

## **1 GENERAL**

### **1.01 DESCRIPTION OF SYSTEM**

- .1 System to consist of alarm control panel, keypads, motion detectors, door contacts, power supplies, graphic annunciator panel, dual line dialer, battery back-up, system software, wiring, and conduits for a complete operating system.
- .2 Remote monitoring must comply with the requirements of CAN/ULC-S524 and CAN/ULC-S561 and utilize two separate and independent communication technologies.
- .3 Related Work:
  - .1 Section 01 33 00 - Submittal Procedures
  - .2 Section 01 91 15 - Facility Commissioning - Electrical
  - .3 Section 26 05 31 - Splitter, Junction, Pull Boxes and Cabinets.
  - .4 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
  - .5 Section 26 05 34 - Conduits, Conduit Fittings and Fastenings.
  - .6 Section 08 71 00 - Door Hardware

### **1.02 REFERENCES**

- .1 CAN/ULC-S524-14, Standard for the Installation of Fire Alarm Systems.
- .2 CAN/ULC-S561-13, Installation And Services For Fire Signal Receiving Centres And Systems.

### **1.03 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 33 00.

## **2 PRODUCTS**

### **2.01 INTRUSION DETECTION SYSTEM**

- .1 Alarm Control Panel:
  - .1 Control panel: surface mounted, programmable, addressable, and expandable to 128 zone capacity, 8 partitions, 1000 user codes, 3000 event buffer. Power supply from 120 VAC circuit. Provide CSA type 1 enclosure c/w lockable cover.
  - .2 Control panel to include a battery back-up feature for a minimum of 48 hours.
  - .3 Provide alarm communicator to interconnect to the central

- system via network and allow remote access for programming purposes.
- .4 Provide all interconnecting cables, connectors, power supplies and communications software to provide a fully functioning system.
- .5 System must be ULC listed.
- .2 Keypads:
  - .1 Two line, 32-character LCD screen.
  - .2 Built-in buzzer for key beeps.
  - .3 Liquid crystal display, adjustable keypad back light, will allow identification of each security system device, by room number, for ease of isolating an alarm condition.
  - .4 Individual LED indicators for Trouble, Armed and Ready.
- .3 Motion Detectors:
  - .1 Twin-element detection with large multi-beam lens.
  - .2 Temperature compensation.
  - .3 Ceiling or wall mounting.
- .4 Door Contacts:
  - .1 Refer to Specification Section 08 71 00.
- .5 Hardwire Zone Expander:
  - .1 Provide hardwire zone expander to connect existing door contacts on Dalplex exterior doors into the new system.
- .6 System Operation:
  - .1 Exterior Doors:
    - .1 Door contacts on all exterior doors are to be monitored by the intrusion alarm system.
    - .2 Zone 1 will be armed by the keypad located in the staff Kitchen (E119) near the exterior door. Zone 2 will be armed by the keypad located in the Gift Shop Storage (E109) near the exterior door. At the time the arm command is received, the system shall sound a distinctive tone. Following a programmable delay, the system shall become armed.
    - .3 When the system is armed, door contacts are to initiate an alarm condition when a violation is detected.
    - .4 An audible alarm is to be sounded locally at the door (via the exit device alarm) and at the keypad located in Reception 1018.
    - .5 System will revert to normal operation when control panel is reset.
    - .6 System will supervise all zones. Any trouble or tamper condition will be annunciated, both locally and remotely.
  - .2 System to be programmed by the contractor under the

direction of the Owner. Allow sufficient time for programming the system to meet the operational requirements of the Owner.

