

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 26 05 01.
- .2 Manufacturer shall provide a complete set of shop drawings for this specific project. Drawings shall include, but not be limited to, equipment supplied, wiring diagrams installation instructions, and operating instructions produced specifically for this project. Drawings shall be approved by the Electrical Consultant before fabrication and supply of equipment.

1.2 OPERATING AND MAINTENANCE DATA

- .1 Provide data for incorporation into Electrical Maintenance Manual specified in Section 26 05 01. Include complete information and drawings describing and depicting the entire system as installed, including all information necessary for maintaining, troubleshooting, and / or expanding the system at a future date.
- .2 Submit a detailed operating, maintenance and testing procedure document prepared specifically for this project.

1.3 TRAINING

- .1 The Owner's operating personnel shall be instructed in the operation of the systems for a minimum period of one (1) hour. Written documentation bearing name and signature of Owner's personnel who received the above instructions shall be included in the operating instructions and service manuals.
- .2 The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.
- .3 The instruction shall detail the proper operation of the installed fire alarm systems and shall cover the schedule of maintenance required by ULC and any additional maintenance recommended by the system manufacturer.

1.4 SUPPLIER QUALIFICATIONS

- .1 The supplier shall be fully qualified in the performance of work specified herein. Service personnel shall be located within the Province of Saskatchewan and shall be experienced in the installation and operation of the system. The supplier shall be an established fire alarm supplier with a service department maintained in Saskatchewan both currently, and for the previous five (5) years.

1.5 VERIFICATION

- .1 Upon completion of installation of the system, a factory trained manufacturers representative shall perform a complete verification and inspection of all installed equipment, including each and every component, such as manual stations, automatic ionization detectors, sprinkler flow and tamper switches, audible signalling appliances, monitor modules, control modules, control equipment, etc., to ensure the following:

- .1 That the type of equipment installed is that designated by the electrical consultant's specifications and plans.
 - .2 That the wiring connections to all equipment are correct and in accordance with CSA and ULC requirements.
 - .3 That the equipment is installed in accordance with the Manufacturers recommendations.
 - .4 That the regulations concerning the supervision of components have been adhered to (e.g. stations, detectors, signal devices, etc.) and are properly wired and supervised.
 - .5 That any subsequent changes necessary to conform to the above will be done by the Contractor, with technical advice supplied by the Manufacturer.
 - .6 That activation of the fire alarm system results in a signal received by the fire department.
- .2 During the verification, the Contractor shall supply to the Manufacturer, one (1) electrician and one (1) helper.
 - .3 The Contractor shall also supply any required equipment such as ladders, scaffolding, etc.
 - .4 To assist the Installer in preparing his bid, the Manufacturer shall indicate the number of hours necessary to complete this verification.
 - .5 Upon completion of the verification and when all of the above conditions have been complied with, the Manufacturer shall issue to the Electrical Consultant the following:
 - .1 A copy of the inspecting technician's report, showing the location of each device, address of each device, and certifying the test results of each device.
 - .2 A certificate of verification confirming that the inspection has been completed, and indicating the condition of the system during the inspection and certification.
 - .6 Complete multiple verifications as required to accommodate phasing of construction and/or partial occupancy by the owner.

1.6 SOFTWARE MODIFICATION

- .1 Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes.
- .2 Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

Part 2 Products

2.1 ADDRESSABLE MANUAL PULL STATIONS

- .1 Addressable Manual Stations shall be provided to connect to the Fire Alarm Control Panel Signalling Line Circuit (SLC) Loops.

- .2 The Manual Station shall, on command from the Control Panel, send data to the panel representing the state of the manual switch. Manual Fire Alarm Stations shall use a key operated test-reset lock, and shall be designed so that after activation they cannot be restored to normal use except by the use of a key or tool.
- .3 All operated stations shall have a positive, visual indication of operation that cannot be reset without the use of a key or tool.
- .4 Manual Stations shall be constructed of LEXAN or die cast metal with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 44 mm (1.75 inches) or larger.
- .5 Stations shall be suitable for surface mounting on a recessed outlet box.

2.2 MULTI SENSOR DETECTORS

- .1 Multi Sensor Detectors shall be addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signalling Line Circuit loops. The multi sensor detector shall process and analyze information from ionization, photoelectric, and heat sensors within the detector.
- .2 The detectors shall use a unipolar chamber to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
- .3 The detectors shall be ceiling mounted and shall include a twist-lock base.
- .4 The detectors shall provide dual alarm and power LEDs to indicate "normal" system polling status and "alarm" state.
- .5 The detector sensitivity shall be set through the Fire Alarm Control Panel, and shall be adjustable in the field through the field programming of the system. Sensitivity may be automatically adjusted by the panel on a time-of-day basis.
- .6 Using software in the Fire Alarm Control Panel, the detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72E.

