice evacuation system.

#### G. Intelligent Ionization Smoke Detectors

1. Intelligent ion smoke detectors shall be analog addressable and shall connect with two wires to the intelligent fire alarm and emergency voice evacuation system Signaling Line Circuit. Up to 126 intelligent ion detectors may connect to each SLC.
2. The intelligent ion detectors shall use the dual-chamber ionization principal to measure products of combustion.
3. The intelligent ion smoke detectors shall be low profile ceiling-mount and shall include a twist-lock base.
4. The intelligent ion smoke detectors shall be self contained and not dependent upon the intelligent fire alarm system for alarm monitoring, sensitivity adjustment, environmental compensation or self testing. Analog/addressable detectors that require fire alarm system intervention for detector status monitoring and control shall not be considered equal.
5. The intelligent ion detectors shall be addressed via the intelligent detector base, by means of an "Xpert" card. The Xpert card shall remain with the detector base when the detector head is removed, thereby maintaining detector address location. Detectors that are addressed in the detector head rather than in the detector base shall not be considered equal due to the errors that can occur during detector removal and cleaning.
6. Xpert card programming shall be a simple pip removal based on address number. Addressing schemes utilizing binary jumpers, dip switches or decimal switches shall not be considered equal due to the errors that can occur during system installation and maintenance.
7. The intelligent ion smoke detectors shall store within its individual microprocessor an identifying code that the intelligent fire alarm system shall use to identify the type of intelligent detector.
8. The intelligent ion smoke detectors shall provide two LEDs for alarm and power indication. The LEDs shall be field programmable on a device basis, to flash under normal condition, indicating that the detector is operational and in regular communication with the intelligent fire alarm system. When in alarm the LEDs on the intelligent ion detectors shall illuminate steady. Control of these LEDs during alarm shall be controlled by the individual intelligent detector, systems requiring fire alarm system commands to illuminate detector alarm LEDs shall not be considered equal. An individual sub-addressable output shall be available from each intelligent ion smoke sensor detector, this output shall be field programmable to act as a remote alarm LED for the individual associated intelligent detector or as a remote LED for any indication required of the system.

#### H. Intelligent Heat Detectors

1. Intelligent heat detectors shall be analog addressable and shall connect with two wires to the intelligent fire alarm and emergency voice evacuation system Signaling Line Circuit. Up to 126 intelligent heat detectors may connect to each SLC loop.

