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Revision History

Date	Changes	Status
2 June 2020	Adding Notification Appliances	Complete

SECTION 13850 (28 31 00)

FIRE DETECTION AND ALARM SYSTEM

GENERAL

1.1 SECTION INCLUDES

- A. Addressable Fire Alarm Control Panels
- B. Emergency Voice Alarm Communication Systems.
- C. Detection and Initiation
 - 1. Fire Sensors and Detectors
 - 2. Spot Type Heat Detection Sensors
 - 3. Duct Smoke Detection Sensors
 - 4. Beam Smoke Detection Sensors
 - 5. Carbon Monoxide Detection Sensors
 - 6. Combination Sensors
 - 7. Air Sampling Systems
- D. Other Initiating Devices
 - 1. Fire Alarm Pull Stations
 - 2. Fire Alarm Flow Switches
 - 3. Fire Alarm Pressure Sensors
 - 4. Sprinkler Supervisory Devices
- E. Fire Alarm Notification Appliances
 - 1. Fire Alarm Horns and Strobes
 - 2. Fire Alarm Speakers
 - 3. Fire Alarm Low Frequency Sounders

1.2 RELATED SECTIONS

- A. Section 21 00 00 - Fire Suppression
- B. Section 23 09 00 - Facility Management System
- C. Section 26 05 00 - Common Work Results for Electrical
- D. Section 25 50 00 - Integrated Automation Facility Controls
- E. Section 27 15 00 - Fire Alarm Communications Horizontal Cabling
- F. Section 28 05 00 - Common Work Results for Electronic Safety and Security

1.3 APPROVALS

- A. The system shall have proper listing and / or approval from the following nationally recognized or regional agencies:
 - 1. UL Underwriters Laboratories, Inc
 - 2. ULC Underwriters Laboratories Canada
 - 3. FM Factory Mutual

4. FCC Federal Communications Commission
- B. When required, the system shall also have the approval of the local Authority Having Jurisdiction, which may include, but is not limited to:
 1. NYFD New York Fire Department (MEA)
 2. CSFM California State Fire Marshal
 3. City of Chicago
 4. City of Los Angeles
- C. When required, the system shall be approved for use in Marine applications by the following agencies.
 1. United States Coast Guard
 2. Lloyd's Register
 3. American Bureau of Shipping
- D. The system shall be certified for seismic applications in accordance with the International Building Code (IBC). For OSHPD applications in California the system shall be Pre-Approved for seismic applications. The basis for qualification of seismic approval shall be via shake table testing.

1.4 DESCRIPTION

- A. The fire alarm system shall comply with currently adopted requirements of NFPA Standard 72 for Protected Premises Signaling Systems. All components of the fire alarm system shall be listed as a system by a Nationally Recognized Testing Laboratory.
- B. The system shall be electrically supervised and monitor the integrity of all conductors.
- C. The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event. The Fire Command Center (FCC) shall also support Emergency manual voice announcement capability for both system wide or selected audio zones, and shall include provisions for the system operator to override automatic messages system wide or in selected zones.
- D. The system shall support additional, alternate Fire Command Centers, which shall be capable of simultaneous monitoring of all system events. Alternate Fire Command Centers shall also support an approved method of transferring the control functions to an alternate Fire Command Center when necessary. All Fire Command Centers shall be individually capable of assuming Audio Command functions such as Emergency Paging, audio zone control functions, and Firefighter's Telephone communication functions.
- E. Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the site via a multiplex communication network.
- F. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof). It's acceptable for peripheral devices to be manufactured outside of the U.S. by a division of the U.S. based parent company.
- G. 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 comply with the UL listing.
- H. The installing company shall employ NICET Certified technicians (minimum Level II Fire

Alarm Technology) on site to guide the final checkout, ensure the systems integrity and certify the complete system operates accordingly.

1.5 SCOPE

A. General

A new intelligent reporting, microprocessor-controlled fire detection system shall be installed in accordance with the project specifications and drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.
3. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.
4. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
5. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.
6. Speaker circuits may be controlled by NAC outputs built into the amplifiers, which shall function as addressable points on the Digital Audio Loop.
7. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone which ever is greater.
8. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.
9. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.

C. Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions.

D. Speaker circuits shall be arranged such that there is a minimum of one speaker circuit per smoke zone.

E. Speaker circuits shall be electrically supervised for open and short circuit conditions. If a short circuit exists on a speaker circuit, it shall not be possible to activate that circuit.

F. Audio amplifiers and tone generating equipment shall be electrically supervised for abnormal conditions. Digital amplifiers shall provide built-in speaker circuits, field configurable as four Class B (Style Y), or two Class A (Style Z) circuits.

G. Digital amplifiers shall be capable of storing up to two minutes of digitally recorded audio messages and tones. The digital amplifiers shall also be capable of supervising the connection to the associated digital message generator, and upon loss of that connection shall be capable of one of the following system responses:

1. The digital amplifier shall automatically broadcast the stored audio message.
2. The digital amplifier shall switch to a mode where a local bus input on the digital amplifier will accept an input to initiate a broadcast of the stored message. This bus input shall be connected to a NAC on a local FACP for the purpose of providing an alternate means of initiating an emergency message during a communication fault condition.
3. Speaker circuits shall be either 25 VRMS or 70VRMS. Speaker circuits shall have

4. 20% space capacity for future expansion or increased power output requirements.
4. Two-way emergency telephone (Fire Fighter Telephone) communication shall be supported between the Audio Command Center and up to seven (7) remote Fire Fighter's Telephone locations simultaneously on a telephone riser.
5. Means shall be provided to connect FFT voice communications to the speaker circuits in order to allow voice paging over the speaker circuit from a telephone handset.
6. The digital audio message generator shall be of reliable, nonmoving parts, and support the digital storage of up to 32 minutes of tones and emergency messages, shall support programming options to string audio segments together to create up to 1000 messages, or to loop messages and parts of messages to repeat for predetermined cycles or indefinitely.

1.6 QUALITY ASSURANCE

- A. The fire alarm system shall be manufactured by an ISO 9001:2008 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q90011994. The manufacturer shall have a minimum of twenty years experience in manufacturing fire alarm systems.
- B. The installer must be factory certified by the manufacturer and have five years of experience installing the systems described by this Section.

1.7 WARRANTY

- A. The fire alarm control panel, voice panels, sensors and modules, and any head-end equipment shall have a manufacturer's warranty of a minimum of 3 years.

1.8 POST CONTRACT MAINTENANCE

- A. Complete maintenance and repair service for the fire detection 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, required tests, and list pricing for any replacement products included on the bill of materials, along with the list pricing for products not on the bill of materials; if test and inspection rates are different than full service rates the bid/proposal shall include pricing for all levels for a minimum period of five (5) years. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.
- C. 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.

1.9 APPLICABLE STANDARDS AND SPECIFICATIONS:

- A. 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.
 - 1. National Fire Protection Association (NFPA) USA:
 - No. 12 Extinguishing Systems (low and high)
 - No. 12A Halon 1301 Extinguishing Systems
 - No. 13 Sprinkler 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
 - No. 2001 Clean Agent Extinguishing Systems
 - No. 70 National Electric Code
 - No. 90A Air Conditioning Systems
 - No. 92A Smoke Control Systems
 - No. 92B Smoke Management Systems in Malls, Atria, Large Areas
 - No. 72 National Fire Alarm Code
 - No. 101 Life Safety Code
 - 2. Underwriters Laboratories Inc. (UL) USA:
 - No. 268 Smoke Detectors for Fire Protective Signaling Systems
 - No. 864 Control Units for Fire Protective Signaling Systems
 - No. 2572 Mass Notification Systems
 - No. 217 Smoke Detectors, Single and Multiple Station
 - No. 228 Door Closers, Holders 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. 1481 Power Supplies for Fire Protective Signaling Systems
 - 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 Standard for General-purpose Signaling Devices and Systems
 - No. 60950 Safety of Information Technology Equipment
 - 3. Local and State Building Codes.
- B. The system shall be certified for seismic applications in accordance with the International Building Code (IBC). For OSHPD applications in California the system shall be Pre-Approved for seismic applications. The basis for qualification of seismic approval shall be via shake table testing.
- C. The system shall be approved for Marine Applications and carry the following certifications:
 - 1. USCG United States Coast Guard
 - 2. Lloyd's Register
 - 3. ABS American Bureau of Shipping
- D. The System shall be FM 6320 (Factory Mutual) approved as a Gas Detection system when

employed with the TC809C monitor module and industry standard 420 mA gas detectors.

