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## AUTOMATIC LOAD TRANSFER EQUIPMENT

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### 1. GENERAL

#### 1.1 References

- .1 CAN3-C13, Instrument Transformers.
- .2 CAN3-C17, Alternating-Current Electricity Metering.
- .3 ANSI/NEMA ICS 2, Industrial Control Devices, Controllers, and Assemblies.

#### 1.2 System Description

- .1 Automatic load transfer equipment which electrically operated, mechanically held to:
  - .1 Monitor voltage on all phases of normal power supply.
  - .2 Initiate cranking of standby generator unit on normal power failure or abnormal voltage on any one phase below preset adjustable limits for adjustable period of time.
  - .3 Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits.
  - .4 Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on all phases above adjustable pre-set limit for adjustable time period.
  - .5 Shut down standby unit after running unloaded to cool down using adjustable time delay relay.

#### 1.3 Shop Drawings

- .1 Submit shop drawings in accordance with Section 16010 - Electrical General Requirements.
- .2 Include:
  - .1 Make, model and type
  - .2 Single line diagram showing controls and relays.
  - .3 Description of equipment operation including:
    - .1 Automatic starting and transfer to standby unit and back to normal power.
    - .2 Test control.
    - .3 Manual control.
    - .4 Automatic shutdown.

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## AUTOMATIC LOAD TRANSFER EQUIPMENT

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### 1.4 Operation and Maintenance Data

- .1 Provide operation and maintenance data for automatic load transfer equipment for incorporation into manual specified in Section 16010 - Electrical General Requirements.
- .2 Detailed instructions to permit effective operation, maintenance and repair.
- .3 Technical data:
  - .1 Schematic diagram of components, controls and relays
  - .2 Illustrated parts lists with parts catalogue numbers
  - .3 Certified copy of factory test results.

### 1.5 Source Quality Control

- .1 Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested.
- .2 Tests:
  - .1 Operate equipment both mechanically and electrically to ensure proper performance.
  - .2 Check selector switch, in all modes of operation Test, Auto, Manual, Engine Start and record results.
  - .3 Check voltage sensing and time delay relay settings.
  - .4 Check:
    - .1 Automatic starting and transfer of load on failure of normal power
    - .2 Retransfer of load when normal power supply resumed
    - .3 Automatic shutdown
    - .4 In-phase monitor operation.

## 2. PRODUCTS

### 2.1 Materials

- .1 Meters: to CAN3-C17.
- .2 Instrument transformers: to CAN3-C13.
- .3 Contactors: to ANSI/NEMA ICS 2.

## **AUTOMATIC LOAD TRANSFER EQUIPMENT**

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### **2.2 Contactor Type Transfer Equipment**

- .1 Two – 3 phase contactors mounted on common frame, in double throw arrangement, mechanically and electrically interlocked, solenoid operated, mounted in the main electrical distribution equipment as indicated on drawings.
- .2 Rated: 347/600 V, 60 Hz, 200 A. 4 wire, solid neutral.
- .3 Main contacts: silver surfaced, protected by arc disruption means including separate arcing contacts, arc splitters and blow out coils for load current.
- .4 Switch and relay contacts, coils, spring and control elements accessible for inspection and maintenance from front of panel [without removal of switch panel or disconnection of drive linkages and power conductors].
- .5 Auxiliary contact: to initiate emergency generator start-up on failure of normal power.
- .6 Fault withstand rating: 42kA symmetrical for 3 cycles with maximum peak value of 50 kA.
- .7 Lever to operate switch manually when switch is isolated.

### **2.3 Controls**

- .1 Selector switch – four position "Test", "Auto", "Manual", "Engine start".
  - .1 Test position – Normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.
  - .2 Auto position – Normal operation of transfer switch on failure of normal power; retransfers on return of normal voltage and shuts down engine.
  - .3 Manual position – Transfer switch may be operated by manual handle but transfer switch will not operate automatically and engine will not start. If the transfer switch is on manual operation mode, a red light should indicate a warning on the control panel and auxiliary contact to be provided for transferring this signal to off site.
  - .4 Engine start position - Engine starts but unit will not transfer unless normal power supply fails. Switch must be returned to "Auto" to stop engine.
- .2 Control transformers: dry type with 120 V secondary to isolate control circuits from:
  - .1 Normal power supply
  - .2 Emergency power supply.

