

## PART 1 - GENERAL

### 1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.1, Canadian Electrical Code, Part 1 (Latest Edition), Safety Standard for Electrical Installations.
  - .2 CSA C22.2 - Latest Edition.
  - .3 CAN/CSA-C22.3 No. 1-01 (Update March 2005), Overhead Systems.
  - .4 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-1-1958, 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.



### 1.2 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 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Language operating requirements: provide identification for control items in English.

### 1.4 SUBMITTALS

- .1 Product Data: submit WHMIS MSDS.
- .2 Shop drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of New Brunswick, Canada.
  - .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.

1.4 SUBMITTALS  
(Cont'd)

- .2 (Cont'd)
  - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
  - .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
  - .5 Submit number of copies of drawings and product data to authority having jurisdiction.
  - .6 If changes are required, notify Engineer of these changes before they are made.
- .3 Quality Control:
  - .1 Provide CSA certified equipment and material.
  - .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special 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 Engineer.

1.5 QUALITY  
ASSURANCE

- .1 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 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.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Health and Safety Requirements.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

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

1.7 SYSTEM STARTUP

- .1 Instruct Engineer 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.
- .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.

1.9 Addenda and  
Revisions

- .1 All addenda, instructions and revisions issued during the tendering period shall become part of the Contract Documents and shall be included in the Tender, and shall take precedence over previous instructions.

1.9 Addenda and  
Revisions  
(Cont'd)

- .2 The Owner and Engineer reserve the right to make revisions to the drawings during the period of construction and these revisions shall take precedence over previously issued drawings. All revisions to work shall be executed by duly authorized change orders with the amount of addition or deduction to the contract amount approved by the Owner before the execution of any work entailed in the revisions.

1.10 Substitutions

- .1 It is the intent of these drawings to establish the required quality of materials. Where manufacturers names or catalogue references are used, it is done in order to establish the required quality, style, size or function. Products of other manufacturers will not be permitted after the signing of the contract. The decision as to suitability shall rest with the Engineer.
- .2 Should the Contractor propose to furnish material and equipment other than those specified, he shall submit a written request for any or all substitutions 10 days prior to the tender closing date. Such a request shall be accompanied by a complete description including manufacturer, brand name, catalogue number, and technical data for all items. If requested by the Engineer, the Contractor shall submit for inspection a sample of the proposed item.
- .3 All material not meeting the standards as set down by these specifications shall not be allowed on the job site.
- .4 Substitutions affecting the design will not be permitted. Additional costs to any other trade as a result of a change or substitution by this Contractor, shall be borne by this Contractor.
- .5 The listing of a manufacturer as acceptable does not imply acceptance of all products of that manufacturer and only products meeting the standards as set out in the specifications will be accepted.

1.11 Work in  
Contract

- .1 The Electrical Contractor shall furnish all labour, materials, tools, appliances and equipment to entirely complete and provide for the operation of the electrical systems.
- .2 The overall intention is to provide for a finished piece of work complete in all aspects, and all items reasonably inferrable as called for by the plans and specifications, and by normally accepted good practice, notwithstanding that every item necessarily required may not be particularly mentioned. This Contractor shall fulfill his obligation and not take advantage of any unintentional errors or omissions should such exist, to the detriment of the Owner's interest. The work shall include but not be limited to:
  - .1 Rearrangement and modifications to existing cell electrical.
  - .2 CCTV Additions.
  - .3 Lift Addition

1.12 Electrical  
Drawings

- .1 The drawings which constitute an integral part of this contract shall serve as working drawings. They indicate the general layout of the complete electrical systems.
- .2 Field verification of scale dimensions on plans is required since actual locations, distances, and levels will be governed by the field conditions.
- .3 All discrepancies related to the electrical work shall be promptly brought to the attention of the Engineer for clarification.

1.13 Examination of  
Drawings and  
Existing Conditions

- .1 The Electrical Contractor shall become completely familiar with the drawings and specifications, as well as construction methods of other trades related to his work to avoid possible conflictions on the project. Should drastic changes be necessary to resolve such conflictions, this Contractor shall notify the Engineer and secure written approval and agreement on necessary adjustments before the installation is started.

1.13 Examination of Drawings and Existing Conditions  
(Cont'd)

- .2 Before submitting his tender, this Contractor shall visit the site and become familiar with Existing installations which could effect the work, site conditions, availability of storage space and all other factors that might influence his tender.
- .3 The Contractor shall determine all working conditions and rigidly comply. Conditions requiring special consideration include but not be limited to:
  - .1 Dust.
  - .2 Noise.
  - .3 Vibration.
  - .4 Water.
  - .5 Use of powder actuated tools.
  - .6 Working hours.
  - .7 Access to working locations.
  - .8 Continuity of power.
  - .9 Project schedule.
  - .10 Physical protection of Owner's facility and equipment.
- .4 No extras will be allowed due to failure to take site conditions into consideration.
- .5 The exact roughing-in dimensions and connection points shall be determined from shop drawings and on-site measurements.

