

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

**1.2 REFERENCE STANDARDS**

- .1 CSA Group
  - .1 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
  - .2 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.
  - .3 Ontario Electrical Safety Code (OESC) 27<sup>th</sup> Edition/2018 and Supplementary Bulletins for the Most Stringent.
  - .4 CSA Z462-18, Workplace Electrical Safety Standard
- .2 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.
  - .2 EEMAC/NEMA DEFINITIONS
- .3 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

**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.
- .2 Provide" means supply and install.
- .3 "Approved" means approved in writing by Departmental Representative.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
  - .1 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
  - .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.

- .3 Certificates:
  - .1 Equipment and Material to be CSA certified. Where CSA certified equipment and/or material is not available, obtain special approval from authority having jurisdiction before delivery to site.
  - .2 Submit test results of installed electrical systems and instrumentation.
  - .3 Permits and fees: in accordance with General Conditions of contract.
  - .4 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
  - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of work to Departmental Representative.
- .4 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of work and electrical system, as described in PART 3 - FIELD QUALITY CONTROL.

## **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for electrical equipment.
  - .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
  - .2 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.
  - .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
  - .4 Post instructions where directed.
  - .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
  - .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

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

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

- .3 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect all electrical equipment and materials from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials, padding, pallets, and crates.

## **Part 2 Products**

### **2.1 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 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification labels for control items in English.

### **2.2 MATERIALS AND EQUIPMENT**

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Equipment and Material to be CSA certified. Where CSA certified equipment and/or material is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
  - .1 CSA labels must be visible and legible after equipment is installed.
- .3 Factory assemble control panels and component assemblies.
- .4 All equipment and materials indicated to be new unless otherwise noted.

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

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

### **2.4 WARNING SIGNS**

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction.
- .2 Decal signs, minimum size 175 x 250 mm.

## 2.5 WIRING TERMINATIONS

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

## 2.6 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
  - .1 Nameplates: lamicoid 3 mm melamine thick plastic engraving sheet, matt white finish face, black core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.

- .2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
  - .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.
  - .4 Allow for minimum of twenty-five (25) letters per nameplate and 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 Terminal cabinets and pull boxes: indicate system and voltage.
  - .8 Transformers: indicate capacity, primary and secondary voltages.
  - .9 Receptacles and light switches: indicate panel and circuit numbers using P touch type labels.
  - .10 Provide neatly typed updated circuit directories in a plastic holder on the inside door of new panelboards, with copy in Manual.
  - .11 Identify all pull and junction boxes, with permanent handwritten marker identification of panel and circuits.
  - .12 Identify molded case circuit breaker with lamicoid nameplate.
  - .13 No drilling to be done on live equipment.

## 2.7 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered, 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.

## **2.8 CONDUIT AND CABLE IDENTIFICATION**

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Type	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green

## **2.9 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 distribution enclosures light gray to EEMAC.

## **2.10 FIRE STOPPING**

- .1 Fire stopping for penetrations of fire separation assemblies in accordance with requirements.

## **2.11 SEISMIC RESTRAINT**

- .1 Install electrical systems with adequate structural support to withstand seismic forces in accordance with the Ontario Building Code.
- .2 Retain a seismic engineer licensed in the Province of Ontario to perform a review of the proposed electrical installation and prepare installation documents indicating all required seismic supports, bracings and fastenings.
- .3 Equipment to be indicated in the structural design documents shall include but not be limited to: suspended conduit runs
- .4 The electrical contractor shall be solely responsible for the full scope of this work. Include all costs of structural design, materials, and site review in tender bid.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation of new electrical equipment.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 INSTALLATION**

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

### **3.3 NAMEPLATES AND LABELS**

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

### **3.4 CONDUIT AND CABLE INSTALLATION**

- .1 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

### **3.5 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.

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

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

### **3.7 FIELD QUALITY CONTROL**

- .1 Load Balance:
  - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
  - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
  - .3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
  - .1 Power distribution system including phasing, voltage, grounding and load balancing.
  - .2 Circuits originating from branch distribution panels.
  - .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
  - .4 Insulation resistance testing:

- .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
  - .2 Check resistance to ground before energizing.
- .3 Carry out tests in presence of Departmental Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests and provision of metering of panels during and at conclusion of project.
- .5 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 - ACTION AND INFORMATIONAL 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.