PRODUCTS

2.1 MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE

- A. Provide FACP with the following capacities and performance specifications as required for complete and proper system operation.
 - 1. SINGLE SLC FACP
 - a. Single Loop FACP shall be a Honeywell Model XLS120 and shall contain a single integrated SLC Circuit with a capacity of 318 addresses.
 - 2. SINGLE OR DUAL SLC FACP
 - a. Single Loop FACP shall be a Honeywell Model XLS140-2 and shall contain a single integrated SLC Circuit.
 - b. The FACP can be expanded to support two SLC through the use of a Loop Expander Module.
 - c. Each SLC shall have a maximum capacity of 318 addresses.
 - 3. MULTI SLC FACP
 - a. Multi-Loop FACP shall be a Honeywell Model XLS3000 and shall contain a microprocessor based Central Processing Unit (CPU) and power supply. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system-controlled devices.
 - b. Each SLC shall have a maximum capacity of 318 addresses.
 - c. The FACP shall support up to 10 Addressable SLC Circuits.
- B. In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:
 - 1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.
 - 2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.
 - 3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.
 - 4. Transmit signals to monitoring location via Listed communicators or IP enabled interfaces.

2.2 SYSTEM CAPACITY AND GENERAL OPERATION

- A. Operator Interface

The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit liquid crystal display, individual, color coded

system status LEDs, and a keypad for the control of the fire alarm system.

B. Continuous Operation

All programming or editing of the existing program in the system shall be achieved without interrupting the alarm monitoring functions of the fire alarm control panel.

C. Features

The FACP shall be able to provide the following software and hardware features depending on model:

1. Pre-signal and Positive Alarm Sequence: The system shall provide means to cause alarm signals to only sound in specific areas with a delay of the alarm from 60 to up to 180 seconds after start of alarm processing. In addition, a Positive Alarm Sequence selection shall be available that allows a 15 second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs shall automatically activate immediately.
2. Smoke Detector Pre-alarm Indication at Control Panel: To obtain early warning of incipient or potential fire conditions, the system shall support a programmable option to determine system response to real time detector sensing values above the programmed setting. Two levels of Pre-alarm indication shall be available at the control panel: alert and action.
3. Alert: It shall be possible to set individual smoke detectors for preprogrammed pre-alarm thresholds. If the individual threshold is reached, the pre-alarm condition shall be activated.
4. Action: If programmed for Action and the detector reaches a level exceeding the preprogrammed level, the control panel shall indicate an action condition. Sounder bases installed with either heat or smoke detectors shall automatically activate on action Pre-Alarm level, with general evacuation on Alarm level.
5. The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.
6. Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.
7. NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meets the sensitivity testing requirements of NFPA 72.
8. Programmable Trouble Reminder: The system shall provide means to automatically initiate a reminder that troubles exist in the system. The reminder will appear on the system display and (if enabled) will sound a piezo alarm.
9. Online or Offline programming: The system shall provide means to allow panel programming either through an offline software utility program away from the panel or while connected and online. The system shall also support upload and download of programmed database and panel executive system program to a Personal Computer/laptop. A single change to one CPU database shall not require a database download to other CPUs.
10. History Events: The panel shall support a maximum history file of the last 4000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. The control panels shall also maintain a 1000 event Alarm History buffer, which consists of the 1000 most recent alarm events from the 4000-event history file.
11. Smoke Control Modes: The system shall provide means to perform FSCS mode Smoke Control to meet NFPA92A and 90B and HVAC mode to meet NFPA 90A.
12. The system shall provide means for all SLC devices on any SLC loop to be auto programmed into the system by specific address. The system shall recognize specific

- device type ID's and associate that ID with the corresponding address of the device.
13. Passwords and Users: The system shall support a minimum of two password levels to separate user features. Up to 9 user passwords shall be available, each of which may be assigned access to the programming change menus, the alter status menus, or both. Only the master password shall allow access to password change screens.
14. Block Acknowledge: The system shall support a block Acknowledge for Trouble Conditions
15. Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.
16. Environmental Drift Control: The system shall provide means for setting Environmental Drift Compensation by device. When a detector accumulates dust in the chamber and reaches an unacceptable level but yet still below the allowed limit, the control panel shall indicate a maintenance alert warning. When the detector accumulates dust in the chamber above the allowed limit, the control panel shall indicate a maintenance urgent warning.
17. Custom Action Messages: The system shall provide means to enter up to 100 custom action messages of up to 160 characters each. It shall be possible to assign any of the 100 messages to any point.
18. Local Mode: If communication is lost to the central processor the system shall provide added survivability through the intelligent loop control modules. Inputs from devices connected to the SLC and loop control modules shall activate outputs on the same loop when the inputs and outputs have been set with point programming to participate in local mode or when the type codes are of the same type: that is, an input with a fire alarm type code shall activate an output with a fire alarm type code.
19. Read status preview enabled and disabled points: Prior to reenabling points, the system shall inform the user that a disabled device is in the alarm state. This shall provide notice that the device must be reset before the device is enabled thereby avoiding activation of the notification circuits.
20. Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bitmapped graphic to the display screen.
21. Multi-Detector and Cooperating Detectors: The system shall provide means to link one detector with up to two detectors at other addresses on the same loop in cooperative multidetector sensing. There shall be no requirement for sequential addresses on the detectors and the alarm event shall be a result of the cooperating detectors chamber readings.
22. ACTIVE EVENT: The system shall provide a Type ID called FIRE CONTROL for purposes of air handling shutdown, which shall be intended to override normal operating automatic functions. Activation of a FIRE CONTROL point shall cause the control panel to (1) initiate the monitor module Control-By-Event, (2) send a message to the panel display, history buffer, installed printer and annunciators, (3) shall not light an indicator at the control panel, (4) Shall display ACTIVE on the LCD as well as display a FIRE CONTROL Type Code and other information specific to the device.
23. NONFIRE Alarm Module Reporting: A point with a type ID of NONFIRE shall be available for use for energy management or other non-fire situations. NONFIRE point operation shall not affect control panel operation nor shall it display a message at the panel LCD. Activation of a NONFIRE point shall activate control by event logic but shall not cause any indication on the control panel.
24. Mass Notification Override: The system shall be UL 2572 listed for Mass Notification and shall be capable, based on the Risk Analysis, of being programmed so that Mass Notification/Emergency Communications events take precedence over fire alarm events.
25. Security Monitor Points: The system shall provide means to monitor any point as a type security.
26. One-Man Walk Test: The system shall provide both a basic and advanced walk test for testing the entire fire alarm system. The basic walk test shall allow a single operator to run audible tests on the panel. All logic equation automation shall be

suspended during the test and while annunciators can be enabled for the test, all shall default to the disabled state. During an advanced walk test, field supplied output point programming will react to input stimuli such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch the input. The advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device and wiring operation/verification.

27. Control-By-Event Functions: CBE software functions shall provide means to program a variety of output responses based on various initiating events. The control panel shall operate CBE through lists of zones. A zone shall become listed when it is added to a point's zone map through point programming. Each input point such as detector, monitor module or panel circuit module shall support listing of up to 10 zones into its programmed zone map.
28. Permitted zone types shall be general zone, releasing zone and special zone. Each output point (control module, panel circuit module) can support a list of up to 10 zones including general zone, logic zone, releasing zone and trouble zone. It shall be possible for output points to be assigned to list general alarm. Non-Alarm or Supervisory points shall not activate the general alarm zone.
29. 1000 General Zones: The system shall support up to 1000 general purpose software zones for linking inputs to outputs. When an input device activates, any general zone programmed into that device's zone map will be active and any output device that has an active general zone in its map will be active. It shall also be possible to use general zone as arguments in logic equations.
30. 1000 Logic Equations: The system shall support up to 1000 logic equations for AND, OR, NOT, ONLY1, ANYX, XZONE or RANGE operators that allow conditional I/O linking. When any logic equation becomes true, all output points mapped to the logic zone shall activate.
31. 100 trouble equations per device: The system shall provide support for up to 100 trouble equations for each device, which shall permit programming parameters to be altered, based on specific fault conditions. If the trouble equation becomes true, all output points mapped to the trouble zone shall activate.
32. Control-By Time: A time-based logic function shall be available to delay an action for a specific period of time based upon a logic input with tracking feature. A latched version shall also be available. Another version of this shall permit activation on specific days of the week or year with ability to set and restore based on a 24-hour time schedule on any day of the week or year.
33. Multiple agent releasing zones: The system shall support up to 10 releasing zones to protect against 10 independent hazards. Releasing zones shall provide up to three cross zone and four abort options to satisfy any local jurisdiction requirements.
34. Alarm Verification, by device, with timer and tally: The system shall provide a user defined global software timer function that can be set for a specific detector. The timer function shall delay an alarm signal for a user specified time period and the control panel shall ignore the alarm verification timer if another alarm is detected during the verification period. It shall also be possible to set a maximum verification count between 0 and 20 with the "0" setting producing no alarm verification. When the counter exceeds the threshold value entered, a trouble shall be generated to the panel.

