

**Part 1            General****1.1                REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.1-06, Canadian Electrical Code, Part 1 (21th Edition), Safety Standard for Electrical Installations.
  - .2 CAN/CSA-C22.3 No. 1-01(Update March 2005), Overhead Systems.
  - .3 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
  - .1 EEMAC 2Y-1, 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.
- .4 Use last version of norms and codes.

**1.2                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.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Shop drawings:
  - .1 Provide shop drawings required for the present section.
  - .2 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.
  - .3 If changes are required, notify Departmental Representative of these changes before they are made.

**1.4                QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
  - .2 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.
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- .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
- .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

## **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

## **1.6 SYSTEM STARTUP**

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

## **Part 2 Products**

### **2.1 MATERIALS AND EQUIPMENT**

- .1 Provide material in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material to be CSA certified. Where CSA certified 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.

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

- .1 Unless otherwise indicated, Division 26 is responsible of the work related to motor control. Wiring (refer to Annex « List of work »). Division 26 together with Divisions 23, are responsible for the start up of motors and for the proper operation of the equipment.
- .2 Before operating motors for the first time check:
  - .1 26.2.1 That the rotation of the motor is in the adequate direction for the equipment;
  - .2 26.2.2 That the motor protection and overloads are appropriate;
  - .3 26.2.3 All control and selector stations;
  - .4 26.2.4 The voltage and current at the connection point of each motor;
  - .5 26.2.5 The type of winding on motors;
  - .6 26.2.6 The available voltage at each starter.
  - .7 Control wiring, conduit and boxes: in accordance with Sections of Division 26.
- .3 No motor start up shall take place before the above procedures are implemented. The party responsible for starting up motors before first implementing these procedures shall solely assume all related costs for ensuing damages..

## **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 nameplates as follows:
  - .1 Nameplates: lamicoid 3 mm thick plastic engraving sheet black or matt white finish face, black or white core, lettering accurately aligned and engraved into core, mechanically attached with self tapping screws. Validate on site the color codes utilized.
  - .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 to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate.
- .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.

## **2.5 WIRING IDENTIFICATION**

- .1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring. Validate on site the code utilized.
- .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 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. Validate on site the color codes utilized. If none is already utilized, use the code described below.

Prime	Auxiliary	
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

**2.7 SUPPORTS**

- .1 See details and description on drawings.

**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 CONDUIT AND CABLE INSTALLATION**

- .1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

**3.4 FIELD QUALITY CONTROL**

- .1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
  - .1 Circuits originating from branch distribution panels.
  - .2 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

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- .3 Insulation resistance testing:
    - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
    - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
  - .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.

### **3.5 SYSTEM STARTUP**

- .1 Make sure that all equipment are well connected to their power source. Make sure of the correct phase rotation.
- .2 Start-up all equipment and make sure that they work properly the same way they did before the execution of the works.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - 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 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1 CSA International CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.
  - .1 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).
- .2 National Electrical Manufacturers Association (NEMA)

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

**1.3                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.

**1.4                DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with 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 off ground, indoors, in dry location 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 to manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan, Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
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**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: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3      Clamps or connectors for TECK 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 cables 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.

**3.3                CLEANING**

- .1      Progress Cleaning: clean in accordance with Section 01 74 11 - 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 11 - Cleaning.
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- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

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**Part 1            General**

**1.1                PRODUCT DATA**

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

**1.2                DELIVERY, STORAGE AND HANDLING**

- .1        Packaging Waste Management: remove for reuse and return to manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**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 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, non jacketed.

**2.2                TECK 90 CABLE**

- .1        Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
  - .2        Conductors:
    - .1        Grounding conductor: copper.
    - .2        Circuit conductors: copper, size as indicated.
  - .3        Insulation:
    - .1        Cross-linked polyethylene XLPE.
    - .2        Rating: 600 V.
  - .4        Inner jacket: polyvinyl chloride material.
  - .5        Armour: interlocking galvanized steel.
  - .6        Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
  - .7        Fastenings:
    - .1        One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
    - .2        Channel type supports for two or more cables at 1.5 m centers.
    - .3        Threaded rods: 6 mm diameter to support suspended channels.
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- .8 Connectors:
  - .1 Watertight 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 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.

#### **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.

#### **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 TECK90 CABLE (0 -1000 V)**

- .1 Group cables wherever possible on channels.
- .2 Install cable exposed, securely supported by staples, straps and hangers.

**END OF SECTION**

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**Part 1            General**

Not applicable.

**Part 2            Products**

**2.1               EQUIPMENT**

- .1      Insulated grounding conductors: green, copper conductors, size [as indicated].
- .2      Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
  - .1      Grounding and bonding bushings.
  - .2      Protective type clamps.
  - .3      Bolted type conductor connectors.
  - .4      Thermit welded type conductor connectors.
  - .5      Bonding jumpers, straps.
  - .6      Pressure wire connectors.

**Part 3            Execution**

**3.1               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 one end 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.

**3.2               EQUIPMENT GROUNDING**

- .1      Install grounding connections to typical equipment included in, but not necessarily limited to following list. Transformers, duct systems, frames of motors, motor control centres, starters, control panels.
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**3.3 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.

**3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - 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 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

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**Part 1            General****1.1                WASTE MANAGEMENT AND DISPOSAL**

- .1        Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2        Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3        Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4        Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5        Fold up metal banding, flatten and place in designated area for recycling.

**Part 2            Products****2.1                SUPPORT CHANNELS**

- .1        See drawings.

