Kentec Electronics Ltd

SINGLE AREA CONVENTIONAL FIRE DETECTION & EXTINGUISHANT CONTROL SYSTEM

CONSULTANT SPECIFICATION

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1 General

1.1 Description

a. Furnish a complete conventional releasing system, including the materials, installation, connections, commissioning, and testing. All equipment shall be as specified herein and as indicated on the drawings. The system shall include, but not be limited to, a conventional releasing control panel, alarm initiating devices, alarm notification appliances, ancillary control devices, annunciators, releasing devices, and other supporting equipment and connections as specified in the plans and drawings.

b. The system shall comply with the requirements of NFPA 72, the National Fire Alarm and Signalling Code, except as modified and supplemented by this specification and/or the AHJ. Other NFPA shall apply as applicable, such as NFPA 2001 the Standard on Clean Agent Fire Extinguishing Systems, NFPA 2010 the Standard for Fixed Aerosol Fire-Extinguishing Systems, and NFPA 13 the Standard for the Installation of Sprinkler Systems.

c. The system shall be electrically supervised and monitor the integrity of all supervised circuits.

d. The system and its components shall be listed by Underwriter's Laboratories Inc., or listed by a Nationally Recognized Testing Laboratory (NRTL) under the appropriate testing standard(s) as listed herein for conventional fire alarm systems and fire suppression systems. The installation shall comply with UL 864 9th Edition.

e. The system shall have Factory Mutual (FM) approval.

f. The project management and installation team shall be factory-trained by Kentec Electronics. Factory-trained technicians shall be on-site to guide the project installation, programming, commissioning, and testing, and to prepare the system for inspection and turn-over to the owner.

g. The system shall be the Sigma A-XT conventional fire alarm and releasing control panel from Kentec Electronics Ltd.

1.2 Scope

a. A new conventional, microprocessor controlled, fire detection and releasing system shall be installed in accordance to the project specifications and drawings.

b. Basic Performance
   i. Initiating Device Circuits (IDCs) shall be Class B.
   ii. Notification Appliance Circuits (NACs) shall be Class B.
   iii. A minimum of five (5) Form-C relays shall be available to on the control panel for integration into other systems and for indicating Fire Alarm, Trouble, Stage 1, and Stage 2 events.
   iv. The system shall allow the configuration of one or more zone alarms to initiate the release of the fire extinguishing agent.
   v. A built-in display shall indicate the pre-discharge countdown time.
   vi. The control panel shall have a built-in manual release switch located behind a protective cover. The switch may be depressed at any time for immediate discharge of the fire extinguishing agent.
   vii. All programming of the releasing control panel shall be accomplished using the built-in display and controls. An external programmer shall not be required or acceptable.

1.3 Submittals

a. Eight copies of all submittals shall be submitted to the Architect/Engineer for review.

b. All references to manufacturers part numbers and other pertinent information herein is intended to establish the standards of performance, function and quality of the Kentec UL-listed system and equipment. Equipment from other manufacturers may be not be substituted for the specified equipment.

1.4 Shop Drawings

a. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

b. Include manufacturer's name(s), model numbers, ratings, power requirements, battery calculations, equipment layout, device arrangement, complete wiring point-to-point diagrams, riser diagrams, conduit layouts, and sequence of operations.

c. Show system layout, configurations, and terminations.

1.5 Manuals

a. Submit product manuals simultaneously with the shop drawings, including technical data sheets.

b. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

c. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

1.6 Certification

Together with the shop drawings, submit a letter of certification from Kentec Electronics indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorised Kentec representative. Include names and addresses in the certification.

1.7 Guarantee

a. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

b. Complete maintenance and repair service for the fire alarm system shall be available from the Kentec trained and authorised representative for this project for a period of four (4) years after expiration of the guarantee.

c. As part of the bid/proposal, include a quote for a maintenance contract to provide all Testing, Maintenance, Inspection and Repair described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of four (4) years after expiration of the guarantee.

d. Maintenance and testing shall be on a semiannual basis or as required by the AHJ and/or local fire codes and regulations. A preventive maintenance schedule shall be provided by the contractor describing the procedures for preventive maintenance. The schedule shall include:
   i. Systematic examination and cleaning of all detectors, manual fire alarm stations, abort switches, control panels, power supplies, relays, and all accessories of the fire alarm system.
   ii. Each circuit in the fire alarm system shall be tested semiannually.
   iii. Each smoke detector shall be tested in accordance with the requirements of NFPA 72.