1.14 Discrepancies

- .1 Bidders in preparing their tenders, finding any errors, omissions, or discrepancies in the plans, specifications or other documents, or having any doubt in the intent or meaning of any part thereof, shall immediately notify the Engineer, who will send written instructions or clarification to all bidders. Where such discrepancies exist and it is evident that this Contractor could not have properly tendered without clarification and where such clarification was not requested, no extra to the contract will be considered in order to have the installation properly made. The Owner and Engineer will not be responsible for oral instruction.

## PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

.2 Factory assemble control panels and component assemblies.

2.2 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction and Engineer.

.2 Decal signs, minimum size 175 x 250 mm.

2.3 WIRING TERMINATIONS

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

2.4 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet , black face, white 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  |

#### 2.4 EQUIPMENT IDENTIFICATION (Cont'd)

- .2 Wording on nameplates to be approved by Engineer prior to manufacture.
- .3 Allow for minimum of twenty-five (25) letters per nameplate.
- .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

#### 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.
- .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.

|                | Prime | Auxiliary |
|----------------|-------|-----------|
| CCTV           | Green |           |
| up to 250 Emer | Red   | Yellow    |
| up to 600 Emer | Red   | Green     |

#### 2.7 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 outdoor electrical equipment "equipment green" finish to.
  - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

### PART 3 - EXECUTION

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| <u>3.1 INSTALLATION</u>                        | .1 | Do complete installation in accordance with CSA C22.1 except where specified otherwise.   |
| <u>3.2 CO-ORDINATION WITH OTHERS</u>           | .1 | Co-ordinate interruptions of electrical services and installation of equipment to minimize inconvenience to Owner.  |
|  | .2 | Care must be taken to prevent interference with normal operations of the Owner.   |
|  | .3 | Work by other contractors will be done concurrently with work in this contract. This contractor shall schedule and arrange his work and store his material in co-operation and so as to avoid interference with others.   |
| <u>3.3 NAMEPLATES AND LABELS</u>               | .1 | Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.  |
| <u>3.4 CONDUIT AND CABLE INSTALLATION</u>      | .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.  |
| <u>3.5 CO-ORDINATION OF PROTECTIVE DEVICES</u> | .1 | Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.  |
| <u>3.6 FIELD QUALITY CONTROL</u>               | .1 | Conduct following tests.<br>.1 Power distribution system including phasing, voltage, and grounding.<br>.2 Insulation resistance testing:<br>.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.<br>.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument. |

- 3.6 FIELD QUALITY CONTROL  
(Cont'd)
- .1 (Cont'd)
  - .2 (Cont'd)
  - .3 Check resistance to ground before energizing.
  - .2 Carry out tests in presence of Engineer.
  - .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.
    - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

- 3.7 CLEANING
- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
  - .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

- 3.8 Record Drawings
- .1 Refer to General Conditions.
  - .2 Two sets of white prints shall be maintained for the exclusive purpose of recording deviations from that shown on the contract drawings. One set shall be kept up to date at all times. At the completion of the project, the information shall be transferred to the second set of drawings and to a set of reproducible drawings, both shall be turned over to the Owner.

- 3.9 Cutting
- .1 The Contractor shall be responsible for all cutting required to complete the work shown on the drawings and described herein.
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| 3.9 Cutting<br>(Cont'd)       | .2 | All holes through concrete or masonry shall be made by core drilling. Care must be taken to contain dust and debris.                       |
|                               | .3 | Seal all holes and openings using a non-shrink, fire proof compound.   |
| 3.10 Patching and<br>Painting | .1 | The Contractor shall neatly patch all surfaces cut or damaged as a result of this contract.  |
|                               | .2 | The patching shall be of matching material or as specified herein and carried out by tradesmen trained and skilled in the work to be done. |
|                               | .3 | Painting of a patched area will be required. The painted area shall match as near as possible the existing paint.                          |
|                               | .4 | All patching, painting and sealing shall be to the satisfaction of the Engineer.   |
|                               | .5 | The Contractor shall neatly paint all surfaces left exposed or patched as a result of this contract.                                       |

## PART 1 - GENERAL

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| <u>1.1 DELIVERY,<br/>STORAGE AND<br/>HANDLING</u> | .1 | Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates paddling and packaging materials in accordance with Section Construction/Demolition Waste Management and Disposal. |
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## PART 2 - PRODUCTS

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| <u>2.1 BUILDING WIRES</u> | .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. |

## PART 3 - EXECUTION

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| <u>3.1 FIELD QUALITY<br/>CONTROL</u> | .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.  |

