

PART 1 - GENERAL

1.1 General

- .1 This Section covers items common to Sections of Division 26. This section supplements requirements of Division 01.

1.2 Codes and Standards

- .1 Do complete installation in accordance with CSA C22.1-2012 except where specified otherwise.
- .2 British Columbia Building Code (current edition)
- .3 Abbreviations for Electrical Terms: to CSZ Z85-1983

1.3 Care, Operation and Start-up

- .1 Instruct operating personnel in the 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 as required.

1.4 Voltage Ratings

- .1 Operating voltages: to CAN3-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.5 Permits, Fees and Inspection

- .1 Submit to Electrical Inspection Department the Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay all associated fees and obtain electrical permit.

- .3 Notify the Departmental Representative of changes required by Electrical Inspection Department prior to making changes.
- .4 Furnish Certificates of Acceptance from authorities having jurisdiction on completion of work to Engineer.

1.6 Materials and Equipment

- .1 Provide materials and equipment in accordance with Division 01.
- .2 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.
- .3 Factory assemble control panels and component assemblies.

1.7 Electric Motors, Equipment and Controls

- .1 Supplier and installer responsibility is indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
- .2 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 23 and shown on mechanical drawings.

1.8 Finishes

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

1.9 Equipment
Identification

- .1 Identify electrical equipment with nameplates as follows:
- .2 Nameplates:
 - .1 Lamicoid 3 mm thick plastic engraving sheet, black face, white core.

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

- .3 Wording on nameplates to be approved by the Departmental Representative prior to manufacture.
- .4 Identification to be English.
- .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.

1.10 Wiring
Identification

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

1.11 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
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Other	Green	Blue
Communication Systems		
Fire Alarm	Red	
Emergency	Red	Blue

1.12 Wiring
Terminations

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

1.13 Manufacturers
and CSA Labels

- .1 Visible and legible, after equipment is installed.

1.14 Warning Signs

- .1 As specified and to meet requirements of Electrical Inspection Department.
- .2 Decal signs, minimum size 175 x 250 mm.

1.15 Location of
Outlets

- .1 Locate outlets in accordance with electrical drawings.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or

credit, providing distance does not exceed 3000 mm, and information is given before installation.

1.16 Mounting Heights

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1400 mm.
 - .2 Wall receptacles:
 - .1 General: 300 mm.
 - .2 Above top of continuous baseboard heater: 200 mm.
 - .3 In mechanical rooms: 1400 mm.
 - .3 Panelboards: as required by Code or as indicated.

1.17 Load Balance

- .1 Measure phase current to panelboards with normal loads 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 Submit, at completion of work, report listing phase and neutral currents on new and existing CDP and panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.18 Conduit and Cable Installation

- .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.
- .2 Contractor shall verify the location of existing and planned service runs and structural components within the existing concrete floor and walls and perform x-

ray prior to core drilling and/or cutting.

1.19 Field Quality
Control

- .1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.
- .2 The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province in which the work is being conducted.
- .3 Conduct and pay for following tests:
 - .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 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .5 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.
 - .3 Check resistance to ground before energizing.
- .6 Carry out tests in presence of the Departmental Representative.
- .7 Provide instruments, meters, equipment and personnel required to conduct tests.

1 GENERAL

1.1 Related Work

- .1 This Section of the Specification is to be read, coordinated and implemented in conjunction with all other parts of the Contract Documents.

1.2 Regulatory Requirements

- .1 Restraints shall meet the requirements of the latest edition of the British Columbia Building Code and amendments.
- .2 The Seismic Consulting Engineer should be able to provide a proof of professional insurance and the related practice credentials if requested by the Departmental Representative. The Seismic Consulting Engineer should be familiar with SMACNA, ECABC & NFPA guidelines as well as BCBC and VBBL requirements.
- .3 The Contractors Seismic Consultant shall submit original signed BC Building Code "Letters of Assurance" "Schedules B1, B2, and C-B" to the Departmental Representative.
- .4 The above requirements shall not restrict or supplant the requirements of any local bylaws, codes, or other certified agencies which may have jurisdiction over all or part of the installation.