### **3 EXECUTION**

#### **3.01 INSTALLATION**

- .1 Supply and install the security systems with all required components and wiring for complete and fully functional systems. The equipment manufacturer's certified representative will supply and install all the equipment, devices, and make all the connections.
- .2 Verify wire type and gauge with manufacturer prior to installation.
- .3 Locate all components as indicated on drawings. Do not locate a motion detector within one meter of a supply air diffuser.
- .4 Motion sensors located in a suspended ceiling are to be installed using a 100 mm square electrical box, complete with a raised 13 mm ring cover. Support of electrical box is to be independent from ceiling.
- .5 Connect system to Owner's IT network.
- .6 Install wireless alarm communication device and connect to security panel and telephone line.
- .7 All security system wiring is to incorporate a white coloured jacket and be installed in a conduit system.
- .8 Provide all documentation associated with the security system alarm panel to the Departmental Representative, including all programming/contractor codes required for future modifications to the system.
- .9 Provide integration from the Intrusion Detection system into the Lighting Control System.

#### **3.02 REMOTE MONITORING OF SECURITY SYSTEM**

- .1 The intrusion detection system will be remotely monitored by the Owner's monitoring agency. Provide the equipment and programming necessary to ensure compatibility between the communications device and the monitoring agency, to the satisfaction of the Departmental Representative.
- .2 Arrange for telephone service to the intrusion detection panel

and pay all associated connection fees.

- .3 The remote monitoring function is to be tested and verified prior to Substantial Performance of the project. Provide a written verification report detailing satisfactory operation of the remote monitoring system, including:
  - .1 Security system alarm.
  - .2 Security system trouble.

### **3.03 TESTS**

- .1 Prepare a written report detailing the security system verification and submit to the Departmental Representative.

### **3.04 COMMISSIONING**

- .1 Refer to Section 01 91 15 - Electrical Systems Commissioning.

**END OF SECTION**

## **1 GENERAL**

### **1.1 RELATED WORK**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 78 00 - Closeout Submittals
- .3 Section 01 91 15 - Facility Commissioning - Electrical
- .4 Section 26 05 00 - Common Work Results for Electrical
- .5 Section 26 05 21 - Wires and Cables (0 - 1000V).
- .6 Section 26 05 34 - Conduits, Conduit Fittings and Fastenings.

### **1.2 REFERENCES**

- .1 CAN/ULC-S524-14, Installation of Fire Alarm Systems.
- .2 ULC-S525-16, Audible Signal Appliances for Fire Alarm.
- .3 CAN/ULC-S526-16, Visual Signal Appliances, Fire Alarm.
- .4 CAN/ULC-S527-11(AMD 14), Control Units, Fire Alarm.
- .5 CAN/ULC-S528-14, Manual Pull Stations.
- .6 CAN/ULC-S529-16, Smoke Detectors, Fire Alarm.
- .7 CAN/ULC-S530-M91, Heat Actuated Fire Detectors, Fire Alarm.
- .8 CAN/ULC-S536-16, Inspection and Testing of Fire Alarm Systems.
- .9 CAN/ULC-S537-13, Verification of Fire Alarm Systems.
- .10 NBC, National Building Code of Canada, 2015.
- .11 Canada Green Building Council (CaGBC)
  - .1 LEED (Leadership in Energy and Environmental Design) Green Building Rating System for New Construction and Major Renovations: LEED Canada-NC - 2009.

### **1.3 SYSTEM DESCRIPTION**

- .1 Fully supervised, microprocessor- based, fire alarm and control system, utilizing digital techniques for data control and

digital, and multiplexing techniques for data transmission. System must be a fully addressable, two wire using intelligent devices.

- .2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to monitoring agency.
- .3 Zoned, non-coded single stage.
- .4 Modular in design to allow for future expansion.
- .5 Operation of system must not require personnel with special computer skills.
- .6 System to include:
  - .1 Central Control Unit in separate enclosure with power supply, standby batteries, central processor with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.
  - .2 Power supplies.
  - .3 Initiating/input circuits.
  - .4 Output circuits.
  - .5 Auxiliary circuits.
  - .6 Wiring.
  - .7 Manual and automatic initiating devices.
  - .8 Audible and visual signaling devices.
  - .9 End-of-line resistors.
  - .10 LCD annunciation and control panel.
  - .11 Dual line dialer.
  - .12 Dual-technology remote communications dialer (landline and cellular)
  - .13 MAPNET modules for connection to the fire alarm network.