## **AUTOMATIC LOAD TRANSFER EQUIPMENT**

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- .3 Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A. minimum:
  - .1 Voltage sensing, one per phase for normal power and on one phase only for emergency, solid state type, adjustable drop out and pick up, close differential, 2 V minimum undervoltage overvoltage protection. Voltage sensing to initiate transfer of the load when normal power supply drops to 70% in any phase and pick up at 90% on all phases.
  - .2 Time delay, normal power to standby, adjustable solid state, 5 seconds to 180 seconds
  - .3 Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 1 to 60 seconds delay.
  - .4 Time delay on retransfer from standby to normal power, adjustable 20 seconds to 30 min.
  - .5 Time delay for engine cool-off to permit standby set to run unloaded after retransfer to normal power, adjustable solid state, 20 seconds intervals to 10 min].
  - .6 Time delay during transfer to stop transfer action in neutral position electrically to prevent fast transfer, adjustable, 5 seconds intervals to 180 seconds.
  - .7 Frequency sensing, to prevent transfer from normal power until supply until frequency of standby unit reaches preset adjustable values.
- .4 Solid state electronic in-phase monitor.

### **2.4 Accessories**

- .1 Pilot lights to indicate switch position, green for normal, red for standby, mounted in panel.
- .2 Solid neutral bar, rated: 400 A.
- .3 Overlapping neutral contacts on contactor type transfer equipment.
- .4 Auxiliary relay to provide 2 N.O. and 2 N.C. contacts for remote alarms.
- .5 Test pushbutton (momentary contact) to simulate failure of normal power.

### **2.5 Equipment Identification**

- .1 Provide equipment identification in accordance with Section 16010 – Electrical General Requirements.

## **AUTOMATIC LOAD TRANSFER EQUIPMENT**

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### **2.6 Acceptable Manufacturers**

- .1 Onan, Kohler.

### **3. EXECUTION**

#### **3.1 Installation**

- .1 Locate, install and connect transfer equipment.
- .2 Check solid state monitors and adjust as required.
- .3 Install and connect battery and alarms.

#### **3.2 Field Quality Control**

- .1 Perform tests in accordance with Section 16980 - Testing, Adjusting and Balancing of Electrical Equipment and Systems.
- .2 Energize transfer equipment from normal power supply.
- .3 Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.
- .4 Set selector switch in "Manual" position and check to ensure proper performance.
- .5 Set selector switch in "Engine start" position and check to ensure proper performance. Return switch to "Auto" to stop engine.
- .6 Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for [10] min, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.

**END OF SECTION**

## **FIRE ALARM SYSTEMS**

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### **1. GENERAL**

#### **1.1 Related Work**

- .1 Conduits, Conduit Fastenings and Conduit Fittings: Section 16111.
- .2 Wires and Cables 0-1000 V: Section 16122.

#### **1.2 References**

- .1 CAN/ULC-S524, Installation of Fire Alarm Systems.
- .2 ULC-S525, Audible Signal Appliances for Fire Alarm Systems.
- .3 CAN/ULC-S526, Visual Signal Appliances, Fire Alarm.
- .4 CAN/ULC-S527, Control Units, Fire Alarm.
- .5 CAN/ULC-S528, Manual Pull Stations.
- .6 CAN/ULC-S529, Smoke Detectors, Fire Alarm.
- .7 CAN/ULC-S530, Heat Actuated Fire Detectors, Fire Alarm.
- .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.
- .11 NBC, National Building Code of Canada.
- .12 CSA C22.1 Section 32, Fire Alarm Systems and Fire Pumps.
- .13 Local Building Code.

#### **1.3 Description of System**

- .1 System includes:
  - .1 Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.
  - .2 Trouble signal devices.
  - .3 Power supply facilities.
  - .4 Manual alarm stations.

## **FIRE ALARM SYSTEMS**

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- .5 Automatic alarm initiating devices.
- .6 Audible signal devices.
- .7 End-of-line devices.
- .8 Annunciators.
- .9 Visual alarm signal devices.
- .10 Ancillary devices.

### **1.4 Shop Drawings**

- .1 Submit shop drawings in accordance with Section 16010 – Electrical General Requirements.
- .2 Include:
  - .1 Layout of equipment.
  - .2 Zoning.
  - .3 Complete wiring diagram, including schematics of modules.

