

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Division 01 – General Requirements.
- .2 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

- .1 Government of Canada, latest edition of the following:
 - .1 NBC, National Building Code of Canada.
 - .2 TB OSH Chapter 3-03, 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, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .2 Underwriter's Laboratories of Canada (ULC), Latest edition of the following:
 - .1 CAN/ULC-S524, Installation of Fire Alarm Systems.
 - .2 ULC-S525, Audible Signal Appliances for Fire Alarm.
 - .3 CAN/ULC-S526, Visual Signal Appliances, Fire Alarm.
 - .4 CAN/ULC-S527, Control Units.
 - .5 CAN/ULC-S528, Manual Pull Stations.
 - .6 CAN/ULC-S529, Smoke Detectors.
 - .7 CAN/ULC-S530, Heat Actuated Fire Detectors.
 - .8 CAN/ULC-S531, Smoke Alarms.
 - .9 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
 - .10 CAN/ULC-S537, Verification of Fire Alarm Systems.

1.3 SYSTEM DESCRIPTION

- .1 Fully supervised, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital, and multiplexing techniques for data transmission.
- .2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general single-stage 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 shall not require personnel with special computer skills.
- .6 Periodic 24 hour automatic background test.

- .7 Alarm indication shall be provided by sounding 20 strokes per minute tone for alert, temporal tone for evacuation, through speaker circuits.
- .8 The sprinkler system shall be fully supervised by the fire alarm system and shall indicate the following conditions: sprinkler flow, tamper, pressure loss, fire pump supervisory etc. Refer to drawings for all required connections.
- .9 The fire hose cabinets shall be electrically monitored to signal trouble or tamper conditions.
- .10 System to include:
 - .1 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 System degrade operation.
 - .3 Trouble signal devices.
 - .4 Power supplies.
 - .5 Initiating/input circuits.
 - .6 Output circuits.
 - .7 Auxiliary circuits.
 - .8 Wiring.
 - .9 Manual and automatic initiating devices.
 - .10 Audible and visual signalling devices.
 - .11 End-of-line resistors.
 - .12 Local and Remote annunciators and displays.
 - .13 Event log memory chip.
 - .14 Historic event recorder.
 - .15 Stand-By Batteries.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

- .1 System:
 - .1 To TB OSH Chapter 3-04.
 - .2 Subject to Fire Commissioner of Canada (FC) approval.
 - .3 Subject to FC inspection for final acceptance.
- .2 System components: listed by ULC and comply with applicable provisions of National Building, 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 unit.

- .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.
- .5 Provide a copy of the proposed labels for the fire alarm devices for review prior to programming.

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.

1.7 MAINTENANCE

- .1 Provide one year's free maintenance with two inspections by manufacturer during year. Inspection tests to conform to ULC-S536. Submit inspection report to Departmental Representative.
- .2 The fire alarm system supplier shall provide temporary program changes during construction period, to include zone labels, control functions, system operation at no additional cost.

1.8 TRAINING

- .1 Provide on-site lectures & demonstration by fire alarm equipment manufacturer for one (1) day to train operational personnel in use and maintenance of fire alarm system.

1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - 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 fire alarm 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: 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.
 - .2 Indicate zone of alarm at central control unit and at remote annunciator display.
 - .3 Cause audible signalling devices to sound continuously throughout building and at central control unit.
 - .4 Transmit signal to fire department via master fire alarm box central station.
 - .5 Cause air conditioning, ventilation fans and central vacuum system 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 Acknowledging alarm: indicated at central control unit.
- .3 Possible to silence signals by "alarm silence" switch at central 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 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 display.

- .3 Cause audible signal at central control unit to sound.
- .4 Activate common supervisory sequence.
- .5 Transmit supervisory signals to central station.
- .6 Resetting alarm supervisory device not to return system indications/functions back to normal until control unit is 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; visual indication to remain until trouble is cleared and system is back to normal.
- .8 Troubles on system: suppressed during course of alarm.
- .9 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 CONTROL PANEL (LOCATED SEAWATER PUMP HOUSE)

- .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 addressable monitoring and addressable control/signal points required + 25% spare capacity. Points to be divided between 2 communication channels in distributed system, each channel operating independently of other. Faults on one communication channel not to affect operation of other channel.
 - .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 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. System shall be field programmable using a laptop computer. Burning of EPROM's is not acceptable.
 - .7 Circuitry to continuously monitor communications and data processing cycles of microprocessor. Upon failure, audible and visual trouble indication to activate.
 - .8 Communication between CCU and remote Annunciators to be supervised, DCLB.
 - .9 Should communications fail between CCU and remote units, audible and visual trouble to be indicated at CCU. Data communication to be binary DC, baseband,

time-division multiplex, half-duplex. Each data channel: capable of communicating up to distance of 3,000 m.