#### **1.4 REQUIREMENTS OF REGULATORY AGENCIES**

- .1 System components: listed by ULC and comply with applicable provisions of National Building Code Local/Provincial Building Code, and meet requirements of local authority having jurisdiction.

#### **1.5 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Include:

- .1 Detail assembly and internal wiring diagrams for control units and Auxiliary cabinets.
- .2 Overall system riser wiring diagram identifying control equipment, initiating zones, signaling circuits; identifying terminations, terminal numbers, conductors and raceways.
- .3 Details for devices.
- .4 Details and performance specifications for control, annunciation and peripherals with item by item cross reference to specification for compliance.
- .5 Step-by-step operating sequence, cross referenced to logic flow diagram.

#### **1.6 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for fire alarm system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Include:
  - .1 Instructions for complete fire alarm system to permit effective operation and maintenance.
  - .2 Technical data - illustrated parts lists with parts catalogue numbers.
  - .3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
  - .4 List of recommended spare parts for system.
  - .5 Complete list of all points and a description for each.

#### **1.7 MAINTENANCE MATERIALS**

- .1 Include: five (5) spare glass rods for manual pull box stations if applicable.

#### **1.8 MAINTENANCE**

- .1 Provide one (1) year's maintenance with two (2) inspections by manufacturer during warranty period. Carry out first test six months after Substantial Performance. Carry out second test twelve months after Substantial Performance Inspection tests to conform to CAN/ULC-S536. Each Inspection must conform to the test procedures as stipulated under Section 6, Periodic Inspections and Tests-Yearly. Complete forms as contained in Appendix E3 on each inspection. Submit inspection report to the Departmental Representative. Include all associated costs in this tender.

#### **1.9 TRAINING**

- .1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.
- .2 Provide advance copy of training material and instructional outline 14 days prior to scheduled training.

## **2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

### **2.2 SYSTEM OPERATION SINGLE STAGE SIGNALS ONLY**

- .1 Actuation of any alarm initiating device to:
  - .1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.
  - .2 Indicate zone of alarm at central control unit and at the remote annunciator.
  - .3 Cause audible and visual signaling devices to operate continuously throughout building and at central control unit.
  - .4 Transmit signal to Building Automation System network via addressable output.
  - .5 Cause all ventilation equipment to shut down or to function to provide required control.
- .2 Acknowledging alarm: indicated at central control unit.
- .3 Possible to silence signals by "alarm silence" switch at control unit, after 60 s period of operation.
- .4 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.
- .5 Actuation of supervisory devices to:
  - .1 Indicate respective supervisory zone at central control unit and at the graphic annunciator.
  - .2 Cause audible signal at central control unit to sound.
  - .3 Activate common supervisory sequence.
- .6 Resetting alarm and supervisory device not to return system indications/functions back to normal until control unit has been reset.
- .7 Trouble on system to:



- .1 Indicate circuit in trouble at central control unit.
- .2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication; whereas visual indication to remain until trouble is cleared and system is back to normal.
- .3 Transmit signal to Building Automation System network via addressable network.
- .8 Trouble on system: suppressed during course of alarm.
- .9 Trouble condition on any circuit in system not to initiate alarm conditions.

## 2.3 CONTROL PANEL

- .1 Central control unit (CCU).
  - .1 Suitable for DCLB communication style: to CAN/ULC-S524.
  - .2 Features specified are minimum requirements for microprocessor- based system with digital data control and digital multiplexing techniques for data transmission.
  - .3 Minimum capacity of 250 addressable monitoring and 250 addressable control/signal points per loop.
  - .4 System to provide for priority reporting levels, with fire alarm points assigned highest priority, supervisory and monitoring lower priority, and third priority for troubles. Possible to assign control priorities to control points in system to guarantee operation or allow emergency override as required.
  - .5 Integral TVSS protected point for power source termination, power supply, battery charger and standby batteries.
  - .6 Basic life safety software: retained in non-volatile Erasable Programmable Read-Only-Memory (EPROM). Extra memory chips: easily field-installed. Random- Access-Memory (RAM) chips in panel to facilitate password-protected field editing of simple software functions (e.g. zone labels, priorities) and changing of system operation software.
  - .7 Circuitry to continuously monitor communications and data processing cycles of microprocessor. Upon failure, audible and visual trouble indication to activate.
  - .8 Support up to two (2) RS-232-C I/O ports. CCU output: parallel ASCII with adjustable baud rates to allow interface of any commercially available printer, terminal or PC.
  - .9 Equipped with software routines to provide Event-Initiated-Programs (EIP); change the status of one or more monitor points, may be programmed to operate any or all of system's control points.