1.8 Applicable Codes & Standards

The codes and standards below for a part of this specification. The system shall comply with the current or latest version of these codes and standards as applicable.

1. National Fire Protection Association (NFPA) – USA:

   13 – Standard for the Installation of Sprinkler Systems
   70 – National Electrical Code
   72 – National Fire Alarm and Signaling Code
   101 – Life Safety Code
   2001 – Standard on Clean Agent Fire Extinguishing Systems
   2010 – Standard for Fixed Aerosol Fire-Extinguishing Systems

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

   268 – Smoke Detectors for Fire Protective Signaling Systems
   864 – Control Units for Fire Protective Signaling Systems (9th Edition)
   521 – Heat Detectors for Fire Protective Signaling Systems
   464 – Audible Signaling Appliances
   38 – Manually Actuated Signaling Boxes
   346 – Water-flow Indicators for Fire Protective Signaling Systems
   1971 – ADA Visual Notification Appliances
   1481 – Power supplies for Fire Protective Signaling Systems
   2127 – Inert Gas Clean Agent Extinguishing System Units
   2166 – Halocarbon Clean Agent Extinguishing System Units
   2775 – Fixed Condensed Aerosol Extinguishing System Units

3. Local, Municipal, and State Building/Fire Codes

4. Requirements of the Authority Having Jurisdiction (AHJ)

1.9 Qualifications of Manufacturing

Manufacturers of the products supplied for the fire detection and fire suppression system shall have been in the business of manufacturing Fire Alarm products for at least five years. The manufacturer shall be assessed and approved as complying with the requirements of ISO 9001:2000.

2 Products

2.1 Equipment & Material

a. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signalling system, meeting the National Fire Alarm and Signalling Code and appropriate UL listing categories identified in this document.

b. All Kentec equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

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

2.2 Conduit and Wire

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

b. 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.

c. 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.

d. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or back-boxes, except where conduit entry is specified by the FACU manufacturer.

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

f. Wiring shall be in accordance with local, state and national codes (e.g., NFPA 70 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 for Initiating Device and Control Circuits, and 16 AWG for Notification Appliance Circuits.

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

h. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).

i. All fire alarm system wiring shall be new. If pre-existing wiring is present it may be used for IDC or NAC circuits, provided that it meets the minimum requirements of the manufacturer, local code requirements, and the site location Authority Having Jurisdiction.

j. All terminal boxes and cabinets shall be UL listed for their intended use and purpose.

k. All terminal, junction boxes and cabinets not marked with the fire alarm manufacturers name shall have the box covers painted red or shall be designated with "F/A" or "Fire Alarm" in bold permanent lettering.

l. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labelled 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, proper building grounding point, or grounding rod to the designated ground point on the fire control equipment.

2.3 Main Fire Alarm Releasing Control Unit (Sigma A-XT)

a. The single-hazard conventional releasing control panel shall be the Kentec Sigma A-XT or equivalent. The releasing fire alarm control panel shall be the central processing unit of the system, receiving and analysing signals from fire detectors or manual releasing devices, providing audible and visual information to the user, initiating automatic alarm response sequences and providing the means by which the user interacts with the system. It shall also have the capability to electronically activate and release a fire suppression agent by means of control of a solenoid valve or explosive actuator device. Only listed suppression equipment shall be used with the releasing fire alarm control panel.

b. The releasing fire alarm control panel shall have the capability to support up to three zones of conventional detection, any or all of which may be configured to contribute to the release of the fire suppression agent. Each conventional detection zone shall be capable of supporting up to 20 conventional fire detectors. Only detectors listed as compatible with the releasing fire alarm control panel shall be used.

c. The releasing fire alarm control panel shall have the capability to operate in either manual-only or automatic and manual (combined) mode. The mode of operation shall be selectable by means of a key-operated switch. In manual-only mode the fire suppression agent shall not be released by automatic detection.

d. The releasing fire alarm control panel shall have the capability to connect to and provide power for, a range of Status Units via a serial connection using a four-conductor cable. It shall be possible to change from manual only to automatic and manual mode, and manually release the fire suppression agent from a Status Unit. Status Unit variants shall be available which include indication-only or mode select and manual release controls. It shall be possible to connect up to seven status units to the releasing fire alarm control panel. Status Units shall be available in both flush and surface mounting versions.