### **1.5 Operation and Maintenance Data**

- .1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Section 16010 – Electrical General Requirements.
- .2 Include:
  - .1 Operation and maintenance 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.
  - .4 List of recommended spare parts for system.

### **1.6 Maintenance Materials**

- .1 Provide maintenance materials in accordance with Division 1 – Maintenance Materials, Special Tools and Spare Parts.
- .2 Include:
  - .1 2 spare glass rods for manual pull box stations if applicable.
  - .2 1 rate of rise heat detector.
  - .3 1 pull station

## **FIRE ALARM SYSTEMS**

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### **1.7 Training**

- .1 Arrange and pay for one on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system. Seminars will use actual demonstration.
- .2 A representative from the manufacturers shall attend the seminar.

## **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 ULC-S525.
- .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 operation. Operation of any alarm initiating device to:
  - .1 Cause audible signal devices to sound throughout building.
  - .2 Transmit signal to fire department via auto dialer provided through Division 17.
  - .3 Cause zone of alarm device to be indicated on control panel.
  - .4 Cause air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.

### **2.3 Control Panel**

- .1 Class B.
- .2 Single stage operation.

## FIRE ALARM SYSTEMS

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- .3 Zoned.
- .4 Non-coded.
- .5 Enclosure: CSA Enclosure 1, c/w lockable concealed hinged door, full viewing window, flush lock and 2 keys. Enclosure to be suitable for surface wall mounting.
- .6 Supervised, modular design with plug-in modules:
  - .1 Alarm receiver with trouble and alarm indications for class B initiating circuit.
  - .2 Spare zones: compatible with smoke detectors and open circuit devices.
  - .3 Space for future modules.
  - .4 Latching type supervisory receiver circuits. Discrete indication for both off-normal and trouble.
- .7 Components:
  - .1 Coded alarm receiver panel with trouble and alarm indications for class B initiating circuit.
  - .2 Single stage alarm pulse rate panels:
    - .1 Single stroke control type for output to signal control panel continuously.
  - .3 Common control and power units:
    - .1 Control panel containing following indications and controls:
      - .1 "Power on" LED (green) to monitor primary source of power to system.
      - .2 "Power trouble" indication.
      - .3 "Ground trouble" indication.
      - .4 "Remote annunciator trouble" indication.
      - .5 "System trouble" indication.
      - .6 "System trouble" buzzer and silence switch c/w trouble resound feature.
      - .7 System reset switch.
      - .8 "LED test" switch if applicable.
      - .9 "Alarm silence" switch to silence signals manually. If new alarm occurs after signals have been silenced, signals to resound.
      - .10 "Signals silenced" indication.
    - .2 Master power supply panel to provide 24 V dc to system from 120 V ac, 60 Hz input.

## **FIRE ALARM SYSTEMS**

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.3 Fire department connections:

- .1 Fire department bypass switch c/w indicator for trouble at panel.

.4 Auxiliary relays: plug-in type, dust cover, supervised against unauthorized removal by common trouble circuit and c/w bypass switch.

- .1 Contacts: 2.0 A, 120 V ac, for initiation of fan shut down.

- .2 Contact terminal size: capable of accepting 22-12 AWG wire.

### **2.4 Power Supply**

- .1 120 V, ac, 60 Hz input, 24 V dc output from rectifier to operate alarm and signal circuits. Power supply from 120 /208 V local emergency power panel. Include surge protection on incoming power wiring.
- .2 Standby nickel cadmium battery unit with automatic battery charger to provide supervisory and trouble signal current for 24 hours, plus general alarm load for minimum of five minutes, complete with voltmeter and charging meter. Unit to be sized to carry the complete fire alarm system.

### **2.5 Manual Alarm Stations**

- .1 Manual alarm stations: pull lever, glass rod, wall mounted surface type, non-coded single pole normally open contact for single stage English signage.

### **2.6 Automatic Alarm Initiating Devices**

- .1 Heat detectors, fixed temperature, non-restorable, rated 88°C.
- .2 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.
- .3 Smoke detector: ionization
- .1 Twistlock Plug-in type with fixed base.

### **2.7 Audible Signal Devices**

- .1 Horns: 90 dB, surface mounting, 24 V dc c/w visual alarm device.

## **FIRE ALARM SYSTEMS**

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### **2.8 End-of-Line Devices**

- .1 End-of-line devices to control supervisory current in [alarm circuits] [and] [signaling 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].