D. Network Communication

1. The FACP shall be capable of communicating on XLS-Net, over a Local Area Network (LAN) or Wide Area Network (WAN) utilizing a peer-to-peer, inherently regenerative communication format and protocol. The network shall support communication speed up to 100 Mb and support up to 200 panels/nodes per network.

E. Central Processing Unit

1. The Central Processing Unit shall contain and execute all Control-By-event (including Boolean functions including but not limited to AND, OR, NOT, ANYx, and CROSSZONE) programs for specific action to be taken if an alarm condition is detected by the system. Such Control-By-event programs shall be held in non-volatile programmable memory, and shall not be lost with system primary and secondary power failure.
2. The Central Processing Unit shall also provide a real-time clock for time annotation, to the second, of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.
3. The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems that require the use of external programmers or change of EPROMs are not acceptable.
4. The CPU shall provide an EIA-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.
5. The CPU shall provide two EIA-485 ports for the serial connection to annunciation and control subsystem components.
6. The EIA-232 serial output circuit shall be optically isolated to assure protection from earth ground.

F. Display

1. The system display shall provide a backlit alphanumeric Liquid Crystal Display (LCD) of up to 640-characters. It shall also provide Light Emitting Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM, SECURITY, SUPERVISORY, SYSTEM TROUBLE, OTHER EVENT, SIGNALS SILENCED, POINT DISABLED, CONTROLS ACTIVE, and CPU FAILURE.
2. The system display shall provide a keypad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming.

G. Loop (Signaling Line Circuit) Control Module:

1. The Loop Control Module shall monitor and control a minimum of 318 intelligent addressable devices. This includes 159 intelligent detectors (Ionization, Photoelectric, Thermal, combination) and 159 monitor or control modules.
2. The Loop Control Module shall contain its own microprocessor and shall be capable of operating in a local/degrade mode (any addressable device input shall be capable of activating any or all addressable device outputs) in the unlikely event of a failure in the main CPU.
3. Each Loop shall be capable of operating as a NFPA Style 4 (Class B) circuit.
4. The SLC interface board shall receive analog or digital information from all intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular device. Each SLC Loop shall be isolated and equipped to annunciate an Earth Fault condition. The SLC interface board software shall include software to automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information may also be used for automatic detector testing and the automatic determination of detector maintenance requirements.

H. Digital Voice Command Center

1. The Digital Voice Command Center located with the FACP, shall contain all equipment required for all audio control, emergency telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control, telephone circuit indication and control, digital voice units, microphone and main telephone handset.

2. The Voice Command Center equipment shall perform the following functions:
 - a. Operate as a supervised multichannel emergency voice communication system.
 - b. Operate as a two-way emergency telephone system control center.
 - c. Audibly and visually annunciate the active or trouble condition of every speaker circuit and emergency telephone circuit.
 - d. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.
 - e. Provide all-call Emergency Paging activities through activation of a single control switch.
 - f. As required, provide vectored paging control to specific audio zones via dedicated control switches.
 - g. Provide a factory recorded "library" of voice messages and tones in standard WAV. file format, which may be edited and saved on a PC running a current Windows® operating system.
 - h. Provide a software utility capable of offline programming for the DVC operation and the audio message files. This utility shall support the creation of new programs as well as editing and saving existing program files. Uploading or downloading the DVC shall not inhibit the emergency operation of other nodes on the fire alarm network.
 - i. Support an optional mode of operation with four analog audio outputs capable of being used with UL 864 listed analog audio amplifiers and SLC controlled switching.
3. The Digital Voice Command shall be modular in construction, and shall be capable of being field programmable without requiring the return of any components to the manufacturer and without requiring use of any external computers or other programming equipment.
4. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.

I. Main Power Supply:

1. The Main Power Supply shall operate on 120/240 VAC, 50/60 Hz, and shall provide all necessary power for the FACP.
2. The Main Power Supply shall provide the required power to the CPU using a switching 24 VDC regulator and shall incorporate a battery charger for 24 hours of standby power using dual-rate charging techniques for fast battery recharge.
3. The Main Power Supply shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge. The supply shall be capable of charging batteries ranging in capacity from 7200 amp-hours within a 48hour period.
4. The Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.
5. The Main Power Supply shall be power-limited per UL864 requirements.
6. The Main Power Supply shall communicate power supply, line voltage, battery status and charger status to the local LCD display. Any abnormal condition shall be annunciated and logged to the system alarm history log.

J. Addressable Charger Power Supply

1. The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Appliances and field devices that require regulated 24 VDC power. The model shall be ACPS-610.
2. The addressable power supply for the fire detection system shall provide up to a minimum of 6.0 amps of 24-volt DC regulated power for Notification Appliance Circuit (NAC) power or 10.0 amps of 24-volt DC general power. The power supply shall have an additional 0.5 amp of 24 VDC auxiliary power for use within the same cabinet as

the power supply. It shall include an integral charger designed to charge secondary batteries with a capacity of 12 - 200-amp hours.

3. The addressable power supply shall provide four individually addressable Notification Appliance Circuits that may be configured as Class "A" or Class "B" circuits. All circuits shall be power-limited per UL 864 requirements.
4. The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules. The power supply's output circuits shall be individually selected for synchronization. A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.
5. The addressable power supply shall operate on 120 or 240 VAC, 50/60 Hz.
6. The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be via the Signaling Line Circuit (SLC) or other multiplexed means. Power supplies that do not use an intelligent interface are not suitable substitutes. The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire.
7. The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection. In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.
8. The addressable power supply shall have an AC Power Loss Delay option. If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed. A delay time of zero, two, eight or sixteen hours shall be programmable.
9. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be programmable.
10. The addressable power supply mounts in either the FACP backbox or its own dedicated surface mounted backbox with cover.
11. Each of the power supply's four output circuits shall be programmed for Notification Appliance Circuit or General Purpose 24 VDC power. Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.
12. The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of an end-of-line resistor. When the power supply's output circuit is selected as General 24 VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
13. When selected for Notification Appliance Circuits, the output circuits shall be individually programmable for Steady, March Time, Dual Stage or Temporal.
14. When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.
15. The addressable power supply shall interface and synchronize with other power supplies of the same type. The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.
16. An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging. Interfaced power supplies shall have the option to share backup battery power.

K. Audio Amplifiers

1. The Audio Amplifiers will provide Audio Power for distribution to speaker circuits.
2. Multiple audio amplifiers may be mounted in a single enclosure, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).
3. The audio amplifier shall include an integral power supply, and shall provide built-in LED indicators for the following conditions:
 - a. Earth Fault on DAP A (Digital Audio Port A)

- b. Earth Fault on DAP B (Digital Audio Port B)
- c. Audio Amplifier Failure Detected Trouble
- d. Active Alarm Bus input
- e. Audio Detected on Aux Input A
- f. Audio Detected on Aux Input B
- g. Audio Detected on Firefighter's Telephone Riser
- h. Receiving Audio from digital audio riser
- i. Short circuit on speaker circuit 1
- j. Short circuit on speaker circuit 2
- k. Short circuit on speaker circuit 3
- l. Short circuit on speaker circuit 4
- m. Data Transmitted on DAP A
- n. Data Received on DAP A
- o. Data Transmitted on DAP B
- p. Data Received on DAP B
- q. Board failure
- r. Active fiber optic media connection on port A (fiber optic media applications)
- s. Active fiber optic media connection on port B (fiber optic media applications)
- t. Power supply Earth Fault
- u. Power supply 5V present
- v. Power supply conditions - Brownout, High Battery, Low Battery, Charger Trouble

4. The audio amplifier shall provide the following built-in controls:

- a. Amplifier Address Selection Switches
- b. Signal Silence of communication loss annunciation Reset
- c. Level adjustment for background music
- d. Enable/Disable for Earth Fault detection on DAP A
- e. Enable/Disable for Earth Fault detection on DAP A
- f. Switch for 2wire/4wire FFT riser

5. Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment.

6. Includes audio input and amplified output supervision, back up input, and automatic switch over function, (if primary amplifier should fail).

