DATE:
PROJECT NAME:
ADDRESS:
ADDRESS2:
CITY:
STATE/PROVINCE:
ZIP/POSTAL CODE:
COUNTRY:
PROJECT ENGINEER:
CONTACT PERSON:
PHONE:
FAX:
EMAIL ADDRESS:
WEB SITE:
PROJECT NUMBER:
FILE NAME:

ENGINEERING SPECIFICATION
PRE-ACTION/DELUGE CONTROL SYSTEM

PART 1.0 - GENERAL

1.1. DESCRIPTION:

A. This section includes the furnishing, installation, and connection of the fire alarm equipment required to form a complete coordinated pre-action deluge system that is ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel, auxiliary control devices, annunciators, power supplies, releasing devices and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.

C. Sprinkler system components shall be provided as specified in Section 15500 – fire protection.

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

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

F. 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 shall be installed in compliance with the UL listing.

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

1.2. SCOPE:

A. A new pre-action deluge control system shall be installed in accordance with the specifications and drawings.

B. Basic Performance:

1. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B).
2. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z).
3. Releasing circuits shall be wired to supervise the solenoid coil.
4. A single ground or open on any initiating device circuit or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

C. Basic System Functional Operation

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

1. Activate the pre-action deluge valves on the sprinkler system.

2. Annunciate the alarm condition on the building fire alarm system.

3. Activate any audible and visual alarm notification appliances connected to the control panel.

1.3. Submittals

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

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

C. Manuals:

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

D. Software Modifications:

1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

1.4. GUARANTY:

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

1.5. POST CONTRACT MAINTENANCE:

A. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.

1.6. APPLICABLE PUBLICATIONS:

The publications listed below form a part of this specification.
A. National Fire Protection Association (NFPA) - USA:

No. 13	Sprinkler Systems
No. 15	Water Spray Systems
No. 16	Foam-Water Deluge and Foam-Water Spray Systems
No. 72	National Fire Alarm Code
No. 101-91	Life Safety Code
No. 720	Carbon Monoxide (CO) Warning Equipment

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

UL 38	Manually Actuated Signaling Boxes
UL 217	Smoke Detectors, Single and Multiple Station
UL 228	Door Closers–Holders for Fire Protective Signaling Systems
UL 268	Smoke Detectors for Fire Protective Signaling Systems
UL 268A	Smoke Detectors for Duct Applications
UL 346	Waterflow Indicators for Fire Protective Signaling Systems
UL 464	Audible Signaling Appliances
UL 521	Heat Detectors for Fire Protective Signaling Systems
UL 864	Standard for Control Units for Fire Protective Signaling Systems
UL 1481	Power Supplies for Fire Protective Signaling Systems
UL 1638	Visual Signaling Appliances
UL 1971	Signaling Devices for Hearing Impaired

C. Local and State Building Codes.

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

1. The FACP shall be UL 864, 9th Edition Listed. Systems listed to UL 864, 8th edition (or previous revisions) shall not be accepted.

1.7. APPROVALS:

Each system must have proper listing and/or approval from the following nationally recognized agencies.

UL Underwriters Laboratories Inc

FM Factory Mutual

PART 2.0 - PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.
B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. All equipment must be available through authorized Engineered Systems Distributors experienced and trained in systems installation.

2.2. CONDUIT AND WIRE:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Where required, all wiring shall be installed in conduit or raceway. conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

4. With the exception of telephone connections, wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited

auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

6. Conduit shall be 3/4 inch (19.1 mm) minimum.

B. Wire:

1. All fire alarm system wiring shall be new.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and 14 AWG (1.63 mm) for Notification Appliance Circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).

5. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

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

D. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

2.3. CONTROL PANEL:

A. The FACP shall be a Gamewell-FCI Model GF506D, shall communicate with and control the following types of equipment used to make up the system: detectors, manual release stations, alarm notification appliances, releasing components and

other system controlled devices.