### **2.9 Visual Alarm Signal Devices**

- .1 Strobe type: flashing, white 24 V dc.
- .2 Designed for surface mounting in combination with audible signal device as indicated.

### **2.10 As-Built Riser Diagram**

- .1 Fire alarm system riser diagram: in glazed frame, minimum size 600 x 600 mm.

### **2.11 Ancillary Devices**

- .1 Remote relay unit to initiate fan shutdown.

## **3. EXECUTION**

### **3.1 Installation**

- .1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-4.
- .2 Install main control panel and connect to ac power supply, dc standby power.
- .3 Locate and 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.
- .5 Connect alarm circuits to main control panel.
- .6 Locate and install audible signal and visual signal devices and connect to signaling circuits.
- .7 Connect signaling circuits to main control panel.
- .8 Install end-of-line devices at end of alarm and signaling circuits, in a separate box not more than 1730 mm above finished floor.
- .9 Locate and install remote relay units to control fan shut down.

## **FIRE ALARM SYSTEMS**

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### **3.2 Wiring**

- .1 Ensure conductors are routed in such a manner to provide required fire rating.
- .2 Signal circuits to be wired with a minimum 2 - #14 R90 per zone. In no case shall the voltage drop to any signal exceed 10%.
- .3 Alarm initiating devices to be wired with multi conductor #18 R90 cables as required in accordance with the Canadian Electrical Code. Circuit resistance shall not exceed 50 ohms.
- .4 All wiring will be terminated into the terminal strips in the fire alarm cabinet with all wiring fully labeled. All cabling to be neat with cables bundled and wrapped inside the cabinets. No splicing will be allowed within the cabinets. A complete schedule of all wiring terminations will be mounted inside each control unit. A complete schematic with all devices, cable labeling information, destinations, etc. will be included with the shop drawings.

### **3.3 Field Quality Control**

- .1 Perform tests in accordance with Section 16980 - Testing, Adjusting and Balancing of Electrical Equipment and System and CAN/ULC-S537.
- .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.
  - .2 Check annunciator panels to ensure zones are shown correctly.
  - .3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of system.
  - .4 Class B circuits.
    - .1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
    - .2 Test each conductor on all circuits for capability of providing alarm signal during ground-fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

## FIRE ALARM SYSTEMS

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### 3.4 Verification and Certification

- .1 The manufacturer shall make an inspection of the fire alarm equipment, including those components necessary to the direct operation of the system such as detectors and controls, whether or not manufactured by the manufacturer added under this contract. The inspector shall comprise an examination of such equipment for the following.
  - .1 That the type of equipment installed is that designated by the specification.
  - .2 That the wiring connections to all equipment components show that the installer undertook to have observed ULC and CSA requirements.
  - .3 That equipment of the manufacturer's manufacture has been installed in accordance with the manufacturer's recommendations and that all signaling devices of whatever manufacture have been operated or tested to verify their operation.
  - .4 That the supervisory wiring of those items of equipment connected to a supervised circuit is operating and that the governmental regulations, if any, concerning such supervisory wiring have been met to the satisfaction of inspecting officials.
  - .5 To assist the contractor in preparing his bid the manufacturer shall indicate the number of hours necessary to complete this inspection prior to closing of tenders, and the number of hours necessary to provide a seminar on the system for the building Owner.
- .2 The system shall be tested and verified according to requirements of CAN/ULC-S537 Standard for Verification of Fire Alarm System Installations. The complete verification procedure will be under the control and supervision of the Consultant. The services of the contractor and representatives of the fire alarm manufacturer are required for the verification. The following is a rough breakdown of the responsibilities of each part participating in the verification. The following is a rough breakdown of the responsibilities of each party participating in the verification. This list does not necessarily note all the required work. The contractor and fire alarm manufacturer shall provide equipment and manpower as necessary to complete the verification to the Consultant's requirements and approval.
- .3 Contractor:
  - .1 Remove/reinstall devices
  - .2 Activate alarms
  - .3 Activate trouble alarms
  - .4 Provide 1 pair of radios
  - .5 All work to be 100% complete
  - .6 Provide necessary manpower
  - .7 Correct deficiencies
  - .8 Coordinate and schedule verification (all two weeks notice).