7. System shall be capable of backing up digital amplifiers.

8. One-to-one backup shall be provided by either a plugin amplifier card or a designated backup amplifier of identical model as the primary amplifier.

9. One designated backup amplifier shall be capable of backing up multiple primary amplifiers mounted in the same or adjacent cabinets.

10. Multichannel operation from a single amplifier shall be supported by the addition of an optional plugin amplifier card.

L. Audio Message Generator (Prerecorded Voice)/Speaker Control:

- 1. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.
- 2. Actuation of any alarm initiating device shall cause a prerecorded message to sound over the speakers. The message shall be repeated four (4) times. Pre and post-message tones shall be supported.
- 3. A built-in microphone shall be provided to allow paging through speaker circuits.
- 4. System paging from emergency telephone circuits shall be supported.
- 5. The audio message generator shall have the following indicators and controls to allow

for proper operator understanding and control:

- a. Lamp Test
- b. Trouble
- c. Off-Line Trouble
- d. Microphone Trouble
- e. Phone Trouble
- f. Busy/Wait
- g. Page Inhibited
- h. Pre/Post Announcement Tone

M. Controls with associated LED Indicators:

- 1. Speaker Switches/Indicators
 - a. The speaker circuit control switches/indicators shall include visual indication of active and trouble status for each speaker circuit in the system.
 - b. The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.

N. Serially Connected Annunciators

- 1. The annunciator shall communicate to the fire alarm control panel via an EIA 485 (multidrop) two-wire communications loop. The system shall support two 6,000 ft. EIA-485 wire runs. Up to 32 annunciators, each configured up to 96 points, may be connected to the connection, for a system capacity of 3,072 points of annunciation.
- 2. An EIA-485 repeater shall be available to extend the EIA-485 wire distance in 3,000 ft. increments. The repeater shall be UL864 approved.
- 3. Each annunciator shall provide up to 96 alarm and 97 trouble indications using a long-life programmable color LED's. Up to 96 control switches shall also be available for the control of Fire Alarm Control Panel functions. The annunciator will also have an "ONLINE" LED, local piezo sounder, local acknowledge and lamp test switch, and custom zone/function identification labels.
- 4. The annunciator may be field configured to operate as a "Fan Control Annunciator". When configured as "Fan Control," the annunciator may be used to manually control fan or damper operation and can be set to override automatic commands to all fans/dampers programmed to the annunciator.
- 5. Annunciator switches may be programmed for System control such as, Global Acknowledge, Global Signal Silence, Global System Reset, and on/off control of any control point in the system.
- 6. An optional module shall be available to utilize annunciator points to drive EIA-485 driven relays. This shall extend the system point capacity by 3,072 remote contacts.
- 7. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

O. Smoke Control Annunciator

- 1. On/Auto/Off switches and status indicators (LEDS) shall be provided for monitoring and manual control of each fan, damper, HVAC control unit, stairwell pressurization fan, and smoke exhaust fan. To ensure compliance the units supplied shall meet the following UL categories: UUKL, PAZX, UDTZ, QVAX as well as the requirements of NFPA 90A, HVAC, and NFPA 92A & 92B, Smoke Control. The control System shall be field programmable for either 90A operation or 92A/B operation to allow for future use and system expansion.
- 2. The OFF LED shall be Yellow, the ON LED shall be green, the Trouble/Fault LED shall be Amber/Orange for each switch. The Trouble/Fault indicator shall indicate a trouble in the control and/or monitor points associated with that switch. In addition, each group of eight switches shall have two LEDS and one momentary switch which allow the following functions: An Amber LED to indicate an OFFNORMAL switch position, in the ON or OFF position; A Green LED to indicate ALL AUTO switch

position; A Local Acknowledge/Lamp Test momentary switch.

3. Each switch shall have the capability to monitor and control two addressable inputs and two addressable outputs. In all modes, the ON and OFF indicators shall continuously follow the device status not the switch position. Positive feedback shall be employed to verify correct operation of the device being controlled. Systems that indicate on/off/auto by physical switch position only are not acceptable.
4. All HVAC switches (i.e., limit switches, vane switches, etc.) shall be provided and installed by the HVAC contractor.
5. It shall be possible to meet the requirements mentioned above utilizing wall mounted custom graphic.

P. Emergency Two-Way Telephone Control Switches/Indicators

- a. The emergency telephone circuit control panel shall include visual indication of active and trouble status for each telephone circuit in the system.
- b. The telephone circuit control panel shall include switches to manually activate or deactivate each telephone circuit in the system.

Q. Remote Transmissions:

1. Provide local energy or polarity reversal or trip circuits as required.
2. The system shall be capable of operating a polarity reversal or local energy or fire alarm transmitter for automatically transmitting fire information to the fire department.
3. Provide capability and equipment for transmission of zone alarm and trouble signals to remote operator's terminals, system printers and annunciators.
4. Transmitters shall be compatible with the systems and equipment they are connected to such as timing, operation and other required features.

R. Universal Digital Alarm Communicator Transmitter (UDACT)

1. The UDACT is an interface for communicating digital information between a fire alarm control panel and an UL Listed central station.
2. The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet. Optionally, the UDACT shall have the ability for remote mounting, up to 6,000 feet from the fire alarm control panel. The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status. Systems that utilize relay contact closures are not acceptable.
3. The UDACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to two different telephone numbers.
4. The UDACT shall be capable of transmitting events in 4+2, SIA, and Contact ID.
5. Communication shall include vital system status such as:
 - a. Independent Zone (Alarm, trouble, Non-Alarm, supervisory)
 - b. Independent Addressable Device Status
 - c. AC Power Loss
 - d. Low Battery and Earth Fault
 - e. System Off Normal
 - f. 12- and 24-Hour Test Signal
 - g. Abnormal Test Signal (per UL requirements)
 - h. EIA-485 Communications Failure
 - i. Phone Line Failure
6. The UDACT shall support independent zone/point reporting when used in the Contact ID format. In this format the UDACT shall support transmission of up to 3,064 points. This enables the central station to have exact details concerning the origin of the fire or response emergency.
7. The UDACT shall be capable of being programmed with the same programming utility as the host FACP, and saved, edited and uploaded and downloaded using the utility.

UDACT shall be capable of being programmed online or offline. The programming utility shall also support upgrading UDACT operating firmware.

8. The UDACT shall be capable of generating Central Station reports providing detailed programming information for each point along with the central station point address.
9. An IP or IP/GSM Communicator option shall be available to interface to the UDACT and be capable of transmitting signals over the internet/intranet or Cellular (GSM) network to a compatible receiver.

S. Field Programming

1. The system shall be programmable, configurable and expandable in the field without the need for special tools, laptop computers, or other electronic interface equipment. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.
2. All field defined programs shall be stored in nonvolatile memory.

T. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.
2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 0 to 60 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

U. System Point Operations:

1. Any addressable device in the system shall have the capability to be enabled or disabled through the system keypad or video terminal.
2. System output points shall be capable of being turned on or off from the system keypad or the video terminal.
3. Point Read: The system shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Each point shall be annunciated for the parameters listed:
 - a. Device Status.
 - b. Device Type.
 - c. Custom Device Label.
 - d. Software Zone Label.
 - e. Device Zone Assignments.
 - f. Analog Detector Sensitivity.
 - g. All Program Parameters.
4. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 4000 system events. Each of these events will be stored, with time and date stamp, until an operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed; one event at a time, and the actual number of activations may also be displayed and or printed. History events shall include all alarms, troubles, operator actions, and programming entries.
5. The history buffer shall use nonvolatile memory. Systems which use volatile memory for history storage are not acceptable.
6. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent system detector and shall analyze the detector responses over a period of time.
7. If any intelligent detector in the system responds with a reading that is below or above

normal limits, then the system will enter the trouble mode, and the particular Intelligent Detector will be annunciated on the system display, and printed on the optional system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

8. The system shall include the ability (programmable) to indicate a "pre-alarm" condition. This will be used to alert maintenance personal when a detector is at 80% of its alarm threshold in a 60 second period.

2.3 SYSTEM COMPONENTS – CONVENTIONAL WIRED DEVICES

- A. Manual Pull Station
- B. Photo-Electric Smoke Detector
- C. Conventional Aspirating Detection
 1. An optional air aspiration detection system shall be available.
 2. The aspirating system shall support multiple sensitivity settings.
 3. The aspirating system shall operate from 24 VDC.
 4. The aspirating system shall provide alarm and trouble relays used to activate a fire alarm control panel.