1.3 Scope

- .1 It is the responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.
- .2 Manufacturer's shop drawings to be submitted with seismic information on equipment structure, bracing and internal components and as required by Division 01.
- .3 Provide restraint on all equipment and machinery, which is part of the building electrical services and systems, to prevent injury or hazard to persons and equipment in and around the structure. Restrain all such equipment in its normal position in the event of an earthquake.
- .4 The total electrical seismic restraint design and field review and inspection will be by a B.C. registered professional structural engineer who specializes in the restraint of building elements. Contractor to allow for coordination, provision of seismic restraints, as well as all costs for the services of the Seismic Restraint Engineer. This engineer, herein referred to as the Seismic Consultant,

will provide normal engineering functions as they pertain to seismic restraint of electrical installations.

- .5 The Contractor shall be aware of, and comply with, all current seismic restraining requirements and make provision for those that may come into effect during construction of the project. Make proper allowance for such conditions in the tender.
- .6 The Seismic Consultant shall provide detailed seismic restraint installation shop drawings to the Contractor. Copies of the shop drawings to be included in the final project manual.
- .7 Provide seismic restraints on all equipment, and/or installations or assemblies, which are suspended, pendant, shelf mounted, freestanding and/or bolted to the building structure or support slabs.
- .8 The Seismic Consultant shall provide inspections during and after installation. The Contractor shall correct any deficiencies noted without additional cost to the contract.
- .9 Include all costs associated with the Seismic installation and certification in the base tender.

1.4 Shop Drawings & Submittals

- .1 Submit shop drawings of all seismic restraint systems including details of attachment to the structure, either tested in an independent testing laboratory or approved by the seismic consultant.
- .2 Submit all the proposed types and locations of inserts or connection points to the building structure or support slabs. Follow the directions and recommendations of the Seismic Consultant.

2 PRODUCTS

2.1 Slack Cable Systems

- .1 Slack cable restraint systems shall be as designed and supplied by Vibra-Sonic Control or equal.
- .2 Slack cable restraints shall be provided on suspended and shelf mounted transformers along with associated equipment and assemblies connected to them at the points of vertical support (4 points). The restraint wires shall be oriented at approximately 90° to each other (in plan), and tied back to the ceiling slab or its structure at approximately 45° to the slab or basic structure. The restraints shall be selected for a 1 g earthquake loading, i.e. each wire shall have a working load capacity equal to the weight of the transformer. The anchors in the structure shall be selected for a load equal to the weight of the transformers at a 45° pull.

- .3 Slack cable systems to allow normal maintenance of equipment and shall not create additional hazard by their location or configurations. Contractor shall rectify any such installations at no additional cost, all to the satisfaction of the engineer and inspection authority having jurisdiction.
- .4 Coordinate requirements of slack cables with suppliers prior to installation.

3 EXECUTION

3.1 General

- .1 All seismic restraints systems shall conform to local authority having jurisdiction and all applicable code requirements.

3.2 Conduits

- .1 Provide restraint installation information and details on conduit and equipment as indicated below:
- .2 Vertical Conduit:
 - .1 Attachment - Secure vertical conduit at sufficiently close intervals to keep the conduit in alignment and carry the weight of the conduits and wiring. Stacks shall be supported at their bases and, if over 2 stories in height, at each floor by approved metal floor clamps.
 - .2 At vertical conduit risers, wherever possible, support the weight of the riser, at a point or points above the center of gravity of the riser. Provide lateral guides at the top and bottom of the riser, and at intermediate points not to exceed 9.2 m [30 ft] o.c.
 - .3 Riser joints shall be braced or stabilized between floors.
- .3 Horizontal Conduits:
 - .1 Supports - Horizontal conduit shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.
 - .2 EMT tubing - tubing shall be supported at approximately 1.2 m [4 ft] intervals for tubing.
- .4 Provide transverse bracing at 12.2 m [40 ft] o.c. maximum unless otherwise noted. Provide bracing at all 90° bend assemblies, and pull box locations.
- .5 Provide longitudinal bracing at 24.4 m [80 ft] o.c. maximum unless otherwise noted.
- .6 Do not brace conduit runs against each other. Use separate support and restraint system.
- .7 Support all conduits in accordance with the capability of the pipe to resist seismic load requirements indicated.