## **FIRE ALARM SYSTEMS**

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**.4 Manufacturer:**

- .1 Ensure correct operation of all alarms, signals, auxiliary functions, trouble indication
- .2 Record all data and issue report and certificate of verification
- .3 Correct any deficiencies
- .4 Check, calibrate, adjust and confirm correct operation of control panels, annunciator
- .5 Generally assure that all aspects of system function properly
- .6 Provide all test equipment, including sound pressure level meter, volt meter, aerosol test smoke.

**.5 Consultant:**

- .1 Direct and supervise verification
- .2 Check and ensure that system is applied and installed to all applicable codes
- .3 Review test documentation, give to the owner and fire authorities.

**.6 All costs involved in this inspection, including manufacturer's, electrical contractor's and the Consultant, shall be included in total price. Submit the cost for this verification to be applied to a cost allowance.**

**.7 Inspection Certification: On completion of the inspection and when all of the above conditions have been complied with, the manufacturer shall issue to the Interior Designer:**

- .1 A copy of the inspecting technician's report showing location of each device and certifying the test results of each device.
- .2 A certificate of verification confirming that the inspection has been completed and showing the conditions upon which such inspection and certification have been rendered.
- .3 Seal the certificate with the seal of a Professional Engineer registered in the Province of Alberta.
- .4 Proof of liability insurance for the inspection.

**END OF SECTION**

## SECURITY SYSTEM

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### 1. GENERAL

#### 1.1 Related Work

- .1 Conduits, Conduit Fastenings and Conduit Fittings Section 16111
- .2 Wires and Cables 0-1000V Section 16122
- .3 Description of System
  - .1 Building Security Control system consisting of a central control panel with a minimum of 16 zones, door position switches, infra-red motion detectors of various range configurations, access/control keypads with LCD display. Security system to include a digital communicator for monitoring by others. System to accept input from fire alarm control panel AND Process automation control system to transmit signal to local fire department and/or any other designated telephone number as directed by the owner.

#### 1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01300 – Submittals.

#### 1.3 Operation And Maintenance Data

- .1 Provide operation and maintenance data for building entrance control system for incorporation into manual specified in Section 01300 – Submittals.
- .2 Include description of system operation and all operating instructions. A written description of all functions of the system shall also be included. Description to be written using clear instructions avoiding unnecessary technical jargon.
- .3 Include parts list, using component identification numbers standard to electronics industry.

### 2. PRODUCTS

#### 2.1 System Operation

- .1 Each individual security device to be annunciated separately at the access control keypad. System to be zoned and programmed at the direction of consultant. All devices to be located to provide optimum detection and to have tamper contacts. Alarm activation to initiate local alarm signal via a paging speakers, (2) and cause the automatic telephone dialer line seizure module to dial a series of predetermined local and monitoring agency telephone numbers.

## SECURITY SYSTEM

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### 2.2 Control Panel

- .1 DCS Power 832 PC5015 or approved equal, main control panel or approved equal.
- .2 Addressable loop interface module.
- .3 Individually programmable detection zones.
- .4 Internal supervised audible alarm output with siren output for exterior sirens.
- .5 Digital communicator for event reporting.

### 2.3 Security Keypads

- .1 Power 832 LCD5500Z or approved equal, keypad, programmable messaging, 32 character display.

### 2.4 Detection Devices

- .1 DSC AMP-700 series contact modules for door control.

### 2.5 Communication Conductors

- .1 Install addressable loop cabling from devices to panel location. All wire to be installed in conduit.
- .2 Install type cable/wire as recommended by the system Manufacturer.

## 3. EXECUTION

### 3.1 Installation

- .1 Install system in accordance with manufacturer's instructions.
- .2 Locations shown on the drawings are for quantity only. The system supplier is to review and modify the locations/mounting of detectors if required to best suit architectural conditions and provide devices with appropriate range/view configurations.
- .3 Each exterior door contact is to be on a separate zone. Program the remaining devices in zones as directed by the owner.

### 3.2 Field Quality Control

- .1 Perform tests in accordance with Section 16010 – Electrical General Requirements.
- .2 Perform function tests to the satisfaction of the consultant that the system operates as intended.

**END OF SECTION**

## INCOMING TELEPHONE SERVICE

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### 1. GENERAL

#### 1.1 Description

- .1 Incoming telephone service facilities pole line to main terminal, aerial routing.