2.4 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

- A. Addressable Devices – General
 1. Addressable devices shall provide an address setting means using rotary decimal switches. Addressable devices that require the address be programmed using a programming tool or utility are not an allowable substitute.
 2. Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159.
 3. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.
 4. Detectors shall be intelligent and addressable, and shall receive operating power and communication via two wires (twisted-pair) to the fire alarm control panel Signaling Line Circuits.
 5. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required by site configuration, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
 6. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel shall be capable of adjusting sensitivity on a time-of-day basis.
 7. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be UL Listed as meeting the calibrated sensitivity test requirements of NFPA Standard 72.
 8. The detectors shall be ceiling or wall mounted and shall include a separate twist-lock base with tamper proof feature. Base options shall include sounder bases as indicated in Section 2.7 .
 9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

10. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
11. A magnetic test switch shall be incorporated into detectors and modules to allow functional test. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.
12. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2 1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

B. Addressable Manual Pull Station

1. Addressable manual pull stations shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. Honeywell model # S464G. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual pull stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.
4. The manual pull station shall be designed to meet the ADAAG guidelines Section 5.1.3[13]) and shall meet ADA requirements for 5 lb. maximum activation force.

C. Intelligent Photoelectric Smoke Detector

1. The intelligent photoelectric smoke detector shall be HONEYWELL model # TC806B and shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
2. The detector shall be provided with a dust cover to reduce

D. Intelligent High-Sensitivity Smoke Detector:

1. The high-sensitivity detector features a smoke-sensing chamber and patented optic block designed to amplify signals from smoke but diminish stray internal reflections that can cause false alarms. New LED technology allows Pinnacle to achieve sensitivity levels from 0.02 percent-per-foot to 2 percent-per-foot obscuration – up to 25 times greater than a standard photoelectric detector.
2. The detector shall provide extensive software processing that includes multi-alert drift compensation, internal self-diagnostics, and superior transient signal rejection algorithms to produce unprecedented stability at ultra-high sensitivities across the full temperature range.
3. The intelligent high-sensitivity photo detector shall have nine sensitivity levels and be sensitive to a minimum obscuration of 0.02 percent per foot.
4. The intelligent high-sensitivity smoke detector shall not require expensive conduit, special fittings or PVC pipe.
5. The intelligent high-sensitivity smoke photo detector shall support standard, relay, isolator and sounder detector bases.
6. The intelligent high-sensitivity smoke photo detector shall not require other cleaning requirements than those listed in NFPA 72. Replacement, refurbishment or specialized cleaning of the detector head shall not be required.
7. The intelligent high-sensitivity smoke photo detector shall include two bicolor LEDs that flash green in normal operation and turn on steady red in alarm.

8. The detector shall be Honeywell model TC846 series.
9. The detector shall be UL listed for:
 - a. UL 268 Open Air Protection (0.5%/ft. to 2.0%/ft. obscuration).
 - b. UL 268 Special Applications (0.02%/ft. to 0.5%/ft. obscuration).
 - c. UL 268A Duct Applications allowing both in duct and within Honeywell models DNR and DNRW duct smoke detector housings.

E. Intelligent Multi Criteria Photo/Thermal/Infrared (PTIR) Detector:

1. The Intelligent Multi-Criteria Photo/Thermal/Infrared detector shall be plug-in addressable multicriteria detectors meeting the general requirements of this section.
2. They shall combine photoelectric, thermal, and infrared (PTIR) sensors in one unit to sense multiple components of a fire. This approach enables enhanced sensitivity to real fire with heightened immunity to nuisance particulates using the following technology:
 - a. Photoelectric sensors detect airborne particles associated with smoke.
 - b. Thermal sensors detect heat and rate-of-rise (135°F fixed temperature threshold).
 - c. The Infrared sensor discerns light patterns in the environment as an additional data point for alarm determination.
3. The PTIR detector shall be listed to both UL 268 7th edition and UL 521 requirements and shall indicate distinct smoke and heat alarms.

F. Intelligent Duct Smoke Detector

1. The smoke detector housing shall accommodate an intelligent photoelectric detector that provides continuous analog monitoring and alarm verification from the panel. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.
2. The Intelligent Duct Smoke Detector shall support the installation of addressable Photoelectric detector capable of being tested remotely.
3. The Intelligent Duct Detector housing shall be model # DNR(W) and the remote test capable photoelectric smoke detector shall be Honeywell model # TC806DNR.

G. Multi-Criteria Fire/CO Detector

1. The multi-criteria fire/CO detector shall be a plug-in, addressable device that meets the general performance requirements of this section.
2. The detector shall provide both fire and carbon monoxide (CO) detection.
3. The detector shall combine four separate sensing elements in one unit to sense multiple components of a fire: smoke, CO, light/flame, and heat. This approach enables enhanced sensitivity to real fire with heightened immunity to nuisance particulates. For CO, the detector's electrochemical sensing cell creates a separate signal for life safety CO detection.
4. The detector shall incorporate the following sensor technologies:
 - a. Photoelectric sensors to detect airborne particles associated with visible smoke.
 - b. Thermal sensors to detect heat and rate-of-rise (135°F fixed temperature threshold).
 - c. Carbon Monoxide sensors to detect this by-product of fire for accurate fire detection.
 - d. Infrared sensors to discern light patterns in the environment as an additional data point for alarm determination.
5. The detector shall combine multiple sensor technologies to improve detector response, while rejecting certain nuisance alarm triggers.
6. The detector shall meet both UL 268 7th edition and UL 521 listing requirements for

fire detection as well as the UL 2075 standard for system-connected life safety carbon monoxide detection.

7. The detector shall meet Agency Standards
 - a. ANSI/UL 268 Smoke Detectors for Fire Alarm Signaling Systems
 - b. CAN/ULCS529 Smoke Detectors for Fire Alarm Systems
 - c. FM 32303250 Smoke Actuated Detectors for Automatic Fire Alarm Signaling
8. The detector shall be Honeywell model TC840C3206.

H. Intelligent Thermal Detectors

1. The intelligent thermal detectors shall be Honeywell TC0808 series addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute.
2. A high heat thermal detector rated at 190 degrees Fahrenheit shall also be available.
3. The thermal detectors shall connect via two wires to the fire alarm control panel signaling line circuit.

I. Intelligent Single-ended Reflective Imaging Beam Smoke Detector

1. The Intelligent Single-ended Reflective Imaging Beam Smoke Detector shall include a transmitter and receiver both within the detector unit (imager). The detector shall include a reflector.
2. The detector shall allow for beam alignment between the detector and the reflector to be done at the detector.
3. The detector shall have automatic sensitivity settings.
4. The detector shall be rated for use in temperatures between 32° F and 100° F. The Operating Humidity Range shall be 0 to 95% RH non-condensing. An internal heater shall be provided to prevent condensation build-up in the detector when installed in low temperatures. An optional heater shall be available for the reflector.
5. The detector shall provide a protection range shall be 16 ft. to 328 ft.
6. Optical filters shall be available for a calibrated test to be performed. An optional unit shall be available that shall allow a remote electronic smoke simulated test at ground level.
7. The detector shall be Honeywell model TC847XR
8. The detector shall be resistant to building movement, sunlight, and foreign object intrusion. The infrared transmitter and receiver imager generates a beam of light towards a high-efficiency reflector. The reflector returns the beam to the receiver where the received signal is analyzed. The change in the strength of the received signal when smoke enters the area between the unit and the reflector is used to determine the alarm condition. The receiver imager has a wide 12° field of view that automatically tracks the reflector in case of building movement or support structure movement.

J. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs. The addressable monitor module shall be Honeywell model # TC809A (Class A or B) or TC809B Class B)
2. The IDC zone shall be suitable for Style D/Class A or Style B/Class B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.
4. For multiple dry contact monitoring, a module shall be available that provides 10 Style B or 5 Style D input circuits; Honeywell model # XP10M.