2. The intelligent heat detectors shall use a single thermistor to sense the air temperature at the intelligent heat detector. Intelligent heat detectors shall be capable of being set for fixed temperature and/or rate-of-rise.
  3. The intelligent heat detectors shall be low profile ceiling-mount and shall include a twist-lock base.
  4. The intelligent heat detectors shall be self contained and not dependent upon the intelligent fire alarm and emergency voice evacuation system for alarm monitoring or self testing. Analog/addressable detectors that require fire alarm system intervention for detector status monitoring and control shall not be considered equal.
  5. The intelligent heat detectors shall be addressed via the intelligent detector base, by means of an "Xpert" card. The Xpert card shall remain with the detector base when the detector head is removed, thereby maintaining detector address location. Detectors that are addressed in the detector head rather than in the detector base shall not be considered equal due to the errors that can occur during detector removal and cleaning.
  6. Xpert card programming shall be a simple pip removal based on address number. Addressing schemes utilizing binary jumpers, dip switches or decimal switches shall not be considered equal due to the errors that can occur during system installation and maintenance.
  7. The intelligent heat detectors shall store within its individual microprocessor an identifying code that the intelligent fire alarm and emergency voice evacuation system shall use to identify the type of intelligent detector.
  8. The intelligent heat detectors shall provide two LEDs for alarm and power indication. The LEDs shall be field programmable on a device basis, to flash under normal condition, indicating that the detector is operational and in regular communication with the intelligent fire alarm and emergency voice evacuation system. When in alarm the LEDs on the intelligent heat detectors shall illuminate steady. Control of these LEDs during alarm shall be controlled by the individual intelligent detector, systems requiring fire alarm system commands to illuminate detector alarm LEDs shall not be considered equal. An individual sub-addressable output shall be available from each intelligent heat detector, this output shall be field programmable to act as a remote alarm LED for the individual associated intelligent detector or as a remote LED for any indication required of the system.
- I. Standard and Optional Intelligent Detector Bases
1. The intelligent detectors shall be addressed via the intelligent detector bases, by means of an "Xpert" card. The Xpert card shall remain with the detector base when individual detector heads are removed, thereby maintaining detector address locations. Systems that employ addressing of detector heads rather than detector bases shall not be considered equal due to the errors that can occur during detector removal and cleaning.
  2. Intelligent detector base Xpert card programming shall be a simple pip removal, based on address number. Addressing schemes utilizing binary jumpers, dip switches or decimal switches shall not be considered equal due to the errors that can occur during system installation and maintenance.
  3. Each intelligent detector base shall incorporate a remote LED output. The remote LED output shall be capable of tracking the status of its associated detector or shall be freely programmable to activate on any status change within the system.
  4. Intelligent Relay Bases shall be available and indicated on the plans where required. The relay portion of the detector base shall be freely programmable to activate on an individual point, zone, or group. The relay base shall be loop-powered and not require separate power for proper operation of the relay.
  5. Intelligent Isolator Bases shall be available for automatic isolation of wire-to-wire short circuits. It shall be possible to provide intelligent isolator bases at each intelligent detector installed within the installation. The number of intelligent isolation bases installed shall have no impact on the number of intelligent devices that can be connected to an SLC loop.
- J. Intelligent Loop-Powered Linear Beam Detectors
1. Intelligent loop-powered linear beam detectors shall be analog addressable. The transmitter power of the intelligent loop-powered linear beam detector shall be obtained directly from the Signaling Line Circuit, requiring no additional power from the intelligent fire alarm and emergency voice evacuation system. The receiver portion of the intelligent loop-powered

linear beam detector shall connect to the Signaling Line Circuit via an intelligent interface module, which contains all of the electronics for linear beam detector monitoring and control while providing Signaling Line Circuit communications. Linear beam detectors that require resettable power from the intelligent fire alarm and emergency voice evacuation system for operation shall not be considered equal due to the costs associated with installation and maintenance requirements.

2. The intelligent interface module shall be capable of being installed in an accessible area, remote from the actual transmitter and receiver.
3. The intelligent loop-powered linear beam detector shall be capable of providing maximum total area coverage of 16,000 square feet.
4. Each intelligent loop-powered linear beam detector shall be capable of being programmed for four levels of detector obscuration, based on installation requirements. Levels shall be 25%, 35%, 50% and 65%, where 25% is the most sensitive and 65% is the least sensitive.
5. The intelligent loop-powered linear beam detectors shall incorporate a drift compensation feature, which will allow the detector to compensate for light decrease over time due to lens contamination from environmental dirt and dust. This feature shall be provided to minimize the risk of unwanted alarms. If drift compensation limits have been reached, a detector dirty indication shall be indicated at the intelligent fire alarm system. Linear beam detectors that do not offer drift compensation shall not be considered equal.
6. A highly bright flashing LED shall be available on the receiver for commissioning/alignment. Once alignment is correct, the LED will cease to flash, indicating correct alignment. Linear beam detectors that require complicated equipment and procedures to align the transmitter and receiver shall not be considered equal.

