

**Part 1            General**

**1.1            RELATED REQUIREMENTS**

- .1        Section 01 00 50 – General Instructions
- .2        Section 01 33 00 – Submittal Procedures.
- .3        Section 01 35 13 – Draft Procedures Specific to Requirements of CSC

**1.2            REFERENCES**

- .1        Canadian Standards Association (CSA International)
  - .1        CSA C22.1-[12], Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
- .2        Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
  - .1        EEMAC 2Y-1-[1958], Light Gray Colour for Indoor Switch Gear.
- .3        Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
  - .1        IEEE SP1122-[2000], The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

**1.3            DEFINITIONS**

- .1        Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

**1.4            DESIGN REQUIREMENTS**

- .1        Operating voltages: to CAN3-C235.
- .2        Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

**1.5            ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submittals: in accordance with Section 01 33 00 - Submittal Procedures Product Data
- .2        Submit WHMIS MSDS in accordance with Section 02 81 01 - Hazardous Materials.
- .3        Shop drawings:
  - .1        Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.
  - .2        Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

- .3 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .4 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Quality Control:
  - .1 Provide CSA approved materials
  - .2 Where CSA certified material is not available, submit such material to authority having jurisdiction for approval before delivery to site.
  - .3 Submit test results of installed electrical systems and instrumentation.
  - .4 Permits and fees: in accordance with General Conditions of contract.
  - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative
- .5 Manufacturer's Field Reports:
  - .1 Submit to Departmental Representative manufacturer's written report, within [3] days of review, verifying compliance of Work, including Veeder Root TLS-350, level sensors, interstitial sensors and liquid detection sensors.
  - .2 Submit the reports as described in PART 3 - FIELD QUALITY CONTROL, written by a certified person that the work conforms to this criteria.
- .6 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver the materials to the work site in their original packaging, which displays a sticker with the name and address of the supplier.

## **1.7 SYSTEM STARTUP**

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

## **1.8 OPERATING INSTRUCTIONS**

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel. Operating instructions to include following:

- .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- .3 Safety precautions.
- .4 Procedures to be followed in event of equipment failure.
- .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .2 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .3 Post instructions where directed.
- .4 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .5 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

## **Part 2 Products**

### **2.1 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS**

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

### **2.2 WARNING SIGNS**

- .1 Warning Signs: in accordance with requirements of Departmental Representative.

### **2.3 WIRING TERMINATIONS**

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

### **2.4 EQUIPMENT IDENTIFICATION**

- .1 Identify electrical equipment with labels as follows:
  - .2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.
  - .3 Wording on labels to be approved by Departmental Representative prior to manufacture.
  - .4 Allow for minimum of twenty-five (25) letters per label.
  - .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
  - .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

- .7 Transformers: indicate capacity, primary and secondary voltages.

## **2.5 WIRING IDENTIFICATION**

- .1 Identify wiring with permanent indelible identifying markings, numbered plastic tape, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

## **2.6 FINISHES**

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.
- .2 Paint outdoor and underground electrical equipment using corrosion resistant protection: Green-Guard.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

### **3.2 NAMEPLATES AND LABELS**

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

### **3.3 LOCATION OF OUTLETS**

- .1 Do not install outlets back-to-back in wall; allow minimum [150] mm horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed [3000] mm, and information is given before installation.

### **3.4 MOUNTING HEIGHTS**

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.

- .1 Wall receptacles (Junction Boxes):
  - .1 In mechanical rooms: 1400 mm.

### **3.5 CO-ORDINATION OF PROTECTIVE DEVICES**

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

### **3.6 FIELD QUALITY CONTROL**

- .1 Conduct following tests in accordance with the following :
  - .1 Circuits originating from branch distribution panels and its controls, the voltage, the grounding and the amount of current under normal load.
  - .2 Insulation resistance testing:
    - .1 Measure circuits, feeders and equipment up to 350 V with a 500 V instrument.
    - .2 Check resistance to ground before energizing.
- .2 Carry out tests in presence of Departmental Representative.
- .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .4 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .5 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .6 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

**END OF SECTION**