### **3.8 SYSTEM STARTUP**

- .1 Instruct Departmental Representative 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.
- .4 Include commissioning service to assist in commissioning turnstile systems at each entrance, with Security contractor.

### **3.9 CUTTING, PATCHING & SCANNING**

- .1 Coordinate with Departmental Representative to obtain approval prior to commencement of work in relation to cutting, patching and scanning.
- .2 Scanning and x-ray of concrete floor slab is required before cutting to locate existing rebars and conduits and to obtain department representative's approval for proposed cutting or core drilling.
- .3 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .4 Patch and seal all openings in floors, walls and partitions. Floors, walls or partitions that are fire rated, patch and seal penetrations with fire resistant insulation and approved fire stop systems.

### **3.10 SITE VISIT**

- .1 Acquire a full working knowledge of the building site and any existing conditions thereon which might affect any aspect of the job. Inspect the contract drawings for all

trades since no extras will be entertained for work which could otherwise have been foreseen by prior inspection of the site and/or the contract drawings.

### **3.11 COOPERATION WITH OTHER TRADES**

- .1 Before commencing work, examine the contract drawings and schedules of all other trades. Report at once to the Departmental Representative any interference which might affect the scheduling of, or performance of, work under this Division.
- .2 During construction, ensure that interference with the work of other trades is kept to a minimum and that the finished work of other trades is protected against damage from the electrical work.
- .3 Coordinate any opening or sleeves required for the installation of circuits or equipment so as not to interrupt the progress of masonry and concrete work.
- .4 Obtain approval from the Departmental Representative, or from the Contractor responsible for structural members, before any openings are cut in structural supports, either concrete or steel.

### **3.12 SHUT DOWNS OF SERVICES AND SYSTEMS**

- .1 All shutdowns to be in accordance with Division 1.
- .2 Contractors are to verify with Departmental Representative before making any connection to any existing systems. This will ensure that (1) the Departmental Representative is aware that work will be done on a system and (2) that the contractor is working on a system that is working when he starts his work.

### **3.13 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**



**Part 1            General**

**1.1            RELATED REQUIREMENTS**

- .1        Section 26 05 00 – Common Work Results for Electrical

**1.2            REFERENCE STANDARDS**

- .1        CSA Group (CSA)
  - .1        CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.
  - .2        CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).
- .2        Electrical and Electronic Manufacturers' Association of Canada (EEMAC) Standards
  - .1        EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3        National Electrical Manufacturers Association (NEMA)

**1.3            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 wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

**1.4            CLOSEOUT SUBMITTALS**

- .1        Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2        Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

**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        Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3        Storage and Handling Requirements:
  - .1        Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2        Store and protect wire and box connectors from nicks, scratches, and blemishes.
  - .3        Replace defective or damaged materials with new.
- .4        Packaging Waste Management: remove for reuse and return by manufacturer of crates, pallets, padding, and packaging materials as specified.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to NEMA to consist of:
  - .1 Connector body and stud clamp for tube aluminum round stranded copper conductors bar.
  - .2 Clamp for round stranded copper conductors bar.
  - .3 Stud clamp bolts
  - .4 Bolts for copper bar conductors.
  - .5 Sized for conductors as indicated.
- .4 Clamps or connectors for TECK cable and armoured cable, as required to: CAN/CSA-C22.2 No.18.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 INSTALLATION**

- .1 Remove insulation carefully from ends of conductors and:
  - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
  - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
  - .3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.
  - .4 Install bushing stud connectors in accordance with NEMA.

**3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

**Part 1            General**

**1.1            RELATED REQUIREMENTS**

- .1      Section 26 05 00 - Common Work Results for Electrical.
- .2      Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .3      Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

**1.2            PRODUCT DATA**

- .1      Provide product data in accordance with Section 01 33 00 - Submittal Procedures.

**1.3            DELIVERY, STORAGE AND HANDLING**

- .1      Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

**Part 2           Products**

**2.1            BUILDING WIRES**

- .1      Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2      Copper conductors: size as indicated, with 1000V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Jacketted Non Jacketted.
- .3      RWU 90 for all outdoor circuits, and in conduits below lowest floor slab.