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| <u>3.2 GENERAL CABLE<br/>INSTALLATION</u> | .1 | Cable Colour Coding: to Section 26 05 00 Common Work Results for Electrical.                      |
|   | .2 | Conductor length for parallel feeders to be identical.  |
|   | .3 | Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points. |

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| <u>3.3 INSTALLATION OF<br/>BUILDING WIRES</u> | .1 | Install wiring as follows:<br>.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings. |
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## PART 1 - GENERAL

### 1.1 REFERENCES

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

### 1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with 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 Engineer.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT

- .1 Grounding conductors: bare stranded copper, tinned, soft annealed, size as indicated.
  - .2 Insulated grounding conductors: green, type. RW90.
  - .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 Protective type clamps.
    - .3 Bolted type conductor connectors.
    - .4 Thermit welded type conductor connectors.
    - .5 Bonding jumpers, straps.
    - .6 Pressure wire connectors.
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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 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. Distribution panels, equipment, etc.

3.3 FIELD QUALITY  
CONTROL

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

## PART 1 - GENERAL

### 1.1 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with 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 Engineer.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

### 2.1 SUPPORT CHANNELS

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- .1 Secure equipment to hollow solid masonry, tile and plaster surfaces with lead anchors or nylon shields.
  - .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.
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3.1 INSTALLATION  
(Cont'd)

- .5 (Cont'd)
  - .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 dia threaded rods and spring clips.
  - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .7 For surface mounting of two or more conduits use channels.
- .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 , nylon straps, 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 Engineer.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

## 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-, Rigid Metal Conduit.
  - .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .4 CSA C22.2 No. 83-, Electrical Metallic Tubing.

### 1.2 SUBMITTALS

- .1 Provide submittals in accordance with 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 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 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 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .2 Flexible metal conduit: to CSA C22.2 No. 56, steel.
- .3 Rigid Steel Conduit: to CSA C22.2 No. 45

### 2.3 CONDUIT FASTENINGS

- .1 One hole steel 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.
- .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 Set Screw connectors and couplings for EMT.

### 2.5 FISH CORD

- .1 Polypropylene.

### PART 3 - EXECUTION

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| <u>3.1 MANUFACTURER'S INSTRUCTIONS</u> | .1 | Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets. |
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|-------------------------|----|--|
| <u>3.2 INSTALLATION</u> | .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.  |
|                         | .3 | Use Rigid Steel Conduit in Inmate accessible areas.  |
|                         | .3 | Use electrical metallic tubing (EMT).  |
|                         | .4 | Use liquid tight flexible metal conduit for connection to motors or vibrating equipment.                                     |
|                         | .5 | Bend conduit cold:<br>.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 | Install fish cord in empty conduits.   |
|                         | .8 | Remove and replace blocked conduit sections.<br>.1 Do not use liquids to clean out conduits.                                 |
|                         | .9 | Dry conduits out before installing wire.   |

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| <u>3.3 SURFACE CONDUITS</u> | .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 channels.                              |
|                             | .5 | Do not pass conduits through structural members except as indicated.       |

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| 3.3 SURFACE<br>CONDUITS<br>(Cont'd) | .6 | Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers. |
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| 3.4 CLEANING | .1 | On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment. |
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PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u>               | .1 | Switches, receptacles, wiring devices, cover plates and their installation.  |
| <u>1.2 RELATED SECTIONS</u>               | .1 | Section 01 33 00 - Submittal Procedures.   |
|   | .2 | Section 26 05 00 - Common Work Results - Electrical.   |
| <u>1.3 REFERENCES</u>                     | .1 | Canadian Standards Association (CSA International)<br>.1 CSA-C22.2 No.42-99(R2002), General Use Receptacles, Attachment Plugs and Similar Devices.<br>.2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).<br>.3 CSA-C22.2 No.55-M1986(July 2001), Special Use Switches.<br>.4 CSA-C22.2 No.111-00, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition). |
| <u>1.4 SHOP DRAWINGS AND PRODUCT DATA</u> | .1 | Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.  |
| <u>1.5 WASTE MANAGEMENT AND DISPOSAL</u>  | .1 | Separate and recycle waste materials in accordance with 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 and wiring materials from landfill to metal recycling facility as approved by Engineer Consultant.   |

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## PART 2 - PRODUCTS

### 2.1 SWITCHES

- .1 15 A, 120 V, single pole,, three-way, four-way switches to: CSA-C22.2 No.55 and CSA-C22.2 No.111.
- .2 Manually-operated specification grade ac switches with following features:
  - .1 Terminal holes approved for No. 10 AWG wire.
  - .2 Silver alloy contacts.
  - .3 Urea or melamine moulding for parts subject to carbon tracking.
  - .4 Suitable for back and side wiring.
  - .5 Ivory toggle.
- .3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 Switches of one manufacturer throughout project.
- .5 Acceptable materials:
  - .1 Hubbell: 1201 to 1204
  - .2 Leviton: 1201 to 1204
  - .3 Bryant: 4801 to 4804
  - .4 Pass & Seymore: 15AC1 to 15AC4
  - .5 Eaton: 1201 to 1204

