

**Part 1           General**

**1.1               RELATED SECTIONS**

- .1       Section 26 05 01 - Common Work Results - Electrical.

**1.2               REFERENCES**

- .1       Government of Canada
  - .1       NBC-2010, National Building Code of Canada.
  - .2       TB OSH Chapter 3-03, 2010-04-01, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire Protection Electronic Data Processing Equipment.
  - .3       TB OSH Chapter 3-04, 2010-04-01, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .2       Underwriters Laboratories of Canada (ULC)
  - .1       CAN/ULC-S524-06, Installation of Fire Alarm Systems.
  - .2       CAN/ULC-S525-07, Audible Signal Appliances for Fire Alarm.
  - .3       CAN/ULC-S526-07, Visual Signal Appliances, Fire Alarm.
  - .4       CAN/ULC-S527-99, Control Units.
  - .5       CAN/ULC-S528-05, Manual Pull Stations.
  - .6       CAN/ULC-S529-09, Smoke Detectors.
  - .7       CAN/ULC-S530-1991(R1999), Heat Actuated Fire Detectors.
  - .8       CAN/ULC-S531-02, Smoke Alarms.
  - .9       CAN/ULC-S536-04, Inspection and Testing of Fire Alarm Systems.
  - .10      CAN/ULC-S537-2004, Verification of Fire Alarm Systems.

**1.3               SYSTEM DESCRIPTION**

- .1       Extend the existing fully supervised, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital, and multiplexing techniques for data transmission, as indicated on the plans.
- .2       System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general two-stage alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to monitoring agency fire department via Owner supplied leased telephone line.
- .3       Zoned, non-coded two stage.
- .4       Modular in design to allow for future expansion.
- .5       Operation of system shall not require personnel with special computer skills.

- .6 System to include:
  - .1 Existing Central Control Unit in separate enclosure with power supply, stand-by batteries, central processor with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.
  - .2 Existing power supplies.
  - .3 Existing initiating/input circuits.
  - .4 Existing output circuits.
  - .5 Existing auxiliary circuits.
  - .6 New and existing wiring.
  - .7 New and existing manual and automatic initiating devices.
  - .8 New and existing audible and visual signalling devices.
  - .9 New and existing end-of-line resistors.
  - .10 New and existing remote annunciators.

#### **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 - Submittal Procedures.
- .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 signalling 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 CLOSEOUT SUBMITTALS**

- .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.

## **1.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal, and with the Waste Reduction Workplan.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .2 Power supply: to CAN/ULC-S524.
- .3 Audible signal devices: to ULC-S524.
- .4 Visual signal devices: to CAN/ULC-S526.
- .5 Control unit: to CAN/ULC-S527.
- .6 Manual pull stations: to CAN/ULC-S528.
- .7 Thermal detectors: to CAN/ULC-S530.
- .8 Smoke detectors: to CAN/ULC-S529.
- .9 Smoke alarms: to CAN/ULC-S531.

### **2.2 SYSTEM OPERATION: TWO STAGE - SIGNALS ONLY**

- .1 Actuation of any alarm initiating device on first stage to:
  - .1 Cause electronic latch to lock-in alarm state at central control unit.
  - .2 Indicate zone of alarm at central control unit and at remote annunciator.
  - .3 For low rise buildings:
    - .1 Cause audible devices throughout building to sound at 20 strokes per minute.
    - .2 Cause audible devices in zone of alarm to sound continuously while other audible devices throughout building sound at 20 strokes per minute.
  - .4 Transmit signal to monitoring agency via leased telephone line.
  - .5 Cause air conditioning and ventilation fans to shut down or to function to provide required control of smoke movement.

- .6 Cause fire doors and smoke control doors, if normally held open, to close automatically.
- .7 Cause elevators to return to floor of egress, or to alternate floor, as required.
- .2 Actuation of any alarm initiating device on second stage to:
  - .1 Cause audible signalling devices to sound in alarm tone throughout building.
- .3 If first stage alarm is not acknowledged within 5 min, system to automatically go into second stage.
- .4 Acknowledging alarm: indicated at central control unit.
- .5 Possible to silence signals by "alarm silence" switch at central control unit, after 60 s period of operation.
- .6 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.
- .7 Actuation of any supervisory device to:
  - .1 Cause electronic latch to lock-in supervisory state at central control unit.
  - .2 Indicate respective supervisory zone at central control unit and remote annunciator.
  - .3 Cause audible signal at central control unit to sound.
  - .4 Activate common supervisory sequence.
- .8 Resetting alarm or supervisory device not to return system indications/functions back to normal until control unit is reset.
- .9 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; visual indication to remain until trouble is cleared and system is back to normal.
- .10 Troubles on system: suppressed during course of alarm.
- .11 Trouble condition on any circuit in system not to initiate alarm conditions.