- .8 Trapeze hangers may be used. Provide flexible conduit connections where conduits pass through building seismic or expansion joints, or where rigidly supported conduits connect to equipment with vibration or seismic isolators.
- .9 A conduit system shall not be braced to dissimilar parts of a building or two dissimilar building systems that may respond in a different mode during an earthquake. Examples: wall and a roof; solid concrete wall and a metal deck with lightweight concrete fill.
- .10 Provide large enough conduit sleeves through walls or floors to allow for anticipated differential movements with firestopping where required.
- .11 It is the responsibility of the contractor to ascertain that an appropriate size restraint device be selected for each individual piece of equipment. Submit details on shop drawings. Review with seismic consultant and submit shop drawings to the Departmental Representative for his reference.

3.3 Floor Mounted Equipment

- .1 Bolt all equipment, e.g. transformers, motor control centres, free standing panelboards, control panels, capacitor banks, etc. to the structure. Design anchors and bolts for seismic force applied horizontally through the center of gravity to a seismic force of 0.5g. For equipment which may be subject to resonances, use a nominal 1.0 g seismic force.
- .2 Provide flexible conduit connections between floor mounted equipment to be restrained and its adjacent associated electrical equipment.

3.4 Light Fixtures

- .1 Fluorescent fixtures in suspended ceilings shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by at least two taught cables which are connected to the fixture at diagonal points.
- .2 Surface and recessed style fixtures shall be hung independently of the ceiling system. Fixtures shall be secured to concrete or structural deck above by taught cables.
- .3 Fixtures which are hung independently of ceiling systems shall have minimum of one seismic cable in addition to the chain or cable used to support the fixture. Seismic restraint cables shall be secured into the concrete or structural deck above.

- .4 Cables shall be corrosion resistant and approved for the application.
- .5 Fixtures which are rod hung shall have seismic ball alignment fittings at the ceiling and fixture.

END OF SECTION

1 GENERAL

1.1 Section Includes

- .1 General requirements related to existing buildings.

1.2 Related Sections

- .1 Section 26 05 00 - Common Work Results

2 SEQUENCING, PHASING AND SCHEDULING OF WORK

- .1 Refer to Section 26 05 00 Electrical Common Work Results and ensure that all work on existing buildings, facilities, services and utilities is coordinated, sequenced, phased, and scheduled with all other work. Refer to specification documents for phasing and scheduling.

3 EXISTING CONDITIONS

- .1 Examine the site and existing conditions prior to tendering on this work and make due allowance for these conditions in the tender. Confirm all locations and routings of any existing services, above and below grade, which might be affected by this installation and allow in the tender for such additional work.
- .2 Indication on the drawings of existing conduit, outlets and other electrical apparatus is based on casual field observations and records of past contracts. As such, this information represents the best data available but is not guaranteed to be full or accurate. Verify that field measurements and circuiting diagrams as indicated on Drawings and that abandoned wiring and equipment serve only abandoned facilities. Report discrepancies to Departmental Representative before disturbing existing installation. Disregard types of existing light fixture shown on the demolition drawings, as they represent mosaic of types retrieved from the past projects and observations, and do not relate to the light fixture schedule of the new design. Confirm existing circuiting on site, disregard circuiting shown on demolition drawings, unless verified by Contractor.
- .3 Submission of a tender for this work shall indicate that the Contractor has made a thorough examination of the site and has accepted the existing conditions.
- .4 Where alterations and/or additions to existing equipment or apparatus are required to be made by these documents, it shall be assumed that any existing CSA certification may be in jeopardy. Ensure that all changes are made in accordance with the current edition of the Canadian Electrical Code, Part 2, obtain re-certification, and include re-certification costs in the tender.