1. The control panel shall be a UL listed and FM approved microprocessor controlled Pre-action/Deluge Control Panel.

2. It shall be field programmable to perform the following options: Cross-Zone, Dual Hazard, and Discharge Timer.

3. Function: The control panel shall perform the following functions:

   a. Supervise and monitor all initiating device circuits and alarm notification circuits for trouble and alarm conditions.

   b. Supervise the release solenoid(s).

   c. Detect the operation of any initiating device circuit and the location of the alarm condition. Operate all notification appliances and release devices as designed.

   d. Visually and audibly annunciate any trouble, supervisory or alarm condition on panel display.

B. System Capacity

The Control Panel shall include six programmable initiating device circuits, four programmable output circuits, three programmable Form-C relays, A 7.0 Amp integral power supply and 80 character LCD.

1. The IDCs (Initiating Device Circuits) shall be individually programmable as conventional two-wire smoke detector circuits, as well as any dry contact input device. Examples of dry contact input devices include four-wire smoke detectors, manual pull stations, heat detectors, pressure switches, and waterflow switches. The IDCs shall support Style D (Class A) operation by adding an expansion board. The IDCs shall support conventional two-wire smoke detectors as well as conventional smoke detectors capable of generating a maintenance signal when the detector becomes dirty and a separate supervisory ‘freeze’ signal when ambient temperature falls below the detector rating of approximately 45 degrees F.

2. The four programmable outputs shall be individually programmable as conventional supervised NACs (Notification Appliance Circuits) or for releasing solenoids. Each NAC may be individually programmed as any of the following: Silence Inhibit, Auto-Silence, Strobe Synchronization, Selective Silence (horn-strobe mute), Temporal or Steady Signal, Silenceable or Non-silenceable, or Release

Stage Sounder. The system shall also provide resettable and non-resettable output power for general use.

3. The FACP shall be capable of coding Notification Appliance Circuits in March Time Code (120 PPM), Temporal (NFPA 72), and California Code. Main panel notification circuits (NACs 1, 2, 3 & 4) shall also automatically synchronize any of the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, Gentex, Faraday and Amseco, with no need for additional synchronization modules.

4. The three programmable relays shall be individually programmable as Alarm, Trouble, Supervisory, Discharge, and AC Power Loss. When programmed as a Trouble relay, the relay shall be fail-safe.

5. The on board power supply shall be capable of 7.0 Amps of regulated, filtered power.

C. System Display

The system shall have six LED indicators as well as an 80 character LCD (Liquid Crystal Display). The LCD shall be capable of displaying a custom description for each input and output circuit. The system LEDs shall indicate the status of the following system parameters:

AC POWER	Green LED
FIRE ALARM	Red LED
DISCHARGE	Red LED
SUPERVISORY	Yellow LED
TROUBLE	Yellow LED
ALARM SILENCED	Yellow LED

1. The main system display shall be an integral, eighty character LCD with a keypad. The keypad shall have full programming capability without requiring the use of a laptop computer.

2. The FACP shall include a history log with a 256 event storage. The history shall be accessible from the main system display.

3. The system shall include a real-time clock/calendar with daylight savings time control.

D. System Control Switch Operation.

1. ACK/Step Silence Switch:
a. Activation of the control panel tone silence switch in response to alarms troubles and supervisory conditions shall silence the

local panel piezo electric signal and change the LED from flashing mode to steady-ON mode. Occurrence of any new conditions in the system shall cause the control panel to resound the Local Piezo sounder and repeat the alarm, trouble, or supervisory sequences.

b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.

2. Alarm Silence Switch:
Activation of the alarm signal silence switch shall cause all alarm notification appliances to return to the normal condition after an alarm condition.

3. System Reset Switch:
Activation of the System Reset Switch shall cause all electronically-latched initiating devices, as well as all associated output devices and circuits, to return to their normal condition. Holding system reset switch down shall perform a LAMP TEST function and will activate the piezo sounder.

4. Drill Activate Switch:
The Drill activate switch shall activate both notification circuits and alarm relays in the system. Drill function shall latch until the panel is silenced or reset.