**2.2            ARMOURED CABLES**

- .1      Conductors: insulated, copper aluminum, size as indicated.
- .2      Type: AC90
- .3      Armour: interlocking type fabricated from galvanized steel aluminum strip.
- .4      Type: PVC flame retardant ACWU90 jacket over thermoplastic armour and compliant to applicable Building Code classification for wet locations.
- .5      Connectors: anti short connectors.

**2.3            TECK CABLE**

- .1      Cable: to CAN/CSA C22.2 No. 131.
- .2      Conductors:
  - .1      Grounding conductor: copper.
  - .2      Circuit conductors: copper, size as indicated.
  - .3      Insulation:
    - .1      Type: ethylene propylene rubber.

- .2 Chemically cross linked thermosetting polyethylene rated type RW90, 600 or 1000 V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: galvanized steel.
- .6 Overall covering: thermoplastic polyvinyl chloride material.
- .7 Fastenings:
  - .1 One hole aluminum straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
  - .2 Threaded rods: 6 mm dia. to support suspended channels.
- .8 Connectors:
  - .1 Manufacturer approved for TECK cable.

### **Part 3 Execution**

#### **3.1 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests to requirements of authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

#### **3.2 GENERAL CABLE INSTALLATION**

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .6 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- .7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

#### **3.3 INSTALLATION OF BUILDING WIRES**

- .1 Install wiring as follows:
  - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

**3.4            INSTALLATION OF ARMOURED CABLES**

- .1        Group cables wherever possible on channels.
- .2        Install cable only for branch wiring in walls or for interconnection of ceiling fixtures, maximum length 3 meters.

**3.5            INSTALLATION OF TECK CABLE 0-1000 V**

- .1        Install cables.
  - .1        Group cables wherever possible on channels.
  - .2        Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.
- .2        Within chamber, install teck cables in floor troffers. Coordinate with RF chamber manufacturer for available space within troffer prior to rough-in.

**END OF SECTION**

**Part 1            General**

**1.1            GENERAL REQUIREMENTS**

- .1            Section 26 05 00 – Common Work Results for Electrical.

**1.2            REFERENCE STANDARDS**

- .1            CSA Group
  - .1            CSA C22.2 No.41-13(R2017), Grounding and Bonding Equipment (Tri-National Standard, with NMJ-J-590ANCE and UL 467).
  - .2            CSA C22.2 No.65-13(R2018), Wire connectors (Tri-National Standard, with UL 486A-486B NMJ-J-543-ANCE).

**1.3            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 connectors and terminations and include product characteristics, performance criteria, physical size, finish and limitations.

**1.4            CLOSEOUT SUBMITTALS**

- .1            Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2            Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

**1.5            DELIVERY, STORAGE AND HANDLING**

- .1            Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2            Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3            Storage and Handling Requirements:
  - .1            Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2            Store and protect connectors and terminations from nicks, scratches, and blemishes.
  - .3            Replace defective or damaged materials with new.
- .4            Packaging Waste Management: remove for reuse by manufacturer and return of pallets, packaging materials, crates, and padding.

**Part 2 Products**

**2.1 CONNECTORS AND TERMINATIONS**

- .1 Copper long barrel compression connectors to CSA C22.2 No.65 as required sized for conductors.
- .2 Contact aid for aluminum cables where applicable.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for connectors and terminations installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 INSTALLATION**

- .1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.
- .2 Bond and ground as required to CSA C22.2 No.41.

**3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Common Work Results for Electrical

**1.2 REFERENCE STANDARDS**

- .1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
  - .1 ANSI/IEEE 837-2014, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.
- .2 CSA Group (CSA)

**1.3 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 grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse by manufacturer and return of packaging materials, pallets, padding, and crates.

**Part 2 Products**

**2.1 EQUIPMENT**

- .1 Grounding conductors: bare stranded copper, tinned, soft annealed, size as indicated.
- .2 Insulated grounding conductors: green, copper conductors, size as indicated.
- .3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
  - .1 Grounding and bonding bushings.
  - .2 Thermit welded type conductor connectors.
  - .3 Bonding jumpers, straps.
  - .4 Pressure wire connectors.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 INSTALLATION GENERAL**

- .1 Install complete permanent, continuous grounding system including, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Install bonding wire for flexible conduit, connected at both one ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .7 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- .8 Bond single conductor, metallic armoured cables to cabinet at supply end, and load end.