- .5 Permit no interruptions to the electric power, fire alarm, telephone, security or other similar systems in the existing building during normal working hours. Advise the Departmental Representative in writing of any intended interruptions outside of these normal hours, including the time and duration of outage. Obtain permission from Departmental Representative at least 24 hours before partially or completely disabling any of the systems. The Departmental Representative may cancel such permission in emergencies at the last minute without penalty or extra cost. Contractor may be required to work in evenings and weekends as required for the existing main building or to minimize duration of outage with no extra cost to the project.
- .6 Assume full responsibility for any disruption to existing services and systems. Provide all necessary material and equipment and provide all labour at no extra cost for any temporary connections be required to maintain services during work in the existing buildings. Include the removal of such temporary connections at completion of the work in the tender price.
- .7 Provide new breakers for all additional circuits as required. Update and retype panel schedules. Where existing panels are affected by the scope of work, provide all necessary blank covers and filler pieces: under no circumstances breaker spaces shall be left open.
- .8 All systems such as power, lighting, security, CCTV, door control, alarm, sound system, fire alarm system, shall be fully operational during renovation and after renovation and be accepted by the Departmental Representative.
- .9 Contractor shall remove all surplus electrical equipment, F.A. devices, speakers, security sensors, wiring, conduits, etc. from renovated areas and return to the Departmental Representative unless otherwise noted.
- .10 Contractor shall relocate, rewire or reroute all wiring which passes through renovated areas, or is in line or on the same circuit as the existing device to be removed to ensure continuity of proper operation of all electrical, fire alarm, security systems, etc. in areas which are not renovated, or devices which are to remain operational. Provide blank covers on all removed devices as required.
- .11 All equipment shown dotted is existing and shall remain in its present location (unless otherwise noted) or shall be relocated as required as per drawings. Rewire, extend wiring, conduits as required.
- .12 Contractor shall allow for adequate removal (without damage) of all fixtures, wiring devices, wires, etc. to facilitate renovation.

- .13 Any fixtures, wiring devices, etc. damaged during and after removal shall be replaced with new approved equipment at Contractor's cost.
- .14 Contractor is responsible for adequate protection of equipment, furniture, etc. (plastic covers, etc.) during the execution of the work.
- .15 Contractor is responsible for cleaning up working area each day before leaving the job site.
- .16 Allow for multiple verifications for fire alarm system and other electrical systems dictated by phasing and scheduling as required for partial building occupancy or substantial performance.

4 INSTALLATION

- .1 Examine drawings of all other trades and allow for all work such as the removal, temporary relocation, and re-installation of electrical fixtures, equipment, devices, wiring, raceways, etc., where such work is required due to alterations in or about existing buildings.
- .2 Where work requires modification, extension, and additions to power and low tension services within the existing building, the wiring required for this work shall be installed concealed wherever possible. In certain cases (e.g., where it is necessary to clear obstructions, or to avoid damage to existing structure and/or finish materials), concealed wiring may not be possible. In such cases, special wiring methods such as mineral-insulated cable or wiremold surface mounted raceway, shall be used, provided that, for each specific instance, approval for same is requested from and granted in writing by the Departmental Representative..
- .3 Chisel and patch concrete for conduits feeding new pedestal-mounted floor outlets in existing building.
- .4 Remove abandoned wiring to source. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- .5 Disconnect abandoned outlets and remove devices. Remove abandoned outlets when servicing conduit is abandoned and removed. Blank off all unused outlet boxes.
- .6 Disconnect, remove and relocate abandoned electrical equipment as required for mechanical modifications.
- .7 Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- .8 Clean and repair existing materials and equipment which remain or are to be reused, as described elsewhere in these Specifications.

Lab Exhaust System Alternation
Summerland, BC
PWGSC Project No. R.018297.001

26 05 01
EXISTING BUILDINGS AND SITE
CONDITIONS
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- .9 Refer to Division 01, Division 23 and Section 26 05 00
Electrical Common Work Results - Phasing of the Work.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

- .1 Section 26 05 34 - Conduits, Conduit Fastenings and Fittings.

1.2 References

- .1 CSA C22.2 No .0.3-96, Test Methods for Electrical Wires and Cables.
- .2 CAN/CSA-C22.2 No. 131-M89(R1994), Type TECK 90 Cable.

1.3 Product Data

- .1 Submit product data in accordance with Division 01 Submittal Procedures.

