

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.
- .2 Treasury Board of Canada Secretariat (TBS), Occupational Safety and Health (OSH)
 - .1 Fire Protection Standard-10.
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-06, Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S526-07, Visible Signal Devices for Fire Alarm Systems, Including Accessories.
 - .3 CAN/ULC-S527-99, Standard for Control Units for Fire Alarm Systems.
 - .4 CAN/ULC-S528-05, Manual Stations for Fire Alarm Systems, Including Accessories.
 - .5 CAN/ULC-S529-09, Smoke Detectors for Fire Alarm Systems.
 - .6 CAN/ULC-S530-91(R1999), Heat Actuated Fire Detectors for Fire Alarm Systems.
 - .7 CAN/ULC-S537-04, Standard for the Verification of Fire Alarm Systems.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for multiplex fire alarm system and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Shop Drawings:
 - .1 Indicate on shop drawings:
 - .1 Detail assembly and diagrams for control unit.
 - .2 Graphic annunciator drawing.
-

- | | |
|---|---|
| 1.2 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd) | .4 Sustainable Design Submittals:
.1 LEED Canada-NC Version 1.0 Submittals:
in accordance with Section 01 35 21 - LEED
Requirements.
.2 Construction Waste Management:
.1 Submit project Waste Management
Plan highlighting recycling and salvage
requirements.
.2 Submit calculations on
end-of-project recycling rates, salvage
rates, and landfill rates demonstrating
that 75% of construction wastes were
recycled or salvaged. |
| 1.3 CLOSEOUT
SUBMITTALS | .1 Submit in accordance with Section 01 78 00 -
Closeout Submittals.
.2 Operation and Maintenance Data: submit
operation and maintenance data for fire alarm
system for incorporation into manual.
.3 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. |
| 1.4 MAINTENANCE
MATERIAL SUBMITTALS | .1 Submit maintenance materials in accordance
with Section 01 78 00 - Closeout Submittals. |
| 1.5 DELIVERY,
STORAGE AND
HANDLING | .1 Deliver, store and handle materials in
accordance with Section 01 61 00 - Common
Product Requirements and with manufacturer's
written instructions.
.2 Develop Construction Waste Management Plan
related to Work of this Section and in |

- | | |
|--|---|
| 1.5 DELIVERY,
STORAGE AND
HANDLING
(Cont'd) | .2 (Cont'd)
accordance with Section 01 35 21 - LEED
Requirements. |
| | .3 Packaging Waste Management: remove for reuse
or return of pallets, crates, padding,
banding, and packaging materials as specified
in Construction Waste Management Plan in
accordance with Section 01 74 21 -
Construction/Demolition Waste Management and
Disposal and Section 01 35 21 - LEED
Requirements. |
| 1.6 SYSTEM
DESCRIPTION | .1 Fully supervised, microprocessor-based,
remote monitored fire alarm system, utilizing
digital techniques for data control and
multiplexing techniques for data transmission. |
| | .2 System to carry out fire alarm and protection
functions; including receiving alarm signals:
initiating general alarm; supervising
components and wiring; actuating auxiliary
functions; initiating trouble signals and
signaling to central monitoring system. |
| | .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 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/signaling. |
| | .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. |

- 1.6 SYSTEM DESCRIPTION (Cont'd) .6 System to include:(Cont'd)
.9 End-of-line resistors.
.10 Local annunciator.
.11 Drill button on main panel.
- 1.7 REQUIREMENTS OF REGULATORY AGENCIES .1 System:
.1 Subject to Federal and Provincial Fire Commissioner's approval.
.2 Subject to FC inspection for final acceptance.
.3 To electrical inspection approval.
.2 System components: listed by ULC and comply with applicable provisions of National Building Code and meet requirements of local authority having jurisdiction.
- 1.8 MAINTENANCE .1 Provide one year's free maintenance from date of substantial completion with two inspections by manufacturer during warranty period and following occupancy. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Owner.
- 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.
- 1.10 WARRANTY .1 Provide manufacturer produce warranty against defects in operation, material and workmanship for 2 years from date of substantial completion.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labeled and supplied by single manufacturer.
- .2 Power supply: to CAN/ULC-S524.
- .3 Audible signal devices: to CAN/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.