- K. Two Wire Detector Monitor Module
 - 1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device); Honeywell model # TC841A.
 - 2. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
 - 3. For multiple 2wire smoke detector circuit monitoring a module shall be available that provides 6 Style B/Class A or 3 Style D/Class B input circuits; Honeywell model # XP6MA.
- L. Addressable Analog Input Module
 - 1. The Honeywell TC809C Analog Input Module shall interface to the addressable SLC and allow the fire alarm control panel (FACP) to monitor industry-standard, linear-scale, 4–20 mA protocol sensors.
 - 2. The module shall convert the sensor output to communication protocol that can be interpreted by the FACP for monitoring and display.
 - 3. The module shall be powered from a power supply that is isolated from the communication line. A 500-mA current limiter and a cutoff circuit protect the module's electrical supply from short circuits. In the event of a short, the output voltage shall cycle within safe limits until the short is removed. The output signal shall be sampled and filtered for transients and noise prior to passing the signal along to the FACP.
 - 4. The module shall accept both 3-wire (device sink) and 2-wire configurations.
 - 5. The modules shall include standard SEMS terminals will accept wiring from 12 AWG to 18 AWG.
 - 6. The module shall support programming of up to five programmable event thresholds.
 - 7. The System shall be FM 6320 (Factory Mutual) approved as a Gas Detection system when employed with the TC809C monitor module and industry standard 420 mA gas detectors.
- M. Addressable Control Module
 - 1. Addressable control modules shall be provided to supervise and control the operation of one conventional circuit of compatible Notification Appliances, 24 VDC powered, polarized audio/visual notification appliances; Honeywell model # TC810N.
 - 2. The control module NAC may be wired for Style Z or Style Y (Class A/B) with a current rating of 2 Amps for Style Z and 3 Amps for Style Y;
 - 3. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.
 - 4. For multiple circuit control a module shall be available that provides 6 Style Y (Class B) or 3 Style Z (Class A) control circuits; Honeywell model # XP6C.
- N. Addressable Relay Module:
 - 1. Addressable Relay Modules shall be available for HVAC control and other network building functions; Honeywell model # TC810C.
 - 2. The module shall provide two form C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.
 - 3. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary devices energize at the same time on the same pair of wires;
 - 4. For multiple relay control, a module shall be available that provides 6 programmable Form-C relays; Honeywell model # XP6R.

- O. Addressable Releasing Control Module
 - 1. An addressable releasing control module shall be available to supervise and control compatible releasing agent solenoids; Honeywell model #TC810S.
 - 2. The module shall operate on a redundant protocol for added protection.
 - 3. The module shall be configurable for Style Z or Style Y (Class A/B) and support one 24 volt or two 12 volt solenoids.
- P. Addressable Two-In / Two-Out Monitor/Relay Module:
 - 1. An addressable Two-In/Two-Out module shall be available; Honeywell model #TC822A
 - 2. The two-in/two-out module shall provide two Class B/Style B dry-contact input circuits and two independent Form-C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.
- Q. Isolator Module
 - 1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building; Honeywell model # TC811A.
 - 2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
 - 3. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
 - 4. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.5 SYSTEM COMPONENTS – ADDRESSABLE WIRELESS DEVICES

A. Integration

Wireless devices used as components of a fire alarm system shall be capable of connection to a compatible Intelligent Fire Alarm Control Panel (FACP) via a Signaling Line Circuit (SLC) via a gateway. The gateway shall provide the link to one mesh network of wireless devices. Multiple gateways can be supported on the same intelligent FACP. All intelligent sensing functions supported for wired devices shall be supported by comparable wireless devices. Additionally, the panel shall allow wired devices to be identified with unique type codes which allow the system to display wireless trouble indications such as low battery, jamming, and tamper.

B. Reliability

Wireless communication for the wireless system shall incorporate an advanced mesh technology which incorporates UL 864 Class A approved supervised, redundant communication. All devices in the mesh network shall be capable of acting as repeaters for other devices in the same network. The wireless system shall also have a suite of tools that can be installed on a portable PC and used to assist in qualifying the site, installing the system, and verifying the proper operation of the system.

C. Addressable Devices – Wireless

- 1. The system shall be capable of supporting intelligent addressable wireless detectors and monitor modules with similar appearance and capabilities as wired addressable intelligent devices.
- 2. Intelligent wireless devices shall utilize a gateway device to communicate with the

intelligent fire alarm control panel, so that the wireless devices report to the panel using the established SLC protocol.

- 3. Wireless devices shall be capable of co-existing on the same panel with wired devices, and shall be capable of participating in common control-by-event programming sequences.
- 4. Device addressing for wireless device shall be consistent with intelligent wired devices, and shall use decade, decimal address switches. Wireless devices shall be capable of being set to an address in a range of 001 to 159.
- 5. Wireless devices (excepting the gateway) shall operate on batteries recommended by the manufacturer, and shall be UL listed for a minimum of 2 years of operation on one set of batteries.
- 6. The gateway shall be connected to the panel SLC loop and shall be capable of being powered by the SLC loop as well. Alternately, the gateway shall be capable of connection to the SLC loop only for communication with the FACP, and power may be supplied via a separate 24VDC input.
- 7. Programmable and automatic sensing options supported by the intelligent FACP which are available for intelligent wired devices shall also be supported for equivalent intelligent wireless devices, including: ability to set the sensor sensitivity at the FACP, ability to adjust sensitivity based on time, ability to automatically compensate for dust accumulation and other slow environmental changes, ability to annunciate two dirty detector states, and the ability to participate in cooperative sensing decisions with other intelligent wired or wireless detectors that are connected to the same panel.
- 8. Wireless devices shall be connected to a compatible intelligent fire alarm system, and shall be supported by the system as wireless devices. Trouble conditions that are unique to wireless devices shall be reported at the head end, such as: Low Battery, Jamming, and Tamper.
- 9. Intelligent wireless devices shall use a UL Listed Class A mesh communication protocol to provide redundant supervised wireless communication links.
- 10. A wireless mesh shall be comprised of one gateway and from one to forty-nine wireless devices.
- 11. Multiple wireless gateway systems may be connected to a single FACP.
- 12. The system shall allow for up to four wireless gateway systems in the same radio space.
- 13. Device status indicators (LEDs) on wireless devices shall not be required to match indications of wired devices, in particular for active indications where a steady on LED would reduce the battery life of the device.
- 14. Wireless detectors shall have dedicated bases with a magnetic tamper mechanism that initiates a trouble when the device is removed from the base. The tamper trouble condition shall latch at the panel until the detector is restored to the normal installed position and the trouble has been reset.
- 15. Wireless monitor modules shall have a dedicated cover that requires unfastening two screws to remove. The cover shall have a built-in magnet, and removal of the cover shall initiate a trouble condition at the panel. The tamper trouble condition shall latch at the panel until the monitor module is restored to the normal installed position and the trouble has been reset.
- 16. Wireless monitor modules shall be capable of being mounted in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. The optional surface mount Lexan enclosure shall be used for this purpose, except where installation of the wireless monitor module in a metal box has been tested and adequate performance for the application using the metal box has been confirmed.
- 17. Available Wireless devices shall include:
 - a. Intelligent wireless smoke detector (photoelectric technology)
 - b. Intelligent wireless smoke/heat detector
 - c. Intelligent wireless fixed temperature heat detector, 135 degrees F.
 - d. Intelligent wireless rate of rise heat detector, 135 degrees F.
 - e. Wireless monitor module

- f. Wireless pull station
 - g. Wireless gateway
 - h. Wireless A/V devices
 - i. Wireless A/V Sync module
- 18. Unprogrammed wireless devices shall be capable of being used to perform a site survey to assist in determining the viability of a site for a wireless application. Tests shall include point to point connectivity, and a background RF scan to indicate conflicts with the Mesh network.
- 19. A program that supports qualification of potential wireless applications, configuration and installation, and diagnostics shall be available. This program shall be capable of being installed on a Windows® PC, and shall be capable of communicating with wireless devices by use of a USB adapter that plugs into the computer.

D. Portable Emergency Telephone Handset Jack

- 1. Portable emergency telephone handset jacks shall be flush mounted on stainless steel plates as indicated on plans. Handset jacks shall be approved for emergency telephone system application.
- 2. Insertion of a remote handset plug into a jack shall send a signal to the fire command center which shall audibly and visually indicate the online condition, and shall sound a ring indication in the handset.
- 3. The two-way emergency telephone system shall support a minimum of seven (7) handsets online without degradation of the signal.

E. Fixed Emergency Telephone Handset

- 1. The telephone cabinet shall be painted red and clearly labeled emergency telephone. The cabinets shall be located where shown on drawings.
- 2. The handset cradle shall have a switch connection such that lifting the handset off of the cradle shall send a signal to the fire command center which shall audibly and visually indicate its online (off-hook) condition.
- 3. The two-way emergency telephone system shall support a maximum of seven (7) handsets online (off hook) without degradation of the signal.