#### K. Intelligent Switch Monitors

1. Intelligent switch monitors shall be provided to connect one supervised IDC (zone) of conventional alarm initiating devices (any N.O. dry contact device) to the intelligent fire alarm and emergency voice evacuation system Signaling Line Circuit (SLC).
2. The intelligent switch monitor shall mount on a standard 4" square or 2-gang electrical box.
3. The IDC (zone) shall be capable of being wired for Style D (Class A) or Style B (Class B) operation. The intelligent switch monitor shall provide address-setting means using DIP switches with binary addresses already stamped on the PCB to eliminate installation confusion and shall also store an internal identifying code that the intelligent fire alarm and emergency voice evacuation system shall use to identify the type of device. An LED shall be provided on the individual device that shall be field programmable to flash under normal condition, indicating that the device is operational and in regular communication with the intelligent fire alarm and emergency voice evacuation system. When active the LED on the individual device shall illuminate steady.
4. Two (2) versions of the intelligent switch monitor shall be available, as indicated on the drawings; one with a priority interrupt and one without the interrupt. The priority interrupt version shall be utilized in monitoring critical devices requiring the fastest response possible to the intelligent fire alarm and emergency voice evacuation system.
5. For difficult to reach areas, the intelligent switch monitor shall be available in a miniature package. These versions shall also offer Style D (Class A) or Style B (Class B) operation, and incorporate an active status LED.

#### L. Intelligent Dual Switch Monitor

1. Intelligent dual switch monitors shall be provided to connect two supervised IDCs (zones) of conventional alarm initiating devices (any N.O. dry contact device) to the intelligent fire alarm and emergency voice evacuation system Signaling Line Circuit (SLC).
2. The intelligent dual switch monitor shall mount on a standard 4" square or 2-gang electrical box.
3. The IDC (zone) shall be wired for Style D (Class A) or Style B (Class B) operation. The intelligent dual switch monitor module shall provide address-setting means using DIP switches with binary addresses already stamped on the PCB to eliminate installation confusion and shall also store an internal identifying code that the intelligent fire alarm and emergency voice evacuation system shall use to identify the type of device. Two LEDs shall be provided, one for each IDC, which shall be field programmable to flash under normal condition, indicating

that the devices are operational and in regular communication with the intelligent fire alarm and emergency voice evacuation system. When an IDC is active its associated LED shall illuminate steady.

4. The intelligent dual switch monitor shall include a priority interrupt feature allowing for the monitoring of critical devices, and providing the fastest response possible to the intelligent fire alarm and emergency voice evacuation system.

#### M. Intelligent NAC Module

1. Intelligent NAC modules shall be provided to supervise and control the operation of a single Notification Appliance Circuit (NAC) of compatible, 24 VDC powered polarized audio/visual appliances or speakers.
2. The intelligent NAC module shall mount on a standard 4" square or 2-gang electrical box.
3. The intelligent NAC module shall be wired for Class B (Style Y) or Class A (Style Z) operation. Each intelligent NAC module output shall be rated for 24 VDC @ 1 Amp or 25/70 Vrms @ 500 mA.
4. Audio/visual power shall be provided by a separate supervised regulated DC Listed power supply either from the main intelligent fire alarm and emergency voice evacuation system or from a supervised, UL listed remote power supply.
5. The intelligent NAC module shall provide address-setting means using DIP switches with binary addresses already stamped on the PCB to eliminate installation confusion and shall also store an internal identifying code that the intelligent fire alarm and emergency voice evacuation system shall use to identify the type of device. An LED shall be provided on the individual device that shall be field programmable to flash under normal condition, indicating that the device is operational and in regular communication with the intelligent fire alarm and emergency voice evacuation system. When active the LED on the individual device shall illuminate steady.

#### N. Isolators

1. Isolators shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The isolator shall limit the number of intelligent modules that may be rendered inoperative by a short circuit fault.
2. If a wire-to-wire short occurs, the isolator shall automatically open the SLC circuit. When the short circuit condition is corrected, the isolator shall automatically reconnect the isolated section of the SLC loop.
3. The isolators shall not require any address setting, and operation shall be automatic. It shall not be necessary to replace or reset an isolator after operation.
4. The isolators shall provide a single LED that shall illuminate steady to indicate that a short circuit condition has been detected and isolated.