1.4 Waste Management and Disposal

- .1 Separate and recycle waste materials in accordance with Division 01 - Waste Management and Disposal, and with the Waste Reduction Workplan.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

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 chemically cross-linked thermosetting polyethylene material rated RW90 or RWU90 for outdoor use.

2.3 Armoured Cables

- .1 Conductors: insulated, copper, size as indicated.
- .2 Type: AC90, 600V XLPE RW90.
- .3 Armour: interlocking type fabricated from galvanized steel strip.

PART 3 - EXECUTION

3.1 Installation of Building Wires

- .1 Install wiring as follows
 - .1 In conduit system in accordance with section 26 05 34.
 - .2 Perform insulation resistance testing on all cable and wiring, submit results to the department representative.
 - .3 Perform continuity test on all new cable and wiring, submit results to the department representative.
 - .4 Check each conductor tested for unintentional grounds.
 - .5 Check if wire and cable are properly tightened to manufacturer's recommendations.

END OF SECTION

PART 1 - GENERAL

1.1 References

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA C22.2 No. 18-98, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
 - .2 CSA C22.2 No. 45-M1981(R1992), Rigid Metal Conduit.
 - .3 CSA C22.2 No. 83-M1985(R1999), Electrical Metallic Tubing.
 - .4 CSA C22.2 No. 211.2-M1984(R1999), Rigid PVC (Unplasticized) Conduit.

1.2 Waste Management and Disposal

- .1 Separate and recycle waste materials in accordance with Division 01 - Waste Management and Disposal, and with the Waste Reduction Workplan.
- .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.
- .4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 Conduits

- .1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

2.2 Conduit Fastenings

- .1 One hole steel straps to secure surface conduits 50 mm and smaller. 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 as required.
- .4 Threaded rods, 6 mm dia., to support suspended channels.

2.3 Conduit Fittings

- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
- .2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT. Set-screws are not acceptable.
- .4 Provide two locknuts and insulating busing on all conduit entering a pressed metal box

2.4 Fish Cord

- .1 Polypropylene or nylon.

PART 3 - EXECUTION

3.1 Installation

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Surface mount conduits except when passing between floors. Provide X-ray of existing floor slab and wall locations prior to any new conduit penetrations.
- .3 Use rigid galvanized steel (RGS) threaded conduit as raceway for all areas exposed to weather and location where mechanical damage may occur.
- .4 Use electrical metallic tubing (EMT) as raceway for surface and concealed areas within the building.
- .5 Minimum conduit size for lighting and power circuits: 21 mm.
- .6 Bend conduit cold. Replace conduit if kinked or

flattened more than 1/10th of its original 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. Do not use liquids to clean out conduits.
- .10 Dry conduits out before installing wire.
- .11 Use water tight connector for conduit installed on top of panelboard.

3.2 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 suspended or 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.

PART 1 - GENERAL

- 1.1 Section Includes .1 this section specifies the requirements of fastenings and supports for the complete electrical installation. Supply and install all hangers, supports and inserts for the installation specified herein and as necessary to fasten electrical equipment securely to the building structure.

PART 2 - PRODUCTS

- 2.1 Concrete and Masonry Anchors .1 Materials: hardened steel inserts, zinc plated for corrosion resistance. All anchor bolts must be galvanized.
- .2 Components: non-drilling anchors for use in predrilled holes, sized to safely support that applied load with a minimum safety factor of four.

- 2.2 Support Channels .1 U shape, size 41 x 41 mm, 2.5 mm thick unless indicated otherwise surface or suspended.

PART 3 - EXECUTION

- 3.1 Installation .1 Secure equipment to masonry, tile and plaster surfaces with lead anchors or nylon shields.
- .2 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .4 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.

- .5 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.
- .6 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .7 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .8 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .9 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.
- .10 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

1 GENERAL

1.1 Related Sections

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 Scope of Work.