F. Field Wiring Terminal Blocks

- 1. For ease of service all panel I/O wiring terminal blocks shall be removable, plugin types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

G. Printer

- 1. The printer shall provide hardcopy printout of all changes in status of the system and shall timestamp such printouts with the current time-of-day and date. The printer shall be standard carriage with 80characters per line and shall use standard pin feed paper. The printer shall be enclosed in a separate cabinet suitable for placement on a desktop or table. The printer shall communicate with the control panel using an interface complying with Electrical Industries Association standard EIA-232D. Power to the printer shall be 120 VAC @ 60 Hz.
- 2. The system shall have a strip printer capable of being mounted directly in the main FACP enclosure. Alarms shall be printed in easy-to-read RED, other messages, such as a trouble, shall be printed in BLACK. This printer shall receive power from the system power supply and shall operate via battery backup if AC mains are lost. The strip printer shall be UL 864 listed.
- 3. The system shall have a strip printer capable of being mounted directly in the main FACP enclosure. Alarms shall be printed in easy-to-read RED, other messages, such as a trouble, shall be printed in BLACK. This printer shall receive power from the system power supply and shall operate via battery backup if primary power is lost. The strip printer shall be UL 864 listed.

2.6 AIR SAMPLING SMOKE DETECTION

- A. High Level Aspiration System Interface:
 - 1. The system shall be capable of supporting a High Level Interface for Vesda Aspirating Detection Systems. The interface shall support up to 100 detectors and allow the fire alarm network to monitor and control events on the aspiration system.

2.7 NOTIFICATION APPLIANCES

- A. General
 - 1. Low frequency sounder and low frequency sounder strobes shall mount to a standard 4 x 4 x 1½-inch back box, 4-inch octagon back box, or double-gang back box. Two-wire products shall also mount to a single-gang 2 x 4 x 17/8-inch back box. A universal mounting plate shall be used for mounting products. The notification appliance circuit wiring shall terminate at the universal mounting plate.
 - 2. When used with the Sync•Circuit™ Module accessory, shall be powered from a non-coded notification appliance circuit output and shall operate on a nominal 12 or 24 volts. When used with the Sync•Circuit Module, 24-volt-rated notification appliance circuit outputs shall operate between 16.5 and 33 volts. Indoor L-Series products shall operate between 32 and 120 degrees Fahrenheit (0°C to 49°C) from a regulated DC or full-wave rectified unfiltered power supply.
 - 3. Low Frequency Sounder strobes shall have field-selectable candela settings including 15, 30, 75, 95, 110, 135, 185. The field selectable tones will sound within the frequency range of 520 Hz ±10% square wave tone and have a permanent marking on the housing that reads "low frequency sounder".
- B. Low Frequency Sounder
 - 1. The low frequency sounder shall be listed to UL 464 and shall be approved for fire protective service.
 - 2. The low frequency sounder and the synchronization module accessory, if used, shall be powered from a notification appliance circuit output and shall operate on a nominal 24 volts (includes fire alarm panels with built-in sync). When used with the synchronization module, 24-volt rated notification appliance circuit outputs shall operate between 16.5 to 33 volts.
 - 3. Provide a compatibility listing of products to power supplies that indicates maximum devices on a circuit based on circuit loading.
 - 4. The low frequency sounder has an option to switch between temporal three or temporal four pattern, nontemporal (continuous) pattern and coded supply within the frequency range of 520Hz ± 10% square wave tone. The low frequency sounder shall operate on a coded or non-coded power supply with high and low volume settings.
 - 5. Low Frequency Sounder Strobe Combination
 - 6. The low frequency sounder strobe shall be a System Sensor L-Series Model _____ listed to UL 1971 and UL 464 and shall be approved for fire protective service. The low frequency sounder strobe shall be wired as a primary-signaling notification appliance and comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.
 - 7. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. The sounder shall have an option to switch between a temporal three or temporal four pattern and a non-temporal (continuous) pattern. These options are set by a multiple position switch. The low frequency sounder on low frequency sounder strobe models shall operate on a non-coded power supply with high and low volume settings.
 - 8. The field selectable tones will sound within the frequency range of 520 Hz ±10% square wave tone.
- C. Synchronization Module
 - 1. The module shall be a System Sensor Sync•Circuit model MDL3 listed to UL 464 and

shall be approved for fire protective service. The module shall synchronize SpectrAlert strobes at 1 Hz and low frequency sounder at temporal three. Also, while operating the strobes, the module shall silence the low frequency sounder on low frequency sounder strobe models over a single pair of wires. The module shall mount to a 4-11/16 x 4-11/16 x 2-1/8-inch back box. The module shall also control two Class B circuits or one Class A circuit. The module shall synchronize multiple zones. Daisy chaining two or more synchronization modules together will synchronize all the zones they control. The module shall not operate on a coded power supply.

D. Accessories

1. Colored Lens Attachments
 - a. Colored Lens Attachments are for installation with strobes, horns, chimes, horn strobes, chime strobes, and speaker strobes. Bezels are offered in red and white for both wall and ceiling devices. Available in FIRE, ALERT, EVAC, AGENT, Plain (no marking), FUEGO, and FOGO. Operating temperature shall be -40°F to 151°F.
 - b. Colored lens attachments shall be approved for fire protective service as listed in UL 1638. The lens attachments shall only be used with plain (no "FIRE" print) strobe devices or in conjunction with a non-fire printed bezel. The lens shall mount to any wall- or ceiling-mount strobes and shall be rated from -35°F to 151°F.
 - c. Colored lens attachments may be used with the following System Sensor L-Series plain (non-FIRE-printed) strobe models: P2RL-P, P2WL-P, SRL-P, SWL-P, SPSRL-P, SPSWL-P, SPSCWL-P, or any device used with a non-FIRE printed bezel.
2. 120 VAC Mounting Plate
 - a. Model MP120KL shall be listed to UL 464 for fire protective signaling systems. The mounting plate shall power a two-wire L-Series horn, strobe, horn strobe, chime or chime strobe from a 120 VAC supply converted to nominal 24 V FWR.
 - b. For indoor applications, the mounting plate shall be installed in a 4x4x21/8 -inch junction box.
 - c. MP120KL may be used with any of the following products at all horn and strobe settings: P2RL, P2WL, P2RL-P, P2WL-P, P2RL-SP, P2WL-SP, PC2RL, PC2WL, SRL, SWL, SRL-P, SWL-P, SRL-SP, SWL-SP, SWL-CLR-ALERT, SWL-ALERT, SCRL, SCWL, SCWL-CLR-ALERT, HRL, HWL, CHRL, CHWL, CHSRL, CHSWL, CHSCRL, CHSCWL.

E. Low Frequency Sounder Base – B200S-LF

1. The low frequency sounder base appliance shall be System Sensor model B200S-LF.
2. The low frequency sounder base shall be listed to UL 268 and UL 464. The low frequency sounder shall have an option to switch between a temporal three-pattern, temporal four-pattern, non-temporal (continuous) or march time pattern. The low frequency sounder base shall offer two volume levels. The alarm current shall not exceed 140 mA at 16 VDC. The low frequency sounder base shall operate between 10% and 93% relative humidity. The appliance shall mount to a standard 4 x 4 x 1½-inch back box, 4- inch octagon back box, 3 ½ - inch octagon back box, double-gang back box or single-gang back box. A pre-wire mounting plate shall be used for mounting products. The wiring shall terminate at the pre-wire mounting plate. The low frequency sounder base shall have the ability to synchronize with notification devices without the use of added accessories. A manual locking feature shall be available to prevent removal of the attached sensor head.

F. Strobe

1. The strobe shall be a System Sensor L-Series Model _____ listed to UL 1638 and shall be approved for fire protective service.

2. The strobe shall be wired as a primary signaling notification appliance and comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.
3. The strobe shall have field-selectable candela settings including 15, 30, 75, 95, 110, 135, 185 for wall mounted units and 15, 30, 75, 95, 115, 150, 177 for ceiling mounted units. The strobe light shall consist of a xenon flash tube and associated lens/reflector system.
4. Indoor products shall operate between 32 and 120 degrees Fahrenheit from a regulated DC or fullwave rectified unfiltered power supply.
5. The strobe shall mount to a standard 4 x 4 x 1½ -inch back box, 4-inch octagon back box, double gang back box, and single-gang 2 x 4 x 17/8-inch back box. A universal mounting plate shall be used for mounting ceiling and standard wall products. A separate mounting plate shall be used for mounting compact wall products. The notification appliance circuit wiring shall terminate at the mounting plate.