### 2.2 RECEPTACLES

- .1 Duplex receptacles, Specification CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:
    - .1 Ivory 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.
  - .2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:
    - .1 Ivory urea moulded housing.
    - .2 Suitable for No. 10 AWG for back and side wiring.
    - .3 Four back wired entrances, 2 side wiring screws.
-

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| <u>2.2 RECEPTACLES</u><br><u>(Cont'd)</u> | .3 | Other receptacles with ampacity and voltage as indicated. |
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|  | .4 | Receptacles of one manufacturer throughout project. |
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|  | .5 | Acceptable materials: |
|  | .1 | Hubbell: 5262         |
|  | .2 | Leviton: 5262         |
|  | .3 | Bryant: 5262          |
|  | .4 | Pass & Seymore: 5262  |
|  | .5 | Eaton: 5262           |

|                         |    |  |
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| <u>2.3 COVER PLATES</u> | .1 | Cover plates for wiring devices to: CSA-C22.2 No.42.1. |
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|  | .2 | Cover plates from one manufacturer throughout project. |
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|  | .3 | Stainless steel, vertically brushed, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box. |
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|  | .4 | cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes. |
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PART 3 - EXECUTION

|                         |    |           |
|-------------------------|----|-----------|
| <u>3.1 INSTALLATION</u> | .1 | Switches: |
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|--|----|---|
|  | .1 | Install single throw switches with handle in "UP" position when switch closed.                          |
|  | .2 | Install switches in gang type outlet box when more than one switch is required in one location.         |
|  | .3 | Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results - Electrical. |

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|--|----|--|
|  | .2 | Receptacles:   |
|  | .1 | Install receptacles in gang type outlet box when more than one receptacle is required in one location.           |
|  | .2 | Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results - Electrical as indicated. |
|  | .3 | Where split receptacle has one portion switched, mount vertically and switch upper portion.                      |

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|  | .3 | Cover plates: |
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3.1 INSTALLATION

(Cont'd)

.3 (Cont'd)

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

## PART 1 - GENERAL

|  |    |   |
|--|----|---|
| <u>1.1 SECTION INCLUDES</u>              | .1 | Materials and installation for fused and non-fused disconnect switches.   |
| <u>1.2 RELATED SECTIONS</u>              | .1 | Section 26 05 00 - Common Work Results - Electrical.  |
| <u>1.3 REFERENCES</u>                    | .1 | Canadian Standards Association (CSA International).<br>.1 CAN/CSA C22.2 No.4-M89 (R2000), Enclosed Switches.<br>.2 CSA C22.2 No.39-M89 (R2003), Fuseholder Assemblies.                  |
| <u>1.4 SUBMITTALS</u>                    | .1 | Submit product data in accordance with Section 01 33 00 - Submittal Procedures.   |
| <u>1.5 HEALTH AND SAFETY</u>             | .1 | Do construction occupational health and safety in accordance with Health and Safety Requirements.   |
| <u>1.6 WASTE MANAGEMENT AND DISPOSAL</u> | .1 | Separate waste materials for reuse and recycling in accordance with Construction/Demolition Waste Management and Disposal.  |
|  | .2 | Remove from site and dispose of 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 | Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.   |
|  | .5 | Fold up metal banding, flatten and place in designated area for recycling.  |

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## PART 2 - PRODUCTS

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| 2.1 DISCONNECT<br>SWITCHES | .1 | Fusible, and non-fusible, heavy duty horsepower rated disconnect switch in CSA Enclosure 1, to CAN/CSA C22.2 No.4 size as indicated. |
|                            | .2 | Provision for padlocking in on-off switch position by three locks.   |
|                            | .3 | Mechanically interlocked door to prevent opening when handle in ON position.   |
|                            | .4 | Fuses: size as indicated, HRC type.  |
|                            | .5 | Fuseholders: to CSA C22.2 No.39, suitable without adaptors, for type and size of fuse indicated.                                     |
|                            | .6 | Quick-make, quick-break action.  |
|                            | .7 | ON-OFF switch position indication on switch enclosure cover.   |

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| 2.2 EQUIPMENT<br>IDENTIFICATION | .1 | Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical. |
|                                 | .2 | Indicate name of load controlled on size 4 nameplate.  |

## PART 3 - EXECUTION

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| 3.1 INSTALLATION | .1 | Install disconnect switches complete with fuses if applicable. |
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