e. The releasing fire alarm control panel shall incorporate a display on the control panel and on all status indicator units which, in the activated condition, shall show the time remaining in seconds until the fire suppression agent will be discharged. Time delays before agent discharge shall be programmable in 5 second steps.

f. The releasing fire alarm control panel shall be capable of halting the release of the discharge by the operation of an “Abort” input. A trigger resistor shall be employed to prevent against unwanted Abort operation in the event of a direct wire-to-wire short.

g. The releasing fire alarm control panel shall be capable of discharging the fire suppression agent immediately by the operation of a “Manual Release” input. This may be by use of the button located on the control panel, or by means of an external Manual Release fire alarm box. A trigger resistor shall be employed on the Manual Release circuit to prevent against unwanted discharge in the event of a direct wire-to-wire short condition.

h. The releasing fire alarm control panel shall have an input for connecting door interlock switches to change the mode of the system from automatic and manual to manual only.

i. The releasing fire alarm control panel shall have the ability to monitor a pressure switch connected to the fire suppression cylinder to indicate loss of pressure in the cylinder.

j. The releasing fire alarm control panel shall have the ability to monitor a pressure switch connected to the fire suppression cylinder to indicate discharge of the suppression agent from the cylinder.

k. The releasing fire alarm control panel shall contain a manual control to provide a 24VDC output to operate an extractor fan after the fire suppression agent has been released.

l. The releasing fire alarm control panel shall provide 2 notification appliance circuits (NACs) which operate when any fire alarm is detected (first stage alarm). The releasing fire alarm control panel shall also contain one NAC that operates when the releasing fire alarm control panel is in the activated condition (second stage alarm).

m. The releasing fire alarm control panel shall provide two (2) volt-free Form-C relays that operate when any fire alarm is detected. These relays shall de-activate only when the releasing fire alarm control panel is reset.

n. The releasing fire alarm control panel shall provide a volt-free Form-C relay that operates when any zone which will contribute to the fire suppression discharge is activated (1st stage relay). This relay shall de-activate only when the releasing fire alarm control panel is reset.

o. The releasing fire alarm control panel shall provide a volt-free Form-C relay that operates when the activated (release imminent) condition is established (2nd stage relay). This relay shall de-activate only when the releasing fire alarm control panel is reset.

p. The releasing fire alarm control panel shall provide a volt-free Form-C relay that operates when any trouble condition is detected (Trouble relay). This relay shall de-activate only when the releasing fire alarm control panel is reset.

2.4 Additional Components

a. It shall be possible to connect an ancillary board to the releasing fire alarm control panel to enable the system to communicate with other systems, such as other fire alarm control panels.

b. Ancillary boards shall provide volt-free relay contacts to indicate the following conditions:

- Zone 1 Fire
- Zone 2 Fire
- Zone 3 Fire
- Manual-Only Mode
- Disabled
- Released
- Activated
- Hold
- Extract Operated
- Manual Release Operated

c. Ancillary boards shall be connected using a four-conductor cable to provide power and data from the releasing fire alarm control unit.

d. Abort switches may be connected to the releasing fire alarm control unit. Abort buttons shall be the “dead-man” type, momentary hold-to-operate, shall be located as indicated on the drawings.

e. One or more Manual Release fire alarm boxes may be connected to the releasing fire alarm control panel. Manual Release boxes shall be the “dual-action” type and shall be located as indicated on the drawings.

f. Releasing valves and other suppression devices to be used, shall be listed as compatible with the releasing fire alarm control panel.

g. A manual disconnect switch shall be installed between the releasing fire alarm control panel extinguishing circuit and the suppression devices, in compliance with NFPA requirements.

h. The enclosure of the releasing fire alarm control panel shall be of metal construction and shall be capable of being surface or semi-flush mounted. It shall be complete with knocks-outs in sufficient quantity to accommodate all likely cabling requirements. The enclosure shall be minimum IP30. It shall not be possible to open the ECP without the use of a key. The enclosure shall be capable of housing two (2) 7Ah sealed lead-acid batteries.