5. Lamp Test:
The System RESET switch shall also function as a Lamp Test switch and shall activate all system LEDs and light each segment of the liquid crystal display.

E. System Operation

1. Zone Status LEDs:
The alarm, supervisory, or trouble LED(s) shall flash until event(s) have been acknowledged LED(s) shall then illuminate steady. Any subsequent alarm, supervisory or trouble will flash the new event only.

2. Supervisory:
A short circuit on this zone shall cause the supervisory LED and zone 4 yellow LED to flash, and shall activate the supervisory notification circuit. An open circuit shall report as a zone trouble.

3. Zone Disable:
Disable/Enable shall be accomplished for any input circuit by a special sequence of the 4 control switches. If a zone has been disabled, an alarm shall activate the red zone LED, but not the piezo or any output circuit.

F. Programming and System Commissioning

1. The FACP shall have a configuration option which allows the user to program the FACP with one of seven factory preprogrammed templates or one custom template which can be programmed by the user. Templates shall include:

SINGLE HAZARD - 3 ZONE
CROSS-ZONE WITH MANUAL RELEASE SWITCH
DUAL HAZARD - COMBINED RELEASE
DUAL HAZARD - SPLIT RELEASE
SINGLE HAZARD - 3 ZONES AND LOW PRESSURE
SINGLE HAZARD - 2 ZONES CROSS-ZONES WITH ALL ACTIVE
SINGLE HAZARD - DUAL ZONE

G. The control panel shall support the following modules:

1. 80 character Remote LCD Annunciator which mimics the FACP main display.

2. I/O LED Driver which provides LED outputs for connection to a custom graphics annunciator.

3. Printer Module which provides a serial output for connection to a UL listed event printer.

4. Relay Module which provides 10 form C relays

5. LED Annunciator Module which mounts on the FACP door and provides three LEDs for each zone: Alarm, Trouble and Supervisory.

6. Optional Digital Communicator (complies with NFPA 72).

7. Optional transmitter module which complies with NFPA-72 Auxiliary and Remote Station Protective Signaling systems.

8. Optional Class A Converter Module

H. The control panel shall also include the following functions:

1. Output circuits shall be protected against false activations by using a 2-step electronic activation circuit.

2. Battery/Earth fault supervision shall be provided.

3. Adjustable discharge timer shall be available, 10 to 15 minutes.

4. Cross zone option shall be available (two zones in alarm before release).

5. Dual hazard option shall be available (separate initiating and release groups).

6. 7 AH to 26 AH battery options shall be available, providing up to 90 hours

standby.

7. Watchdog timer to supervise microprocessor shall be provided.

I. Remote Field Charging Power Supply

1. The remote field charging power supply shall be a Honeywell HPF24S6 or HPF24S8. The HPF24S6/8 shall be used to provide power to audio visual devices or any other device on the system whenever the power requirements exceed those provided by the FACP.

2. The HPF24S6/8 shall offer up to 6.0 amps continuous current of regulated, filtered, 24 volt power. It shall include an integral charger designed to charge 7.0 to 18.0 amp hour batteries and to support 60 hour standby.

3. The HPF24S6/8 shall offer up to 8.0 amps continuous current of regulated, filtered, 24 volt power. It shall include an integral charger designed to charge 7.0 to 18.0 amp hour batteries and to support 60 hour standby.

4. The Field Charging Power Supply shall provide regulated and filtered 24 VDC power to four notification appliance circuits configured as either four Class B (Style Y) or Class A (Style Z, with ZNAC-4 option module). Alternately, the four outputs may be configured as all non-resettable, all resettable, or two non-resettable and two resettable.

5. The Field Charging Power Supply shall include an attractive surface mount backbox.

6. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.

7. The Field Charging Power Supply shall include power limited circuitry, per UL standards.

8. The Field Charging Power Supply shall provide UL-Listed NAC synchronization using System Sensor, Wheelock, or Gentex "Commander²" appliances.