- .10 Support up to 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.
- .11 Equipped with software routines to provide Event-Initiated-Programs (EIP); change is status of one or more monitor points, may be programmed to operate any or all of system's control points.
- .12 Software and hardware to maintain time of day, day of week, day of month, month and year.
- .13 Software to operate variable sensitivity addressable smoke detectors and annunciate their status and sensitivity settings at control panel.
- .14 Central Control Unit shall provide an LCD annunciator capable of simultaneously displaying eight (8) separate events without the requirement for scrolling.

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.

2.5 INITIATING/ INPUT CIRCUITS (ADDRESSABLE LOOPS)

- .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 Addressable loop to be capable of monitoring VP to 250 sensors and input modules.
- .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 DGP's/transponders.

- .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 Speaker output circuit: connected to speaker/strobe wired in Class B configuration to control unit.
 - .1 Zoned signal circuits' operation to follow system programming; capable of speaker sounding 20 strokes per minute and temporal code. Each speaker will provide strobe output 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 Alarm and or supervisory trouble on system to cause operation of programmed auxiliary output circuits.
- .3 Three sets of separate contacts for elevator capture (to main floor of egress to alternate floor of egress and elevator machine room alarm).
- .4 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.
- .5 Auxiliary circuits: rated at 2 A, 24 Vdc or 120 Vac.

2.8 WIRING

- .1 Twisted copper conductors: rated 300 V.
- .2 To addressable loops: 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 Provide 2# 14 AWG minimum wiring to strobe circuits where indicated by fire alarm system drawings.

2.9 MANUAL ALARM STATIONS

- .1 Addressable manual pull station.
 - .1 Pull lever, wall mounted type, single stage, electronics to communicate station's status to addressable module/transponder over 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 smoke detector.
 - .1 Photo-electric type.
 - .2 Electronics to communicate detector's status to addressable module/transponder.
 - .3 Detector address to be set on detector base head in field.

2.11 AUDIBLE SIGNAL DEVICES

- .1 Speakers – Ceiling and wall mounted as indicated on plans – 70V, ¼, ½, 1 and 2 watt taps complete with integral field adjustable strobe light – cd to be as indicated on plans. Minimum setting is to meet requirements of ADA.

2.12 VISUAL ALARM SIGNAL DEVICES

- .1 Strobe type: flashing, red, 24 V dc.
- .2 Designed for flush on surface mounting on ceiling and walls as indicated.
- .3 Minimum settings to meet requirements of ADA.

2.13 REMOTE ANNUNCIATORS

- .1 Remote alphanumeric type, with designation cards to indicate zones per ULC S527-M99. Located at main entrance.
- .2 Display:
 - .1 Alarms and troubles for alarm initiating circuits.
 - .2 Supervisory alarms and troubles common supervisory alarm for supervisory initiating circuits.
 - .3 Common system trouble.
- .3 Trouble buzzer.
 - .1 Acknowledging trouble at main panel to silence trouble buzzers in system.
- .4 Supervised, with LED test button and alarm trouble acknowledge button.
- .5 Minimum wiring configuration with main panel and other remote annunciators.

2.14 ANCILLARY DEVICES

- .1 Remote relay unit to initiate fan shutdown – addressable located as indicated on drawings.

2.15 IDENTIFICATION

- .1 All fire alarm devices are to be identified with their unique identification code number to assist in the inspection and maintenance of the Fire Alarm System.

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.
- .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 speakers and visual signal device and connect to signalling circuits.
- .7 Install remote annunciator panels and connect to annunciator circuit wiring.
- .8 Install door releasing devices.
- .9 Install remote relay units to control fan shut down.
- .10 Sprinkler system: wire alarm and supervisory switches and connect to control panel.
- .11 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.
- .12 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
- .13 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 00 - 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, sprinkler system, transmit alarm to control panel and actuate first stage alarm general alarm 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 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
- .3 All testing shall be witnessed by the Fire Protection Services (Atlantic) Office.

3.3 COMMISSIONING

- .1 Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

END