**3.3 SYSTEM AND CIRCUIT GROUNDING**

- .1 Install system and circuit grounding connections to neutral of primary 120 V system, secondary 208 V system.

**3.4 EQUIPMENT GROUNDING**

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. duct systems, building steel work, distribution panels and turnstile systems at each entrance.

**3.5 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

**3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

**Part 1 General**

**1.1 GENERAL REQUIREMENTS**

- .1 Section 26 05 00 – Common Work Results for Electrical.

**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 hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

**1.3 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 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect hangers and supports from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of crates, pallets, padding, and packaging materials.

**Part 2 Products**

**2.1 SUPPORT CHANNELS**

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for hangers and supports installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 INSTALLATION**

- .1 Secure equipment to solid masonry, tile and plaster surfaces with nylon shields lead anchors.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 Fasten exposed conduit or cables to building construction or support system using straps.
  - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
  - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
  - .3 Beam clamps to secure conduit to exposed steel work.
- .6 Suspended support systems.
  - .1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.
  - .2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- .7 For surface mounting of two or more conduits use channels at 1 m on centre spacing.
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

### **3.3 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for recycling and reuse.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Common Work Results for Electrical.

**1.2 REFERENCE STANDARDS**

- .1 Ontario Provincial Standards
  - .1 Ontario Electrical Safety Code (OESC), 27th Edition, and Electrical Safety Authority Bulletins.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.

**Part 2 Products**

**2.1 SPLITTERS**

- .1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Terminations: main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
- .3 Spare Terminals: minimum three spare terminals on each connection or lug block sized less than 400 A.

**2.2 JUNCTION AND PULL BOXES**

- .1 Construction: welded steel enclosure.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: screw-on flat covers.

**Part 3 Execution**

**3.1 SPLITTERS**

- .1 Mount plumb, true and square to building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.

**3.2 JUNCTION AND PULL BOXES INSTALLATION**

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

**3.3 IDENTIFICATION**

- .1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating source panel, circuit number and voltage.

**END OF SECTION**

**Part 1 General**

**1.1 GENERAL REQUIREMENTS**

- .1 Section 26 05 00 – Common Work Results for Electrical

**1.2 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
  - .1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

**Part 2 Products**

**2.1 OUTLET AND CONDUIT BOXES GENERAL**

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Combination boxes with barriers where outlets for more than one system are grouped.

**2.2 GALVANIZED STEEL OUTLET BOXES**

- .1 One-piece electro-galvanized construction.
- .2 Single and multi-gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
- .4 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .5 Extension and plaster rings for flush mounting devices in finished tile and plaster walls.

**2.3 CONDUIT BOXES**

- .1 Cast FS aluminum FD boxes with factory-threaded hubs and mounting feet for surface wiring of devices.



**2.4 FITTINGS - GENERAL**

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

**2.5 SERVICE FITTINGS**

- .1 'High tension' receptacle fitting made of 2 piece stainless steel with brushed aluminum housing finish for 1 duplex receptacle. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

**END OF SECTION**

**Part 1 General**

**1.1 GENERAL REQUIREMENTS**

- .1 Section 26 05 00 – Common Work Results for Electrical.

**1.2 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
  - .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
  - .2 CSA C22.2 No. 56-04 (R2009), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .3 CSA C22.2 No. 83-M1985(R20017), Electrical Metallic Tubing.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
  - .1 Submit cable manufacturing data.
- .3 Quality assurance submittals:
  - .1 Test reports: submit certified test reports.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Instructions: submit manufacturer's installation instructions.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

**Part 2 Products**

**2.1 CABLES AND REELS**

- .1 Provide cables on reels or coils.
  - .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
- .2 Each coil or reel of cable to contain only one continuous cable without splices.
- .3 Identify cables for exclusively dc applications.

## **2.2 CONDUITS**

- .1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel galvanized steel aluminum threaded.
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings with expanded ends.
- .3 Rigid pvc conduit: to CSA C22.2 No. 211.2.
- .4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal steel aluminum.