- .10 Software and hardware to maintain time of day, day of week, day of month, month and year.
- .11 Software to operate variable sensitivity addressable smoke detectors and annunciate their status and sensitivity settings at control panel.

## **2.4 POWER SUPPLIES**

- .1 120 V, 60 Hz as primary source of power for system.
- .2 Voltage regulated, current limited distributed system power.
- .3 Primary power failure or power loss (less than 102 V) will activate common trouble sequence.
- .4 Interface with battery charger and battery to provide uninterruptible transfer of power to standby source during primary power failure or loss.
- .5 During normal operating conditions fault in battery charging circuit, short or open in battery leads to activate common trouble sequence and standby power trouble indicator.
- .6 Standby batteries: sealed, maintenance free.
- .7 Continuous supervision of wiring for external initiating and alarm circuits to be maintained during power failure.
- .8 TVSS protected point integral to fire alarm panel to be provided for power source termination.

## **2.5 INITIATING/INPUT CIRCUITS**

- .1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors, heat detectors and water flow switches, wired in DCLB configuration to central control unit.
- .2 Alarm receiving circuits (active and spare): compatible with smoke detectors and open contact devices.
- .3 Actuation of alarm initiating device: cause system to operate as specified in "System Operation".
- .4 Receiving circuits for supervisory, N/O devices. Devices: wired in DCLB configuration to central control unit.
- .5 Actuation of supervisory initiating device: cause system to operate as specified in "System Operation".

## **2.6 ALARM OUTPUT CIRCUITS**

- .1 Alarm output circuit: connected to signals, wired in class B configuration to central control unit.
  - .1 Signal circuits' operation to follow system programming; capable of sounding bells horns and strobes continuously at 20 spm. Each signal circuit: rated at 2 A, 24 VDC; fuse-protected from overloading/overcurrent.
  - .2 Manual alarm silence, automatic alarm silence and alarm silence inhibit to be provided by system's common control.

## **2.7 AUXILIARY CIRCUITS**

- .1 Auxiliary contacts for control functions.
- .2 Actual status indication (positive feedback) from controlled device.
- .3 Alarm and supervisory on system to cause operation of programmed auxiliary output circuits.
- .4 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.
- .5 Fans: stagger-started upon system reset; timing circuit to separate starting of each fan or set of fans connected to auxiliary contact on system. Timing circuit: controlled by CCU.
- .6 Auxiliary circuits: rated at 2 A, 24 V dc or 120 V ac, fuse-protected.

## **2.8 WIRING**

- .1 Twisted copper conductors: rated 300 V.
- .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.
- .3 To signal circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
- .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
- .5 Install wiring in an approved conduit system. Install initiating and signalling wiring in separate conduit.

## **2.9 MANUAL ALARM STATIONS**

.1 Addressable manual pull station.

- .1 Pull lever, semi-flush wall mounted type, single action, dual stage, electronics to communicate station's status to addressable module/transponder over two (2) wires and to supply power to station. Station address to be set on station in field.

## 2.10 AUTOMATIC ALARM INITIATING DEVICES

.1 Addressable thermal fire detectors, combination fixed temperature of 57°C.

- .1 Electronics to communicate detector's status to addressable module/transponder.
- .2 Detector address to be set on detector base and head in field.

.2 Addressable variable-sensitivity smoke detectors.