2.2 SYSTEM OPERATION.1 SINGLE STAGE

- Actuation of any alarm initiating device to:
 - .1 Cause electronic latch to lock-in alarm at central control unit.
 - .2 Indicate zone of alarm at central control unit.
 - .3 Cause audible signaling devices sound continuously throughout building and at central control unit.
 - .4 Transmit signal to monitoring agency.
 - .5 Cause elevator to return to recall floor, or to alternate floor. Exact programming shall be confirmed during construction in coordination with Elevator inspector and inspection authorities.
 - .2 Acknowledging alarm: indicated at central control unit.
 - .3 Possible to silence signals by "alarm silence" switch at control unit, after 60 second period of operation.
 - .4 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.
-

2.2 SYSTEM OPERATION.5
SINGLE STAGE
(Cont'd)

- Actuation of supervisory devices to:
- .1 Cause electronic latch to lock-in supervisory state at central control unit.
 - .2 Indicate respective supervisory zone at central control unit.
 - .3 Cause audible signal at central control unit to sound.
 - .4 Activate common supervisory sequence.
- .6 Resetting alarm or 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.
- .8 Trouble on system to be suppressed during course of alarm.
- .9 Trouble condition on any circuit in system not to initiate any alarm conditions.

2.3 CONTROL PANEL

- .1 Central Control Unit (CCU).
- .1 Suitable for DCLA 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.
 - .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 units in system to guarantee operation or allow emergency override as required.
-

- 2.3 CONTROL PANEL .1 (Cont'd)
-
- (Cont'd)
- .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.
 - .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 2 RS-232-C I/O ports. CCU output: parallel ASCII.
 - .9 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, control points.
 - .10 Software and hardware to maintain time of day, day of week, day of month, month and year.
 - .11 Panel to have:
 - .1 2 x 40 LCD readout, LED backlight showing system condition, time and date. Alarm display.
 - .2 Status indicator LED's to supplement information on LCD screen.
 - .3 Input buttons, alarm acknowledgement, supervisory acknowledgement, trouble acknowledgement, alarm silence, system reset, program and surf options.
 - .4 LED annunciator built-in showing zone of alarm, complete with description of each zone adjacent to its respective LED.
 - .12 Standard of acceptance: Simplex 4100U Fire Alarm Control Panel complete with LED Zone Annunciator on front of 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 The power supply must be able to perform an automatic load test of batteries and return a trouble if batteries fail test.

- 2.5 INITIATING/INPUT CIRCUITS .1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors, and heat detectors wired in DCLA 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 DCLA configuration to central control unit.
-

Actuation of supervisory initiating device:
cause system to operate as specified in
"System Operation".

- .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 V DC; fuse-protected from overloading/overcurrent.
- .2 Manual alarm silence, automatic alarm silence and alarm silence inhibit to be provided by system's common control.

- .1 Auxiliary contacts for control functions.
- .2 Actual status indication (positive feedback) from controlled device.
- .3 Alarm or supervisory/trouble 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 Auxiliary circuits: rated at 2 A, 24 V DC or 120 V AC, fuse-protected.
- .6 Auxiliary contacts for shut down of all ventilation/exhaust units indicated.
- .7 Auxiliary contacts for release of hold-open devices and roll up shutters.
- .8 Multiple sets of separate contacts for elevator capture (to main floor of recall and to alternate recall floors).

- 2.8 WIRING
- .1 Multi-conductor cable assemblies with dedicated bonding wire CSA FAS105 and FT-4 rated. Standard of Acceptance: Securex I, twisted copper conductors, rated 300 V.
 - .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.
 - .3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.
 - .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
 - .5 Fire alarm cables to be run in EMT conduit unless otherwise noted.
- 2.9 MANUAL ALARM STATIONS
- .1 Addressable manual pull stations.
 - .1 Pull lever, break glass rod, semi-flush wall mounted type, single action, 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 thermal fire detectors, combination fixed temperature and rate of rise, non-restorable fixed temperature element, self-restoring rate of rise, fixed temperature 57 °C, rate of rise 8.3 °C per minute.
 - .1 Electronics to communicate detector's status to addressable module/transponder.
 - .2 Detector address to be set on detector in field.
 - .2 Addressable variable-sensitivity smoke detectors.
 - .1 Photo-electric type.
 - .2 Electronics to communicate detector's status to addressable module/transponder.
 - .3 Detector address to be set on detector in field.
-