#### O. Remote Graphical LCD Annunciators

1. The remote graphical LCD annunciator shall communicate with the intelligent fire alarm and emergency voice evacuation system via a true peer-to-peer network. The annunciator shall include a 240 x 64 backlit graphical LCD display. Two versions of the remote graphical LCD annunciator shall be available; one with system control capabilities and one without controls. The control annunciator shall provide all the same controls that are available on the intelligent fire alarm and emergency voice evacuation system. A local piezo sounder shall also be included on each remote graphical LCD annunciator.
2. The remote graphical LCD annunciator shall be a graphical LCD (liquid crystal display) display providing 240 x 64 characters. It shall provide 12 LEDs (light emitting diodes), consisting of Power, Alarm, Supervisory, System Trouble, Pre-Alarm, Test, Disable, and five field programmable LEDs based on installation requirements.
4. The remote graphical LCD annunciator shall include a 12-button keypad and 5-button arrow/checkmark for the control, programming, and diagnostic capabilities. Entry of numeric, alphanumeric and various other character sets shall be available from these buttons. Up to twelve programmable passwords shall be available with various password access capabilities programmable based on installation needs to prevent unauthorized system access.
5. The remote graphical LCD annunciator with control capabilities shall include the following user operator buttons; RESET, ACK (Acknowledge), SILENCE, RESOUND, and DRILL.

6. The remote graphical LCD annunciator shall include a programmable switch input which can be utilized as an access enable switch or for connecting a project specific switch (keyed or non-keyed) for a control/by-pass function.
7. The remote graphical LCD annunciator shall be capable of being programmed for limited or full system access and control. In addition, it shall be possible to program the remote graphical LCD for sector base (alarm only, trouble only, etc.) information reporting and control. Remote annunciators that cannot be programmed for these functionalities shall not be considered equal.
8. The remote graphical LCD annunciator shall include an RS-232 and USB port for device programming and remote printer connection. The printer shall be capable of receiving Standard, Standard +, and Diagnostic printing. Standard printing shall print all status changes from normal, and any acknowledge, silence, reset or drill button activations. Standard + shall print all Standard printing plus print automatic restoral's of non-latching devices. Diagnostic printing shall include all Standard and Standard + printing, in addition to any event change of an intelligent device even when not confirmed by the intelligent fire alarm and emergency voice evacuation system.
9. The remote graphical LCD annunciator shall include a contrast adjustment feature to allow optimum viewing/display.

## **2.5 BATTERIES:**

- A. Shall be 12 volt.
- B. Batteries (two required) shall have sufficient capacity to power the intelligent fire alarm and emergency voice evacuation system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.
- C. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

## **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 equipment manufacturer.
- B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Intelligent 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 intelligent 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.

### **3.2 TEST:**

Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
2. Close each sprinkler system flow valve and verify proper supervisory alarm at the intelligent fire alarm system. (if Applicable)
3. Verify activation of all flow switches (if applicable)
4. Open initiating device circuits and verify that the trouble signal actuates.
5. Open and short signaling line circuits and verify that the trouble signal actuates.
6. Open and short Notification Appliance Circuits and verify that trouble signal actuates.
7. Ground all circuits and verify response of trouble signals.
8. Check presence and audibility of tone at all alarm notification devices.



9. Check installation, supervision, and operation of all intelligent smoke detectors using the intelligent fire alarm system Walk Test.
10. 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 intelligent fire alarm system and the correct activation of the control outputs.
11. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures.

### **3.3 FINAL INSPECTION:**

At the final inspection, a manufacturer-trained representative shall demonstrate that the intelligent fire alarm and emergency voice evacuation system functions properly in every respect.

### **3.4 INSTRUCTION:**

Provide instruction as required for operating the intelligent fire alarm and emergency voice evacuation system. "Hands-on" demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation" to the Owner if required.