G. Horn Strobe

1. The horn strobe shall be a System Sensor L-Series Model _____ listed to UL 1971 and UL 464 and shall be approved for fire protective service.
2. The horn strobe shall be wired as a primary signaling notification appliance and comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. The strobe shall have field-selectable candela settings including 15, 30, 75, 95, 110, 135, 185 for wall mounted units and 15, 30, 75, 95, 115, 150, 177 for ceiling mounted units. The strobe light shall consist of a xenon flash tube and associated lens/reflector system.
3. The horn shall have two audibility options and an option to switch between a temporal three pattern and a non-temporal (continuous) pattern. These options are set by a multiple position switch. The horn or horn strobe models shall operate on a coded or non-coded power supply.
4. Indoor products shall operate between 32 and 120 degrees Fahrenheit from a regulated DC or full-wave rectified unfiltered power supply. The horn strobe shall mount to a standard 4 x 4 x 1½ -inch back box, 4-inch octagon back box, or double gang back box. Two-wire products shall also mount to a single-gang 2 x 4 x 17/8-inch back box. A universal mounting plate shall be used for mounting ceiling and standard wall products. A separate mounting plate shall be used for mounting compact wall products. The notification appliance circuit wiring shall terminate at the mounting plate.

H. Chime

1. The chime shall be a System Sensor L-Series Model _____ listed to UL 464 for wall or ceiling installation.
2. The chime shall mount to a standard 4 x 4 x 1½-inch back box, 4-inch octagon back box, single-gang 2 x 4 x 17/8-inch back box, or double-gang back box. A universal mounting plate shall be used for mounting products. The notification appliance circuit wiring shall terminate at the universal mounting plate. The chime shall have two audibility options and an option to switch between a temporal three pattern and a non-temporal (continuous) pattern. These options are set by a multiple position switch. The chime shall operate between 32°F and 120°F.

I. Chime Strobe

1. The chime strobe shall be a System Sensor L-Series Model _____ listed to UL 464 and UL 1638 for wall and ceiling installation. The chime strobe shall comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. The strobe shall have field-selectable candela settings including 15, 30, 75, 95, 110, 135, 185 for wall mounted units and 15, 30, 75, 95, 115, 150, 177 for ceiling mounted units. The strobe light shall

consist of a xenon flash tube and associated lens/reflector system. The chime shall have two audibility options and an option to switch between a temporal three pattern and a non-temporal (continuous) pattern. These options are set by a multiple position switch. The chime strobe models shall operate between 32 and 120 degrees Fahrenheit.

2. The chime strobe shall mount to a standard 4 x 4 x 1 1/2 -inch back box, 4-inch octagon back box, single-gang 2 x 4 x 1 7/8-inch back box or double gang back box. A universal mounting plate shall be used for mounting ceiling and 4x4 wall products. A separate mounting plate shall be used for mounting wall 2x4 products. The notification appliance circuit wiring shall terminate at the mounting plate.

J. Speaker Strobes

1. The speaker strobe shall be a System Sensor L-Series Model _____ listed to UL 1971 and UL 1480 and shall be approved for fire protective signaling systems.
2. It shall be a dual-voltage transformer speaker strobe capable of operation at 25.0 or 70.7 nominal Vrms.
3. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F.
4. It shall mount to a 4 x 4 x 2 1/8-inch back box. A universal mounting plate shall be used for mounting ceiling and wall speaker strobe products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate.
5. The speaker strobe shall have power taps (from 1/4 watt to 2 watts) and voltage that are selected by rotary switches.
6. All models have a maximum sound output of 86dB at 10 feet and shall incorporate an open back construction.
7. The strobe shall have field-selectable candela settings including 15, 30, 75, 95, 110, 135, 185 for wall mounted units and 15, 30, 75, 95, 115, 150, 177 for ceiling mounted units. The strobe light shall consist of a xenon flash tube and associated lens/reflector system and operate on either 12V or 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.

K. Universal Dual Strobe Expansion Plate

1. UPPER APPLIANCE (Configurable)
 - a. The upper position of the Universal Strobe Expansion plate is configurable with another L-Series appliance. See the applicable Engineering Spec for the specific appliance that shall be mounted to the expansion plate as the upper appliance.
2. LOWER APPLIANCE, Strobe
 - a. The strobe shall be a System Sensor L-Series Model _____ listed to UL 1638 and shall be approved for fire protective service.
 - b. The strobe shall be wired as a primary signaling notification appliance and comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. The strobe shall have field-selectable candela settings including 15, 30, 75, 95, 110, 135, 185 for wall mounted units. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Indoor products shall operate between 32 and 120 degrees Fahrenheit from a regulated DC or fullwave rectified unfiltered power supply.
 - c. For MNS or ECS applications, the lower appliance can be used for general notification and not be held to fire protection service requirements.
 - d. The strobe shall mount to a standard 4 x 4 x 1 1/2 -inch back box, 4-inch octagon back box, double gang back box, and single-gang 2 x 4 x 1 7/8-inch back box.
 - e. A universal mounting plate shall be used for mounting ceiling and standard wall products. A separate mounting plate shall be used for mounting compact wall products. The notification appliance circuit wiring shall terminate at the

mounting plate.

2.8 INTEGRATION AND CLOUD SERVICES

- A. Common Alerting Protocol (CAP) Gateway
 1. The system shall support an optional CAP Gateway (Common Alerting Protocol). The CAP Gateway translates fire system messages to industry standard CAP messages for integration with CAP compliant clients. A CAP gateway shall be available from the fire alarm control panel manufacturer.
- B. LEDSIGN Gateway
 1. The system shall support an optional and proprietary LEDSIGN Gateway to interface to LED signs that will automatically display emergency messages. The signs shall be capable of storing up to 100 messages that can be activated via system programming with the ability to be manually overridden. The LEDSIGN Gateway shall support up to 10 independent signs, each sign capable of playing an independent message. Multiple LEDSIGN Gateways can be used in network applications. An LEDSIGN Gateway shall be available from the fire alarm control panel manufacturer.
- C. BACnet Interface Gateway
 1. The system shall be capable of being interfaced with BACNet compliant clients.
 2. A BACnet interface supporting BACnet/IP communication shall be available from the fire alarm control panel manufacturer.
 3. The BACnet interface shall support the Life Safety Object model.
- D. MODbus Interface Gateway
 1. The system shall be capable of being interfaced with MODbus compliant clients.
 2. A MODbus interface supporting MODbus/TCP communication shall be available from the fire alarm control panel manufacturer.
- E. Fire Network Adapter
 1. The system shall support an IP based gateway to enable the panel or local XLS-Net to be connected to a Graphical User Interface via the Internet or Intranet. This gateway shall also support the ability to integrate the system to an interactive firefighter's display. The Fire Network Adapter shall be available from the fire alarm control system manufacturer.
- F. Webserver
 1. The system shall support a webserver allowing remote connection via the Internet or Intranet. Authorized users will have the ability to view panel/network history, event status and device properties. The webserver shall also support sending event information via email or text to up to 50 registered users, the webserver shall be available from the fire alarm control panel manufacturer.
- G. Connected Life Safety Services
 1. The system shall be capable of being interfaced with an internet portal (Checkpoint Hub) to integrate the fire alarm system with cloud based Inspection and service utilities.
 2. The CheckPoint Hub shall enable reading the connected device system inventory from one panel or a network of panels and transmitting this data to the Connected Life Safety Services (CLSS) Cloud.
 3. The gateway board can be connected with the CLSS Cloud, a configuration computer, a panel, a mobile device, and an external power supply.
 4. The Checkpoint Hub shall provide internet connectivity via wired or wireless (802.11) connections. The wireless interface shall support both 2.5Ghz and 5Ghz operation

using IEEE 802.11(a,b,g,n and ac modes).

5. The CheckPoint Hub shall be commissioned using a smartphone application and communicate via BlueTooth.
6. The CheckPoint Hub shall have the following additional certifications and meet the following requirements:
 - a. CE Certification meeting:
 - 1) EMC Directive 2014/30/EU
 - 2) Low Voltage Directive (LVD) 2014/35/EU
 - 3) Radio Equipment Directive 2014/53/EU
 - 4) RoHS Directive 2011/65/EU
 - 5) WEEE Directive 2012/19/EU
 - b. Additional requirements:
 - 1) EFSG [BRE,AFNOR/CNPP, and VdS]
 - 2) Incert
 - 3) SBSC
 - 4) EMEA
 - 5) EAC

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 TESTING

- A. The services 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.
- B. Before energizing the cables and wires, check for correct connections and test for short

circuits, ground faults, continuity, and insulation.

- C. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
- D. Verify activation of all waterflow switches.
- E. Open initiating device circuits and verify that the trouble signal actuates.
- F. Open and short signaling line circuits and verify that the trouble signal actuates.
- G. Open and short notification appliance circuits and verify that trouble signal actuates.
- H. Ground all circuits and verify response of trouble signals.
- I. Check presence and audibility of tone at all alarm notification devices.
- J. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
- K. 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.
- L. 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