## **2.3 CONTROL PANEL**

- .1 Central control unit (CCU) is existing.

## **2.4 POWER SUPPLIES**

- .1 Power supplies are existing.

## **2.5 INITIATING/ INPUT CIRCUITS**

- .1 Initiating circuits are existing.

## **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 horns continuously. 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 WIRING**

- .1 Twisted copper conductors: rated 300V.
- .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.

## **2.8 AUDIBLE / VISUAL SIGNAL DEVICES**

- .1 Horn strobe: 90db, at 3m surface mounting, white surface, 24V dc, 15, 30, 75 or 110cd; field selectable.

## **2.9 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 and remotely as indicated.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.
- .2 Install central control unit and connect to ac power supply, dc standby power.
- .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 1 m of air outlets. Maintain at least 600 mm 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 horn 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.

- .9 Install remote annunciator panels and connect to annunciator circuit wiring.
- .10 Install door releasing devices.
- .11 Install remote relay units to control fan shut down.
- .12 Sprinkler system: wire alarm and supervisory switches and connect to control panel.
- .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 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
- .16 Identify circuits and other related wiring at central control unit, annunciators and terminal boxes.

### **3.2 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical and CAN/ULC-S537.
- .2 Fire alarm system:
  - .1 Test such device and alarm circuit to ensure manual stations, thermal and smoke detectors and sprinkler system transmit alarm to control panel and actuate first stage alarm, general alarm and ancillary devices.
  - .2 Check annunciator panels to ensure zones are shown correctly.
  - .3 Simulate grounds and breaks on alarm and signalling 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 3 or more subsequent alarm signals on each 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 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 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 3 signals. Correct imposed fault after completion of each series of tests.
- .3 Provide final PROM program re-burn for system Engineer incorporating program changes made during construction.

**3.3 DEMONSTRATION AND 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.

**3.4 VERIFICATION AND CERTIFICATION OF THE FIRE ALARM EQUIPMENT**

- .1 The contractor shall retain the services of the fire alarm system manufacturer's authorized factory representative to verify and certify fire alarm system operation. The manufacturer's authorized factory representative shall:
  - .1 Inspect all fire alarm equipment to ensure installation conforms to the manufacturer's recommendations.
  - .2 Test all alarm initiating devices to ensure each device is operable and will initiate alarm and trouble signals as specified.
  - .3 Test all alarm indicating devices to ensure each device operates upon alarm and is correctly wired to provide supervision.
  - .4 Verify that all magnetic holding devices release as specified.
  - .5 Verify that all mechanical ventilation equipment controlled by the fire alarm system shuts down upon alarm. Note: Verifying control module contact operation only is not allowed. Actual equipment shut downs must be verified.
  - .6 Verify that all sprinkler system tamper and flow switches are correctly wired and initiate the required alarm and trouble signals. Note: Simulation of sprinkler tamper and flow switch operation only is not allowed. Tamper and flow switches must be operated to verify correct connection.
- .2 The contractor shall provide the manufacturer's authorized representative with sufficient personnel during system identification.
- .3 The manufacturer's authorized representative shall provide the contractor with technical assistance to correct deficiencies identified during the verification.
- .4 Inspection Certification:
  - .1 On completion of the verification and when all of the conditions have been complied with, the manufacturer shall issue to the Consulting Engineer the following:  
A Certificate of Verification and copies of the verification worksheet that the inspection of wiring and devices has been completed, and that the system is fully operational.
- .5 All costs involved in this inspection, both for the manufacturer's and the electrical contractor's work shall be included with the electrical contractor's total tender price.

- .6 The contractor shall identify to the Engineer, prior to verification, the names and places of employment for the manufacturer's authorized representatives. The contractor shall also provide, if requested, a resume detailing the manufacturer's authorized representative's experience, training and other details as required by the Engineer. Proof of liability insurance held by the manufacturer's authorized representative shall also be delivered by the contractor to the Engineer.

**END OF SECTION**