## **2.3 CONDUIT FASTENINGS**

- .1 One-hole malleable iron straps straps to secure surface conduits 50 mm and smaller.
  - .1 Two-hole steel straps for conduits larger than 50 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1500mm on center.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

## **2.4 CONDUIT FITTINGS**

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.  
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
  - .1 Set-screws are not acceptable.

## **2.5 EXPANSION FITTINGS FOR RIGID CONDUIT**

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

## **2.6 FISH CORD**

- .1 Polypropylene.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
- .3 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.
- .4 Use flexible metal conduit for final connection from junction box to surface or recessed fluorescent fixtures. Not to exceed 3000 mm.
- .5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .6 Minimum conduit size for lighting and power circuits: 21 mm.
- .7 Bend conduit cold:
  - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .8 Mechanically bend steel conduit over 21 mm diameter.
- .9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .10 Install fish cord in empty conduits.
- .11 Remove and replace blocked conduit sections.
  - .1 Do not use liquids to clean out conduits.
- .12 Dry conduits out before installing wire.

### **3.3 SURFACE CONDUITS**

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on surface channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

### **3.4 CONCEALED CONDUITS**

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

### **3.5 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 GENERAL REQUIREMENTS**

- .1 Section 26 05 00 – Common Work Results for Electrical.

**1.1 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CSA C22.2No.248.12-94, Low Voltage Fuses Part 12: Class R (Bi-National Standard with, UL 248-12 (1st Edition).

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
  - .1 Provide fuse performance data characteristics for each fuse type and size above 100A. Performance data to include: average melting time-current characteristics.
- .3 Shop Drawings:
  - .1 Provide shop drawings in accordance with Section 01 33 00- Submittal Procedures.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Ship fuses in original containers.
- .2 Do not ship fuses installed in switchboard.
- .3 Store fuses in original containers in moisture free location.
- .4 Waste Management and Disposal: remove for reuse and return by manufacturer of packaging materials, crates, pallets, and padding.

**1.4 MAINTENANCE MATERIALS**

- .1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.
- .2 Three spare fuses of each type and size installed above 600A.
- .3 Six spare fuses of each type and size installed up to and including 600A.

**Part 2 Products**

**2.1 FUSES - GENERAL**

- .1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.
- .2 Fuses: product of one manufacturer.

## **2.2 FUSE TYPES**

- .1 Class L fuses.
  - .1 Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
  - .2 Type L2, fast acting.
- .2 Class J fuses.
  - .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
  - .2 Type J2, fast acting.
- .3 Class R -R fuses.
  - .1 Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.
  - .2 Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.
  - .3 Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.
- .4 Class C fuses.
- .5 Fuses for Motors:
  - .1 All fuses for motor loads are to be time-delay type.

## **2.3 FUSE STORAGE CABINET**

- .1 Fuse storage cabinet, manufactured from 2.0mm thick aluminum 750mm high, 600mm wide, 300mm deep, hinged, lockable front access door finished in accordance with Section 26 05 00- Common Work Results for Electrical.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install fuses in mounting devices immediately before energizing circuit.
- .2 Ensure correct fuses fitted to physically matched mounting devices.
  - .1 Install rejection clips for Class R fuses.
- .3 Ensure correct fuses fitted to assigned electrical circuit.
- .4 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.
- .5 Install spare fuses in fuse storage cabinet.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 26 05 00 - Common Work Results for Electrical.

**1.2 REFERENCE STANDARDS**

- .1 CSA Group
  - .1 CAN/CSA-C22.2 No.4-04(R2009), Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).

**1.3 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 disconnect switches - fused and non-fused and include product characteristics, performance criteria, physical size, finish and limitations.

**Part 2 Products**

**2.1 DISCONNECT SWITCHES**

- .1 Non-fusible and fusible disconnect switch in CSA enclosure to CAN/CSA-C22.2 No.4 sized as indicated on drawings.
- .2 Provision for padlocking in ON-OFF switch position by locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Quick-make, quick-break action.
- .5 ON-OFF switch position indication on switch enclosure cover.

**2.2 EQUIPMENT IDENTIFICATION**

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Indicate name of load controlled on size 4 nameplate.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install disconnect switches complete with fuses if applicable.

**END OF SECTION**