

Approved: 2008-12-31

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        All other sections.

**1.2                REFERENCES**

- .1        CSA C22.2 No. 0 General Requirements – Canadian Electrical Code – Part 2
- .2        CAN3-C235 Preferred Voltage Levels for AC Systems, 0-50,000 V
- .3        Electrical and Electronic Manufacturers Association of Canada (EEMAC)
- .4        National Electrical Manufacturers Association (NEMA)
- .5        Institute of the Electrical and Electronics Engineers (IEEE)
- .6        Insulated Cable Engineers Association (ICEA)
- .7        Canadians Standards Associations (CSA)
- .8        Canadian Gas Association (CGA)
- .9        Underwriters Laboratories Canada (ULC)
- .10      American National Standards Institute (ANSI)
- .11      National Fire Protection Agency (NFPA)
- .12      Comply with the latest editions of CSA C22.1 Canadian Electrical Code – part 1, Provincial Electrical Authority Safety Codes and Bulletins, and local codes and requirements which govern the installation. Where these regulations conflict, comply with the most stringent condition.

**1.3                DEFINITIONS**

- .1        Inspection Authority means agent of any authority having jurisdiction over construction and safety standards associated with any part of the electrical site work.
- .2        Supply Authority means electrical power company or commission responsible for delivering electrical power to the project site
- .3        Electrical Code or Code means Provincial Electrical Code in force at the project location
- .4        CEC means latest edition of the Canadian Electrical Code.

**1.4                DESIGN REQUIREMENTS**

- .1        Operating voltages to be within those defined in CAN3-C235. All supplied electrical equipment shall operate utilizing one of the following voltage systems:
  - .1        3 $\phi$ , 575V
  - .2        3 $\phi$ , 208V
  - .3        1 $\phi$ , 208V
  - .4        1 $\phi$ , 115V
- .2        Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 HZ, within normal operating limits established by CAN3-C235.

Equipment must be able to operate in extreme operating conditions established by CAN3-C235, without damage.

- .3 Verify that equipment supplied under this contract is compatible with related electrical power supply system.
- .4 All electrical components, where applicable, must be NEMA product design and rated unless otherwise noted. IEC product designed components with equivalent NEMA ratings are not acceptable.

## **1.5 SUBMITALS**

- .1 Refer to Section 013300 – Submittal Procedures.

## **Part 2 Products**

### **2.1 ACCEPTED MATERIALS**

- .1 Materials: Approved by CSA. Where equipment or material is not approved or certified as indicated, obtain and pay for special acceptance from CSA or independent agency accepted by CSA.
- .2 Standards: Unless otherwise indicated, manufacture to standards of North American Standards Agencies.

### **2.2 INSULTATING BARRIERS**

- .1 Barriers: Covering exposed terminals and terminal blocks against inadvertent contact.
- .2 Warning Labels: Provide lamacoid with 6 mm white letters on red background, on front of compartments where multiple power sources are present.

### **2.3 IDENTIFICATION**

- .1 Engraved nameplate identification required on electrical instrumentation equipment
- .2 Nameplate: Lamacoid, 3 mm thick, white face, black core, mechanically secured to equipment with non-corroding, self-tapping stainless steel screws or rivets. Grind protruding screws flush with inside surface to prevent injury.
- .3 Nameplate lettering size unless otherwise indicated:
  - .1 MCC's - main nameplate: 25 mm, individual components: 8mm
  - .2 Transformers - 25 mm
  - .3 Control Panels – main nameplate: 25 mm, individual devices: 6 mm
  - .4 Local Panels – main nameplate: 13 mm, individual devices: 6 mm
  - .5 Operating Stations: 6 mm
  - .6 Terminal Boxes: 6 mm
  - .7 Junction Boxes: 6 mm
  - .8 Motors: 6 mm
  - .9 Field Instruments and Devices: 6 mm
  - .10 Disconnect Switches: 13 mm
- .4 Nameplate sizes and wording: Submit schedule to consultant for review prior to manufacture.

- .5 Identification: English unless otherwise noted.
- .6 Terminal cabinets, junction boxes and pull boxes nameplates: indicate system and voltage characteristics.
- .7 Manufacturer's nameplates and CSA labels: visible and legible after equipment installation and field painting.

**2.4 AMBIENT ENVIRONMENT**

- .1 Unless otherwise indicated, supply equipment enclosures, boxes, electrical materials and products suitable for ambient environment of the following areas. All these areas have been classified for compliance with the Canadian Electrical Code (CEC) 2012 version and NFPA 820.

| Area                              | CEC (2012)             | NFPA 820  |
|-----------------------------------|------------------------|---|
| Gallery No. 5                     | Category 2, Section 22 | Ordinary  |
| West Electrical Room              | Ordinary               | Ordinary  |
| West Control Room                 | Ordinary               | Ordinary  |
| Digester Tank #11<br>- Interior - | Hazardous              | Hazardous   |
| Digester Tank #11<br>- Exterior - | Category 2, Section 22 | Hazardous 1.5 m above top of tank and 1.5 m from any exterior tank wall; otherwise Category 2, Section 22 |

**2.5 FINISHES**

- .1 Unless otherwise indicated, prepare, shop prime and factory finish electrical equipment as per manufacturer's standards, colour ANSI/ASA 61 grey.

**2.6 WIRING**

- .1 Lugs, terminals, screws used for termination of wiring must be suitable for copper conductors.

**2.7 MANUFACTURERS AND CSA LABELS**

- .1 Manufacturers' nameplates and CSA labels are to be visible and legible after equipment is installed.

**Part 3 Execution**

**3.1 WORKMANSHIP**

- .1 All work to be carried out by a qualified journeyman of the related trades.
- .2 Where sheet metal enclosures are not provided with knockouts, Greenlee punches shall be used in all cases. Cutting torches shall not be used for making holes.

**3.2 INSTALLATION**

- .1 Provide instruction and supervision as required to the electrical installation contractor.
- .2 Following installation complete Certificate of Satisfactory Installation.

**3.3 EQUIPMENT START-UP**

- .1 Refer to Section 019113 – Start-Up, Commissioning and Performance Testing.

**3.4 TESTING OF ELECTRICAL SYSTEMS**

- .1 All electrical equipment, materials and systems installed shall be subject to an inspection and applicable performance tests supervised by the Contract Administrator to ensure that the operation of the system and components satisfy the requirements of the specification.
- .2 Ensure the system and its components are ready prior to the inspection and test for acceptance.
- .3 All testing shall be conducted by fully qualified personnel only. Tests requiring initial power energization of a system shall not be made without notification of the Contract Administrator. Tests, checks and the like carried out by or on behalf of the Contractor shall be documented and certified at no additional cost to the City. Carefully check wiring for each system and/or part of a system to ensure that the system will function properly as indicated by wiring and schematic diagrams, description of operation, etc.
- .4 Carefully check wiring for each system and/or part of a system to ensure that the system will function properly as indicated by wiring and schematic diagrams, description of operation, etc.
- .5 Manually operate alarms and control devices to check whether their operation during normal and abnormal operating conditions causes the proper effect.
- .6 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to values and settings indicated.
- .7 Supply all instruments, meters and personnel required for the tests.

**3.5 OPERATOR TRAINING**

- .1 Provide operator training in accordance with Section 017900 – Demonstration and Training.

**END OF SECTION**