J. Power Supply

1. The power supply for the control panel shall be integral to the control panel itself, and shall provide all control panel and peripheral device power needs.

2. Input power shall be 120 VAC, 60 HZ. The power supply shall provide an integral battery charger for use with batteries up to 26 AH. The FACP shall also be available in 220/240VAC, 60 Hz.

3. It shall provide 7.0 amperes of regulated 24 VDC power for release solenoids and

notification devices, Four-Wire smoke detector power 24 VDC up to 400 mA, non resettable power 24 VDC up to 400 mA.

4. The power supply shall be designed to meet UL and NFPA requirements for power-limited operation on all notification and initiating circuits.

5. Positive-temperature-coefficient thermistors, circuit breakers, fuses, or other over-current protection shall be provided on all power outputs.

K. Mechanical Design

The control panel shall be housed in a cabinet designed for mounting directly to a wall or vertical surface. The back box and door shall be constructed of 0.060 steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. The cabinet shall be approximately 5.25 inches (13.34 cm) deep and 16.8 inches (42.67 cm) wide. Height shall be approximately 19.25 inches (48.90 cm). An optional trim ring shall be used for flush mounting of cabinet. Space shall be provided in the cabinet for 7 AH or 18 AH batteries. If 26 AH batteries are used, a separate battery enclosure shall be available from the same manufacturer.

2.4. BATTERIES

A. Shall be 12 volt, Gell-Cell type (2 required).

B. Battery shall have sufficient capacity to power the fire alarm system for not less than 90 hours plus 5 minutes of alarm upon a normal AC power failure.

C. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

2.5. SYSTEM COMPONENTS:

A. Horns, Strobes, and Horn/Strobes

1. General
All horns, strobes and horn/strobes shall be System Sensor SpectrAlert Advance series. Horns, strobes and horn/strobes shall mount to a standard 4 × 4 × 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 × 4 × 1 7/8-inch back box. A universal mounting plate shall be used for mounting ceiling and wall products. The notification appliance circuit wiring shall terminate at the universal mounting plate. Indoor SpectrAlert Advance products shall operate between 32 and 120 degrees Fahrenheit from a regulated DC, or full-wave rectified, unfiltered power supply. Strobes and

horn/strobes shall have field-selectable candela settings including 15, 15/75, 30, 75, 95, 110, 115, 135, 150, 177, 185.

2. Strobes
The strobe shall be a System Sensor SpectrAlert Advance Model SR listed to UL 1971 and shall be approved for fire protective service. 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 1Hz over the strobe's entire operating voltage range. The strobe light shall consist of a xenon flash tube and associated lens/reflector system.

3. Horn/Strobe Combination
The horn/strobe shall be a System Sensor SpectrAlert Advance Model P2R listed to UL 1971 and UL 464 and shall be approved for fire protective service. 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 1Hz over the strobe's entire operating voltage range. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. The horn shall have three 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. On four-wire products, the strobe shall be powered independently of the sounder. The horn on horn/strobe models shall operate on a coded or non-coded power supply.

4. Outdoor Horns, Strobes, and Horn/Strobes
SpectrAlert Advance outdoor horns, strobes and horn/strobes shall be listed for outdoor use by UL and shall operate between minus 40 degrees and 151 degrees Fahrenheit. The products shall be listed for use with a System Sensor outdoor/weatherproof back box with half inch and three-fourths inch conduit entries.

5. Synchronization Requirements
All Horns, Strobes, and Horn/Strobes shall be synchronized without the need for additional synchronization hardware or modules. Synchronization shall be provided by the GF506D FACP Power Supply or from an additional field power supply. All Horns, Strobes, and Horn/Strobes shall be synchronized at 1Hz and horns at temporal three. Also, while operating the strobes, the FACP shall silence the horns on horn/strobe models over a single pair of wires.

B. Manual Fire Alarm Stations

1. Manual Fire Alarm Stations shall be Gamewell-FCI MS-7 Series, be non-code, with a key- or hex-operated reset lock in order that they may be tested, and so designed that after actual Emergency Operation, they cannot be restored to normal except by use of a key or hex. An operated station shall automatically condition itself so as to be visually detected as activated.