- .1 Combined Ionization and Photo-electric type.
- .2 Electronics to communicate detector's status to addressable module/transponder.
- .3 Detector address to be set on detector base and head in field.
- .4 Sensitivity settings: determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.
- .5 Ability to annunciate minimum of two (2) levels of detector contamination automatically with trouble condition at control panel.
- .6 Duct mounted where indicated. Duct mounted detectors shall come c/w with relay base for fan shut down.

.3 Addressable Interface Modules (AIM):

- .1 To provide ability to communicate with CCU for sprinkler supervisory devices and other equipment which would otherwise be unaddressed.
- .2 Provide as indicated.

.4 Addressable Relays:

- .1 To allow the CCU to selectively monitor and control equipment.
- .2 Provide as indicated.

## 2.11 BELL DEVICES

- .1 152 mm- or 254 mm-diameter bell, as indicated.

- .2 Semi-flush mounted, adjustable Candella output strobe plate, compatible with bell.
- .3 Alarm output synchronizing module(s) as required to synchronized bell and strobe throughout facility.

## **2.12 END-OF-LINE DEVICES**

- .1 End-of-line devices to control supervisory current in alarm circuits and signalling circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel.

## **2.13 ANNUNCIATOR**

- .1 LCD annunciator:
  - .1 Flush mounted with trim.
  - .2 Lockable hinged door.
  - .3 LCD display.
  - .4 Modular construction.

## **2.14 ANCILLARY DEVICES**

- .1 Remote relay unit to initiate equipment shutdown, as indicated.

# **3 EXECUTION**

## **3.1 INSTALLATION**

- .1 Install systems in accordance with CAN/ULC-S524.
- .2 Install central control unit and connect to ac power supply.
- .3 Install manual alarm stations and connect to alarm circuit wiring.
- .4 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1m of air outlets. Maintain at least 600mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .5 Connect alarm circuits to main control panel.
- .6 Install signal horns and visual signal devices and connect to signalling circuits.

- .7 Connect signalling circuits to main control panel.
- .8 Install end-of-line devices at end of alarm and signalling circuits as required.
- .9 Install annunciator panel where indicated and connect to annunciator circuit wiring.
- .10 Install door releasing devices as indicated.
- .11 Install remote relay units to control equipment shut down, elevator, and shunt trips.
- .12 Sprinkler system: wire alarm and supervisory switches and connect to control panel as indicated.
- .13 Splices are not permitted.
- .14 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.
- .15 Confirm wiring is free of opens, shorts or grounds, before system testing and handing over.
- .16 Identify all circuits and other related wiring at central control unit, annunciators, and terminal boxes.
- .17 Provide integration from the Fire Alarm system into the Lighting Control System.

### **3.2 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 and CAN/ULC-S537.
- .2 Fire alarm system:
  - .1 Test such device and alarm circuit to ensure manual stations, thermal and smoke detectors, sprinkler system transmit alarm to control panel and actuate general alarm and ancillary devices.
  - .2 Check annunciator panels to confirm zones are shown correctly.
  - .3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of systems.
  - .4 Addressable circuits system style DCLB:
    - .1 Test each conductor on all DCLB addressable links for capability of providing three (3) or more subsequent alarm signals on line side of single open-circuit

fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the three (3) signals. Correct imposed fault after completion of each series of tests.

- .2 Test each conductor on all DCLB addressable links for capability of providing three (3) or more subsequent alarm signals during ground- fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the three (3) signals. Correct imposed fault after completion of each series of tests.
- .3 Test complete operation of fire alarm system ventilation unit control. Coordinate commissioning with Commissioning Agent and other trades.
- .4 Verification agency to provide Verification Certification to the Departmental Representative upon completion of all testing.
- .5 Verify connection to existing fire alarm panel and confirm each panel will display a trouble condition when the other panel is in alarm/alert.
- .6 Confirm transmission of signals to ULC monitoring agency

### **3.3 COMMISSIONING**

- .1 Refer to Section 01 91 13 - Commissioning - General Requirements.

**END OF SECTION**