- 2.10 AUTOMATIC ALARM.3
INITIATING DEVICES
(Cont'd)
- Sensitivity settings: 3 settings, determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.
- .4 Ability to annunciate minimum of 2 levels of detector contamination automatically with trouble condition at control panel.
- .5 Weatherproof heat detectors' corrosion resistant, sealed against moisture to IP67 rating, tamper resistant, mount on flush junction box.
- 2.11 VISUAL ALARM .1
SIGNAL DEVICES Strobe: flashing white, 24 V dc semi-flush mounted in finished areas.
- .2 Designed for surface mounting on ceiling and walls as indicated on drawings.
- 2.12 AUDIBLE/VISUAL .1
DEVICES Combination mini-horn/strobes: 94 dB, semi-flush mounting, red colour, 24 Vdc, 100 cd output, adjustable light output. Wall mount.
- .2 Exterior horn/strobes: weatherproof NEMA4X 1P56, 24V on surface weatherproof back box, 185 cd output, 98+ dBA. - 40°C to 66°C operating temperature.
- 2.13 END-OF-LINE .1
DEVICES End-of-line devices to control supervisory current in signaling circuits sized to ensure correct 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.
-

- 2.14 ADDRESSABLE
CONTROL/MONITOR
MODULES .1 Initiation Interface Modules:
.1 Addressable intelligent interface module
for connection of normally open or normally
closed contact type devices such as water flow
switches, tamper switches and other direct
contact monitoring functions as required.
.2 Available in single zone, dual zone or
single zone with programmable relay.
- .2 Applications: ventilation unit shut down,
sprinkler device monitoring.
- 2.15 AS-BUILT RISER
DIAGRAM .1 Fire alarm system riser diagram: in glazed
frame minimum size 600 x 600 mm.
- .2 Provide complete riser diagram indicating all
devices in relative position on communications
loop. Indicate location of each device by
Block reference and room name and number.
- .3 Locate riser diagram in main electrical room.
- 2.16 PASSIVE GRAPHIC
DISPLAY .1 Provide passive graphic display, to be
mounted adjacent to the main fire alarm
control panel. Plastic laminate type, black
artwork on white background, framed under
glass approximately size: 600 x 600 mm.
- 2.17 REMOTE
MONITORING .1 Provide remote monitoring capability of fire
alarm status to monitoring agency. Coordinate
with Owner's monitoring service provider.
- 2.18 ACCEPTABLE
MANUFACTURES .1 Acceptable manufacturers shall be:
.1 Mircom.
.2 Simplex.
.3 Edwards.
.4 Notifier.
-

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-4.
 - .2 Run all fire alarm wiring in conduit.
 - .3 Install central control unit and connect to ac power supply.
 - .4 Install manual alarm stations and connect to alarm circuit wiring.
 - .5 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.
 - .6 Connect alarm circuits to main control panel.
 - .7 Install horns and visual signal devices and connect to signaling circuits, provide quantity of loops as required by fire alarm manufacturer.
 - .8 Connect signaling circuits to main control panel.
 - .9 Install end-of-line devices at end of signaling circuits.
 - .10 Make connections to sprinkler systems.
 - .11 Splices are not permitted.
 - .12 Provide necessary raceways, cables and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.
 - .13 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
-

- 3.1 INSTALLATION
(Cont'd)
- .14 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.
- .15 Make provisions for remote monitoring. Fire alarm control panel shall also be complete with a 2nd dialing provision by cellular telephone that shall come complete with this package. Pay all associated costs.
- 3.2 FIELD QUALITY CONTROL
- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and Section 01 91 13 - General Commissioning (Cx) Requirements.
- .2 Fire alarm system:
- .1 Test each device and alarm circuit to ensure manual stations, thermal and smoke detectors transmit alarm to control panel and actuate general alarm and ancillary devices.
- .2 Check annunciator panels to ensure alarms are shown correctly.
- .3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of system.
- .4 Addressable circuits system style DCLA:
- .1 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals on each side of single open-circuit fault condition imposed near midmost point of 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 DCLA addressable links for capability of providing 3 or more subsequent alarm signals during ground-fault condition imposed near midmost point of each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.
-

- 3.2 FIELD QUALITY CONTROL
(Cont'd)
- .3 Provide final PROM program re-burn for system incorporating program changes made during construction.
 - .4 Provide programming for system to provide identification of alarm and trouble conditions to satisfaction of the owner. Coordinate with the owner prior to programming display items.