2. Manual stations shall be constructed of red colored LEXAN (or polycarbonate equivalent) with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in white letters, 1.00 inches (2.54 cm) or larger.

3. Stations shall be suitable for surface mounting on matching backbox SB-10 or SB-I/O; or semi-flush mounting on a standard single-gang, double-gang, or 4" (10.16 cm) square electrical box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) or per national/local requirements. Manual Stations shall be Underwriters Laboratories listed.

C. Conventional Photoelectric Area Smoke Detectors

1. Smoke detector shall be a System Sensor i3 Series conventional photoelectric smoke detector, listed to Underwriters Laboratories UL 268 for Fire Protection Signaling Systems. The detector shall be a photoelectric type (Model 2W-B, 4W-B) or a combination photoelectric/thermal (Model 2WT-B, 4WT-B) with thermal sensor rated at 135°F (57.2°C).

2. The detector shall include a mounting base for mounting to 3½-inch and 4-inch octagonal, single gang, and 4-inch square back boxes with a plaster ring. Wiring connections shall be made by means of SEMS screws. The detector shall allow pre-wiring of the base and the head shall be a plug-in type.

3. The detector shall have a nominal sensitivity of 2.5 percent-per-foot nominal as measured in the UL smoke box. The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms. The detector shall provide dual color LED indication which blinks to indicate power up, normal standby, out of sensitivity, alarm, and freeze trouble (Model 2WT-B, 4WT-B) conditions.

4. Two-wire models shall include a maintenance signal to indicate the need for maintenance at the alarm control panel, and shall provide a loop testing capability to verify the circuit without testing each detector individually.

D. Conventional Ionization Type Area Smoke Detectors

1. Smoke detector shall be a System Sensor 1451 conventional ionization plug-in smoke detector, listed to Underwriters Laboratories UL 268 for Fire Protection Signaling Systems.

2. Ionization type smoke detectors shall be a two wire, 24 VDC type using a dual unipolar chamber.

3. Each detector shall contain a remote LED output and a built-in test switch.

4. Detector shall be provided on a plug-in twist-lock mounting base.

5. It shall be possible to perform a calibration sensitivity and performance test on the detector without the need for the generation of smoke.

6. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs) over 360 degrees, on the detector, which may be seen from ground level. This LED shall flash every 10 seconds, indicating that power is applied to the detector.

7. The detector shall not alarm when exposed to air velocities of up to 1,200 feet (365.76 m) per minute. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.

8. All field wire connections shall be made to the base through the use of a clamping plate and screw.

D. Duct Smoke Detectors

1. The air duct smoke detector shall be a System Sensor Model D2, D4120 Series Duct Smoke Detector.

2. The detector housing shall be UL listed per UL 268A specifically for use in air handling systems. The detector shall operate at air velocities of 100 feet per minute to 4000 feet per minute (0.5 to 20.32 m/sec.).

3. It shall be capable of local testing via magnetic switch or remote testing using the RTS451KEY Remote Test Station. The unit shall be reset by local reset button or RTS451KEY.

4. The duct detector housing shall incorporate an airtight smoke chamber in compliance with UL 268A, Standard for Smoke Detectors for Duct Applications. The housing shall be capable of mounting to either rectangular or round ducts without adapter brackets. An integral filter system shall be included to reduce dust and residue effects on detector and housing, thereby reducing maintenance and servicing.

5. Sampling tubes shall either be metal or be easily installed after the housing is mounted to the duct by passing through the duct housing. The enclosure shall meet all applicable NEC and NFPA standards regarding electrical junction boxes. Terminal connections shall be of the strip and clamp method suitable for 12–18 AWG wiring.

F. Projected Beam Detectors

1. The Projected Beam Detector shall be a System Sensor Model BEAM1224S 4-wire conventional reflected beam smoke detector, listed to UL standard 268.