#### 1.2 Related Work

- .1 Plywood Backboard: Division 06

#### 1.3 References

- .1 CAN/CSA-C83, Communication and Power Line Hardware and latest NW Tel standards.

#### 1.4 Co-ordination with Telephone and Telecommunication Authorities

- .1 Co-ordinate with NW Tel to ensure availability of service.

### 2. PRODUCTS

#### 2.1 Material

- .1 Grounding-Secondary: Section 16450
- .2 Overhead service mast.
- .3 Communication line hardware to CAN/CSA-C83 and to latest EIA/TIA standards.

### 3. EXECUTION

#### 3.1 Installation

- .1 Install telephone service facilities.
- .2 Install 19 mm thick plywood backboard for termination of equipment sized to NW Tel requirements and to suit placement of equipment.
- .3 Install grounding facilities and make connections.
- .4 Install 50 m rigid steel mast on building for overhead service where required.

**END OF SECTION**

## DATA AND VOICE SYSTEMS

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### 1.1 General

### 1.2 Related Work

- |    |  |               |
|----|--|---------------|
| .1 | General Requirements:                              | Section 16010 |
| .2 | Conduits, Conduit Fastenings and Conduit Fittings: | Section 16111 |
| .3 | Boxes and Fittings:                                | Section 16180 |
| .4 | Fastenings and Supports:                           | Section 16191 |

### 1.3 Installer Qualifications

- .1 Personnel installing communications cabling shall be trained and conversant with communications cabling practices required for this project.

### 1.4 General Requirements

- .1 The workmanship and installation shall conform with the current guidelines contained in the following:
- .1 Telephone system manual of the NW Tel.
  - .2 ANSI/EIA/TIA568A (or CSA T529-M), Commercial Building Telecommunications wiring standard.
  - .3 CSA C22.1 Canadian Electrical Code, Part 1 and BC Amendments.
  - .4 CSA C22.2 Canadian Electrical Code, Part 2.
  - .5 ANSI/EIA/TIA (or CSA T530-M), Commercial Building standard for Telecommunications pathways and spaces.
  - .6 ANSI/EIA/TI-606 (or CSA T528-M), Administration standard for Telecommunications infrastructure of commercial buildings.
  - .7 ANSI/EIA/TIA-607 (or CSA T527), Commercial Building Grounding and Bonding requirements for telecommunications.
  - .8 Building Industry Consulting International (BICSI) TDM Manual.

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## DATA AND VOICE SYSTEMS

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### 2. PRODUCTS

#### 2.1 Communications Outlet Assemblies

##### .1 Communications Outlet - Boxes:

- .1 One gang recessed box, 63 mm minimum depth comes with 19 mm deep One gang wallboard adapter ring, 1.6 mm 16 AWG thickness.
- .2 25 mm EMT, from box to telephone termination backboard.

##### .2 Communication Outlet - Jacks:

- .1 Data jacks to be Cat 5E complete with RJ45 jack, cabling, termination and testing.
- .2 Voice jacks to be Cat 5E complete with RJ11 jack, cabling, terminations and testing.

### 3. EXECUTION

#### 3.1 Installation

##### .1 Boxes and Fittings:

- .1 Ensure in advance that outlet box/data outlet installation methods yield vertically-mounted outlets.

##### .2 Cabinets, Enclosures, Racks, Backboards:

- .1 Install at locations and heights indicated on drawings.
- .2 Use green insulated 6 AWG ground conductors for grounding.
- .3 Protect ground conductors from mechanical injury.

##### .3 Connectors:

- .1 Use tooling specific to connector types in use.
- .2 Use connectors suitable for nature of conductor in cable, e.g., stranded vs. solid copper.
- .3 Ensure that connectors' strain relief provisions are used. Strip jackets only amount required.
- .4 Maintain pair twists as close to connector as possible.
- .5 Provide and install necessary strain reliefs and cable support brackets, and install cables

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## DATA AND VOICE SYSTEMS

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### 3.2 Testing

- .1 Test all runs upon completion of permanent terminations as per EIA/TIA standards, using instrumentation acceptable to Engineer. Before commencing testing, submit sample test data sheets and information with respect to test instrumentation to be used.

### 3.3 Fire Stop

- .1 After installation of the cable, all penetrations for conduits, sleeves, etc. shall be sealed using material and methods that meet the requirements of ULC standards CAN4.2115 and installed according to manufacturer's specifications.

**END OF SECTION**