**Part 3            Execution****3.1                INSTALLATION**

- .1        Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .2        Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .3        Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.
- .4        Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1       Canadian Standards Association (CSA International)
  - .1       CSA C22.1-10, Canadian Electrical Code, Part 1.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1       Shop Drawings:
  - .1       Provide shop drawings required for the present section.

**Part 2            Products**

**2.1                JUNCTION BOXES**

- .1       Construction:welded steel enclosure.
- .2       Construction PVC enclosure, type NEMA 3R for exterior or humid environment.
- .3       Covers Surface Mounted: screw-on flat covers.
- .4       Covers with rubber gasket and screw-on for exterior and humid environment.

**Part 3            Execution**

**3.1                JUNCTION BOXES INSTALLATION**

- .1       Install pull boxes accessible locations.
- .2       Install terminal block for A-B-C phases and neutral as indicated in junction boxes.
- .3       Install additional pull boxes as required by CSA C22.1.

**3.2                IDENTIFICATION**

- .1       Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.
- .2       Identification Labels: size 2 indicating voltage and phase.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1       Canadian Standards Association (CSA International)
  - .1       CSA C22.1-10, Canadian Electrical Code, Part 1.

**1.2                SUBMITTALS**

- .1       Shop drawings:
  - .1       Provide shop drawings required by the present section.

**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       Weather tight PVC cover NEMA 3R protection box and plug for exterior and humid environment.

**2.2                FITTINGS - GENERAL**

- .1       Bushing and connectors weather tight when install for exterior or humid environment.

**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.

**END OF SECTION**

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## **Part 1 General**

### **1.1 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
  - .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
  - .3 CSA C22.2 No. 211.2, PVC Conduit.
  - .4 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .5 CSA C22.2 No. 83, Electrical Metallic Tubing.

### **1.2 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.

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .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 CONDUITS**

- .1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
- .2 PVC Conduit for exterior environment: to CSA C22.2 No. 211.2, PVC Conduit.
- .3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

- .4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

## **2.2 CONDUIT FASTENINGS**

- .1 One hole steel straps to secure surface conduits NPS 2 50 mm and smaller.
  - .1 Two hole steel straps for conduits larger than NPS 2 50 mm.
- .2 PVC straps for exterior environment.
- .3 Beam clamps to secure conduits to exposed steel work.
- .4 Channel type supports for two or more conduits.
- .5 Threaded rods, 6 mm diameter, to support suspended channels.
- .6 All types of fasteners should be hot dip galvanized steel.

## **2.3 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.

## **2.4 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.

## **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 See details on drawings and photographs. Unless otherwise noted, existing conduits must be extended or replaced with conduits of the same type.

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- .2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
  - .3 Conceal conduits except in mechanical and electrical service rooms.
  - .4 Use liquid tight flexible metal conduit for connection to motors, mechanical equipment or vibrating equipment.
  - .5 Bend conduit cold:
    - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
  - .6 Mechanically bend steel conduit over 19 mm diameter.
  - .7 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
  - .8 Install fish cord in empty conduits.
  - .9 Remove and replace blocked conduit sections.
    - .1 Do not use liquids to clean out conduits.
  - .10 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 Do not pass conduits through structural members except as indicated.
- .5 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 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1        CSA International
  - .1        CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.
  - .2        CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
  - .3        CAN/CSA C22.2 No.144, Ground Fault Circuit Interrupters.
- .2        National Electrical Manufacturers Association (NEMA)
  - .1        NEMA PG 2.2, Application Guide for Ground Fault Protection Devices for Equipment.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Shop Drawings:
  - .1        Submit drawings required by the present section.

**Part 2            Products**

**2.1                MATERIALS**

- .1        Equipment and components for ground fault circuit interrupters (GFCI): to CAN/CSA C22.2 No.144.
- .2        Components comprising ground fault protective system to be of same manufacturer.

**2.2                RECEPTACLES**

- .1        Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, DOFT U ground, to: CSA C22.2 No.42 with following features:
  - .1        Grey urea moulded housing.
  - .2        Suitable for No. 10 AWG for back and side wiring.
  - .3        Break-off links for use as split receptacles.
  - .4        Eight back wired entrances, four side wiring screws.
  - .5        Triple wipe contacts and rivetted grounding contacts.
  - .6        Industrial grade with ground detector.
- .2        Receptacles of one manufacturer throughout project.

**2.3                GROUND FAULT PROTECTOR UNIT**

- .1        Self-contained with 15 A, 120 V circuit interrupter and duplex receptacle complete with:
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- .1 Solid state ground sensing device.
- .2 Facility for testing and reset.
- .3 CSA Enclosure 3R, surface mounted with stainless steel face plate.

## **2.4 COVER PLATES**

- .1 Cover plates for wiring devices to: CSA C22.2 No.42.1 and weather tight.

## **2.5 SOURCE QUALITY CONTROL**

- .1 Cover plates from one manufacturer throughout project.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Receptacle:
  - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
  - .2 Mount receptacles at height as indicated.
  - .3 Install GFI type receptacles as indicated.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1 Canadian Standards Association (CSA International).
  - .1 CAN/CSA C22.2 No.4-M89 (R2009), Enclosed Switches.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Shop drawings :
  - .1 Submit shop drawings required for the present section.

**1.3                HEALTH AND SAFETY**

**Part 2            Products**

**2.1                DISCONNECT SWITCHES**

- .1 Non-fusible, disconnect switch in CSA Enclosure NEMA 1 with observation glass for interior installation and NEMA 3R with observation glass for out door or humid environment installation.
- .2 Provision for padlocking in off switch position by three 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.
- .6 Caliber : as indicated.

**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 as per manufacturer requirement and mounting supports and accessories in galvanized steel.

**END OF SECTION**

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