2.3 HEAT DETECTORS

- .1 Heat Detectors shall be addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signalling Line Circuits.
- .2 The detectors shall use an electronic sensor to measure thermal conditions (fixed temperature/rate of rise) caused by a fire and shall, on command from the control panel, send data to the panel representing the analog level of such thermal measurements.
- .3 The detectors shall be ceiling mounted and shall include a twist-lock base.
- .4 The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector

itself (by activating a magnetic switch) or may be initiated remotely on command from the control panel.

- .5 The detectors shall provide dual alarm and power LEDs to indicate "normal" polling status and "alarm" state.
- .6 An output connection shall also be provided in the base to connect an external remote alarm LED.

2.4 ADDRESSABLE MONITOR MODULE

- .1 Addressable Monitor Modules shall be provided to connect one supervised IDC zone of Alarm Initiating Devices to one of the Fire Alarm Control Panel Signalling Line Circuit (SLC) Loops (ie sprinkler flow and tamper switches).
- .2 The Monitor Module shall mount in a 102 mm square, 54 mm deep electrical box.
- .3 The Monitor module shall be identified by a device specific address. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.

2.5 ADDRESSABLE CONTROL MODULE

- .1 Addressable Control Modules shall be provided to supervise and control the operation of conventional signal devices, fan shutdown, elevator return to home signal, electro-magnetic door holders, and other auxiliary control functions. The control module may be set to operate as a dry contact relay.
- .2 The Control Module shall mount in a 102 mm square, 54 mm deep electrical box.
- .3 The Control Module shall be identified by a device specific address. An LED shall be provided that shall flash under normal conditions, indicating that the Control Module is operational, and is in regular communication with the Fire Alarm Control Panel.

2.6 AUDIBLE/VISUAL SIGNAL DEVICE

- .1 Both audible and visual signals shall be contained in one common flush mounted device. The lens for the visual section shall be constructed of polycarbonate with the word "FIRE" in red letters on both sides of the lens. The lens shall project from the face of the enclosure to allow visibility from the side of the device. The visual signal shall consist of xenon flash tube which shall flash at a rate of between one and three flashes per second. The visual signal shall produce a minimum effective luminous intensity of 15 cd, a flash duration of 200 ms or less, with a maximum duty cycle of 40% (as per ULC/CAN-S526).

The audible portion of the device shall have two tone options, two audibility options, and the option to switch between a temporal 3 pattern and a non-temporal continuous pattern. Sound level shall be minimum 97 dBA (measured in anechoic room at 3 metres, and shall meet requirements of ULC Standard S525).

- .2 All strobes shall be synchronized and shall comply with ADA guidelines concerning photo sensitive epilepsy.

2.7 SHORT CIRCUIT LOOP ISOLATOR MODULES

- .1 Short circuit loop isolator modules shall be provided between each floor so that a fault on one floor does not affect the operation of devices on another floor area.
- .2 No more than fifteen (15) devices shall be connected between short circuit isolators.
- .3 If a fault occurs, isolators shall remove power to all devices beyond the isolator on the loop to the next isolator. When the fault is removed, the module shall automatically restore the loop to normal condition.

2.8 END OF LINE DEVICES

- .1 Provide end-of-line devices wall mounted in separate boxes at 1800mm above the finished floor level.
- .2 Flush mount devices in finished areas.
- .3 Provide finished stainless steel or anodized aluminium cover plates.
- .4 Provide permanent lamicoid labels on plates to indicate the related circuits.
- .5 Clearly locate and identify the end-of-line devices on record drawings.

2.9 MECHANICAL SYSTEM CONTROL

- .1 Provide control of mechanical system air handling equipment as follows:
 - .1 Building Management System (BMS) interface to receive the Fire Alarm status and commands as indicated.
 - .2 All wiring, connections, relay modules, etc. as required.
 - .3 Interposing relays as required.
 - .4 Separate relay for each system as indicated in Motor Control Schedule.
 - .5 Minimum one set of Form "C" contacts for each system accessed via clearly labelled terminal strip located adjacent to MCC or starter. Provide general purpose enclosure.
 - .6 Fan shutdown shall be achieved by wiring fan starter control circuit through appropriate alarm operated contacts located in the Fire Alarm panel. Use interposing relays and do not run 120V or higher motor feeder voltages through Fire Alarm system cabinets.