2. The Beam Detector shall be single-ended reflected
design. All wiring shall only be necessary on the transmitter/receiver end of the detector.

3. Beam Detector alignment shall quickly accomplished via an optical sight and a 2-digit signal strength meter incorporated into the product.

4. The Beam Detector shall be listed for operation from –22°F to 131°F
(-30°C to 55°C).

5. The Beam Detector shall have four standard sensitivity selections along with two Acclimate settings. When either of the two Acclimate settings is selected the detector will automatically adjust its sensitivity to select the optimum sensitivity for the specific environment.

6. The Beam Detector shall be equipped with an integral sensitivity test feature that meets the annual maintenance and test requirements of NFPA 72. This test feature shall be initiated via a key switch.

7. The projected beam type shall be a 4-wire 24 VDC device.

8. The unit shall be both ceiling and wall mountable.

G. Automatic Conventional Heat Detectors

1. Mechanical heat detector shall be a System Sensor 5600 series model, listed to Underwriters Laboratories UL 521 for Heat Detectors for Fire Protective Signaling Systems.

2. The detector shall be either a single-circuit or a dual-circuit type, normally open. The detector shall be rated for activation at either 135°F (57°C) or 194°F (90°C), and shall activate by means of a fixed temperature thermal sensor, or a combination fixed temperature/rate-of-rise thermal sensor. The rate-of-rise element shall be activated by a rapid rise in temperature, approximately 15°F (8.3°C) per minute.

3. The detector shall include a reversible mounting bracket for mounting to 3½-inch and 4-inch octagonal, single gang, and 4-inch square back boxes with a square to round plaster ring. Wiring connections shall be made by means of SEMS screws that shall accommodate 14–22AWG wire.

4. The detector shall contain alphanumeric markings on the exterior of the housing

to identify its temperature rating and activation method.

5. The rate-of-rise element of combination fixed temperature/rate-of-rise models shall be restorable, to allow for field-testing. The detectors shall include an external collector that shall drop upon activation to identify the unit in alarm.

H. Waterflow Switches:

1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.

2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.

3. All waterflow switches shall come from a single manufacturer and series.

4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.

5. Where possible, locate waterflow switches a minimum of one (1) foot (305 mm) from a fitting which changes the direction of the flow and a minimum of three (3) feet (914 mm) from a valve.

I. Sprinkler and Standpipe Valve Supervisory Switches:

1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.

2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.

3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.

4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4 inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.

5. The switch housing shall be finished in red baked enamel.

6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its

mounting.

7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

J. Carbon Monoxide Detector

1. Carbon monoxide detector shall be a System Sensor model number CO1224T, listed to Underwriters Laboratories UL 2075 for Gas and Vapor Detectors and Sensors.

2. The detector shall be equipped with a sounder and a trouble relay.

3. The detector's base shall be able to mount to a single-gang electrical box or direct (surface) mount to the wall or ceiling. Wiring connections shall be made by means of SEMS screws.

4. The detector shall provide dual color LED indication, which blinks to indicate normal standby, alarm, or end-of-life. When the sensor supervision is in a trouble condition, the detector shall send a trouble signal to the panel. When the detector gives a trouble or end-of-life signal, the detector shall be replaced.

PART 3.0 - EXECUTION

3.1. INSTALLATION:

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

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

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

D. At the final inspection a factory trained representative of the manufacturer of the major equipment shall perform the tests in Section 3.2 TESTS.

3.2. TEST:

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

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

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

3. Verify activation of all flow switches.

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

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

6. Ground device circuits and verify response of trouble signals.

7. Open release solenoids and verify response of trouble signals.

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

9. Check installation and supervision of heat detectors to ascertain that they will function as specified.

10. Conduct tests to verify trouble indications for common mode failures, such as alternating current power failure.

11. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and that the release solenoid(s) will activate.

3.3. FINAL INSPECTION:

At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

3.4. INSTRUCTION:

Provide instruction as required to the building personnel. "Hands-on" demonstrations of the operation of all system components and the entire system shall be provided.