2.5 Front Panel Controls

a. The releasing fire alarm control panel shall have the following front-panel controls:

- Silence/Re-Sound Alarm
- Buzzer Silence
- Reset
- Lamp Test
- Mode
- Select
- Enter
- Enable Controls (Key-operated switch)
- Manual-Only or Automatic and Manual Operation (Key-operated switch)
- Manual Release (Lift flap, push button)

b. The releasing fire alarm control panel shall have the following front-panel indicators:

- Fire
- Power On
- Delay On
- Test Mode On
- General Disablement
- Power Trouble
- NAC Trouble/Disabled
- General Trouble
- System Trouble
- Alarm Silenced
- Fire Zone 1
- Fire Zone 2
- Fire Zone 3
- Trouble Zone 1
- Trouble Zone 2
- Trouble Zone 3
- Extinguishant Disabled
- Manual Release Disabled
- 1st Stage Output Disabled
- 2nd Stage Output Disabled

- Extract Fan On
- Extinguishant Released
- Release Imminent
- 1st Stage Activated
- Abort Activated
- Releasing Trouble
- Low Pressure
- Manual Only
- Automatic and Manual

c. The releasing fire alarm control panel shall have the following internal controls:

- Terminate Release
- Watchdog Reset
- Processor Reset
- Adjust Releasing Monitor Circuit
- Write Enable

d. The releasing fire alarm control panel shall have the following internal indicators:

- Mains Fail
- Battery Fail
- CPU Trouble
- Aux 24V Trouble
- Battery Low
- Comms Trouble
- Earth Fault
- System Fuse Trouble
- NAC 1 Trouble
- NAC 2 Trouble
- NAC 3 Trouble
- Extinguishant Trouble
- Abort Trouble
- Manual Release Trouble
- Mode Select Trouble
- Release Trouble
- Low Pressure Switch Trouble
- Tell Tale

2.6 Panel Configuration

a. The releasing fire alarm control panel shall have configurable options which are programmed using the front-panel buttons and LCD display. All programmed settings shall be stored in non-volatile memory.

b. The releasing fire alarm control panel shall include the ability to track programming changes. This shall be achieved by indicating a number on the LCD display that is incremented each time the programming configuration is changed. When the counter reaches 99 it shall reset to 00.

c. The programming options shall allow for one zone or any combinations of zones to start the pre-discharge sequence.

d. Programming access shall be protected by the enclosure key lock.

3 Execution

3.1 Installation

a. Installation shall be in accordance with the Codes and Standards outlined earlier in this specification, as well as with all local and state codes, per AHJ requirements, as shown on the drawings, and as recommended by the equipment manufacturer.

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

c. Manual pull-stations shall be suitable for surface mounting or semi-flush mounting as shown on the plans and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor. Manual pull-station installation shall comply with ADA requirements and all local building codes.

3.2 Testing

a. The service of a competent, factory-certified/trained engineer or technician authorised by Kentec Electronics for the fire alarm equipment, shall be provided to technically supervise and participate during all the adjustments and tests for the system during initial commissioning, as well as for post-installation service and maintenance testing, as applicable. All testing shall be in accordance with NFPA 72.

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

c. Verify activation of all initiating devices and verify proper fire alarm operation at the control panel. Confirm proper NAC operation, including audibility, synchronization, and pattern.

d. Verify all trouble signals for IDCs, NACs, and system devices and accessories to ensure proper trouble signal actuation and operation.

e. Verify operation of system ground fault detection to ensure proper trouble operation and to prove the fire alarm system is clear of all grounds.

f. Confirm correct cross-zone operation (as applicable). Confirm proper pre-discharge notification and extinguishing circuit operation.

g. Ensure that all other aspects of system operation are working as required, including power supervision, Walk Test functionality, disablement operation, and Auto/Manual control.

h. All test methods shall comply with NFPA requirements and manufacturer instructions and recommendations for the equipment and process under test.

3.3 Final Inspection

a. At the final inspection, a Kentec Electronics factory-certified/trained representative for the equipment shall demonstrate that the system functions properly in every respect.

b. The system shall be demonstrated satisfactorily and comply with local AHJ requirements for Temporary Certificate of Occupancy (T.C.O.) and/or Permanent Certificate of Occupancy (C.O.).

c. The final inspection performance and documentation shall comply with local AHJ and NFPA 72 requirements.

d. System operating instructions placard or signage shall be installed at AHJ designated locations for the control panels and annunciators in the system per NFPA requirements. The manufacturers system operating instructions may be used for this purpose.

e. As-built drawings and programming shall be provided upon completion.

3.4 Training

a. End-user training shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components shall be provided.

b. The contractor and/or the systems manufacturer's representatives shall provide a document outlining the system Sequence of Operation.

c. Appropriate quantities of installation and operation manuals shall be provided and used for instructional purposes.