2.10 WIRE AND CABLE

- .1 Conducts: Copper, to CSA C22.2 and as follows:
 - .1 Refer to riser drawing for particular wiring specifications and as follows:
 - .2 Conductor Insulation: Minimum rating 300 volts. Single conductor RW90XLPE (X-link).
 - .3 Multi-conductor cables 105C with outer PVC jacket, colour coded, FAS rated.
 - .4 Conductor sizes as follows:
 - .a Minimum conductor size for alarm initiating circuits shall be #18 AWG.

- .b Minimum conductor size for signal circuits shall be #16 AWG.
 - .c Minimum conductor size for AC circuits shall be #12 AWG.
 - .d Minimum conductor size for visual signal appliance circuits shall be #14 AWG.
 - .e Size all Fire Alarm wiring for maximum 3% voltage drop at maximum load at last device in run.
- .5 Main data risers and loops between fire separations to be approved fire rated cables in accordance with the manufacturers rated system requirements.
 - .6 Selection of the type of cable to be at discretion of Fire Alarm installer but the system shall meet all code requirements, when complete. All wiring to be terminated in terminal panels, junction boxes, etc. on suitable identified terminal strips or blocks, and to be neatly installed, laced and tagged where required. All terminals in terminal panels and junction boxes to be made with solderless connectors to terminal blocks with separate terminal for each conductor.
 - .7 All wiring to be tag identified at the points of connection.
 - .8 Provide a ground conductor with all system wiring and bond all metal parts including device boxes.

2.11 MANUFACTURERS

- .1 All equipment and components shall be 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 protected premises protective signalling fire alarm and smoke control system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.
- .2 Acceptable manufacturers: manufacturer shall be that of the existing building fire alarm system.

Part 3 Execution

3.1 INSTALLATION

- .1 Class "A" wiring shall be used for the fire alarm system. The primary wiring circuit and the return circuit shall not be installed in the same conduit.
- .2 Provide 19 mm empty conduit to telephone plywood.
- .3 Provide and install a fire alarm control module and associated conductors (in conduit) at a 150 x 150 mm junction box mounted adjacent to each elevator controller (for elevator recall).
- .4 Provide and install a fire alarm monitor module and associated conductors (in conduit) at the generator controller (to monitor generator fault condition).
- .5 Pullstations, signal devices, and E.O.L. resistors shall be aligned vertically where grouped at one location. Devices staggered vertically will not be accepted.

- .6 Provide wireguards for all devices located in areas where they may sustain damage.
- .7 Energize fire alarm panel from breaker located in main distribution centre. The breaker shall be coloured red and be lockable in the "on" position. The location of the breaker energizing the fire alarm panel shall be identified on a plastic laminate label located inside the fire alarm panel.
- .8 All fire alarm system wiring shall be contained in conduit.
- .9 Ensure that air sampling tube, and exhaust tube for duct detectors are properly aligned within the ventilation duct, according to manufacturer's installation instructions.
- .10 Manufacturer shall allow for a required amount of on-the-job-site assistance for the Contractor during the construction period.
- .11 The entire installation shall be performed under the supervision of the Manufacturer. Upon completion of the installation, the Manufacturer shall check the entire system to the approval of the Electrical Consultant. The Manufacturer shall verify the entire system and demonstrate its complete operation to those having jurisdiction.
- .12 The exit lighting circuit shall be controlled by the flashing relay.
- .13 All fire alarm conductors shall be free of splices and t-taps and shall be installed continuous between devices.
- .14 If a 120 volt electric bell and associated pressure switch is supplied by the sprinkler trade energize from a dedicated 120 volt branch circuit.
- .15 All monitor and control modules shall be identified with a plastic laminate label (size 3) indicating what device the module is monitoring or controlling (i.e. "TAMPER SWITCH #5", "ELECTRO-MAGNETIC HOLD OPEN", etc.).
- .16 When the fire alarm system installation is complete and before verification, the Contractor shall provide written notification to the Owner requesting that the Owner arrange to contract with a Central Monitoring Agency and/or the telephone utility for monitoring services and telephone line lease (if required). Monitoring of the fire alarm system shall allow both "trouble" and "alarm" status of the fire alarm system to be annunciated separately. During verification, confirm that activation of the fire alarm system results in a signal received by the fire department.
- .17 In addition to all required devices indicated on the drawings and specified herein, provide the following spare components:
 - .1 Monitor Modules: Quantity two (2)
 - .2 Control Modules: Quantity two (2)
 - .3 Manual Pull Stations: Quantity one (1)
 - .4 Multi Sensor Detectors: Quantity two (2)
 - .5 Heat Detectors: Quantity one (1)
- .18 Existing fire alarm system wiring may be reused providing the conductors are continuous between devices. No terminations will be permitted in junction boxes between devices. Contractor is responsible to ensure the integrity of existing conductors wherever they are reused.

END OF SECTION