- .1 A copy of the short circuit coordination and arc flash studies will be prepared by others but provided to the contractor by the Departmental Representative for execution and implementation. The coordination and arc flash study outlined in section 1.3 and section 2 will be provided by others. A preliminary copy of the coordination and arc flash study is included in Appendix E. Contractor shall obtain a final copy of the coordination and arc flash study from the Departmental Representative prior to preparation of arc flash labeling.
- .2 The electrical contractor is responsible for all work in the Execution section. The contractor shall review the coordination study and arc flash study, prepare and provide arc flash labeling to all existing electrical power distribution equipment, unit substation, and generator equipment as shown the electrical appendix. A sample of arc flash label is shown on Appendix E-5 for reference.
- .3 The contractor shall apply final approved breaker and relay settings to all existing overcurrent protection devices to ensure a complete and selective coordination of all the primary power, secondary and generator protective devices as recommended in the final coordination and arc flash study.

1.3 Co-ordination of Protective Devices and Short Circuit and ARC Flash Study

- .1 The preparation of a complete power system coordination study is done by others and details included in the following sections and #2.1 to #2.4 are for reference information only. It will include Protective Coordination, Short Circuit, Ground Fault, and Arc Flash. The base and system short circuit study values, electrical coordination curves and breaker settings.
- .2 The arc flash study shall analyze the Flash Boundary Distance and the range of incident energy based on the calculated available fault current range at each device. The arc flash analysis, short circuit and coordination study shall be performed using the latest version of SKM system analysis power tools for Windows software, which meets the calculation requirements of IEEE Std 1584a, NFPA 70E, ANSI C.37, and IEEE Std. 399.
- .3 The Coordination Study and Curves to be sealed by a practicing professional engineer registered in the jurisdiction of the project installation. (Province, Territory, State, etc).
- .4 Documentation to include the following:

- .1 Available symmetrical fault current including Utility and large motor contribution.
- .2 Symmetrical withstand current rating for bussing.
- .3 Transformer damage curves and in-rush for the main power transformers and major distribution transformers.
- .4 Large Motor starting and damage curves.
- .5 Breaker interrupting capacities including any cascade arrangements.
- .6 Transfer switch interrupting or withstand capacity as appropriate.
- .7 Relay information, manufacturer and type, sensor ratings and tap setting, relay pickup and delay settings.
- .8 Settings for all breakers having adjustable solid state trips or thermal magnetic trips.
- .9 Single line of system illustrated on curves. All curves to be justified using upstream and downstream conditions. Provide alternative scenarios where applicable.
- .10 Submit, with the main distribution switchgear and secondary distribution switchboard general arrangement drawings, a complete set of coordination curves. Coordination curves to be submitted prior to selection of primary fuses, main and secondary air circuit breaker trip settings and ground fault relay pick-up and time delay settings.
- .11 Coordination curves to include the main primary feeder protective devices in the utility system, the primary fuses in the main switchgear, transformer damage curves, all main and secondary air circuit breakers.
- .12 Coordination curves to be plotted on log-log graph paper and shall be accomplished by individual time current trip curves of each device.
- .13 High voltage cable thermal damage curves.
- .14 New unit substation and transformer
- .15 347/600V switchboard, CDPs, panelboards and connecting feeder cables
- .16 120/208V switchboard, CDPs, panelboards and connecting feeder cables
- .17 New emergency generators, switchgear and feeder cables
- .18 Largest mechanical equipment/motor (e.g. Chiller)
- .19 Motor Control Centres
- .20 Any additional data necessary for successful completion of the studies
- .5 The review will not eliminate the responsibility of this Division to provide system coordination and protection.
- .6 Circuit protective devices such as overcurrent trips, relays and fuses to be set to the required values and settings. Prior to final inspection, arrange for the switchgear manufacturer, or the (coordination agency) to visit the site to check all settings to ensure they are in accordance with coordination study values.

.7 Arc Flash Analysis

- .1 Contractor is responsible for preparing arc flash labeling based on approved final copy of arc flash analysis study in conjunction with the previous specified short circuit and protective device coordination study. This arc flash analysis study to be performed in accordance with IEEE Std 1584a.
- .2 The study shall be calculated by means of a digital computer, with the latest version of SKM Analysis Software. Pertinent data and the rational employed in developing the calculations shall be incorporated in the introductory remarks of the student.
- .3 Determine the following for each bus analyzed:
 - .1 Flash Hazard Protection Boundary
 - .2 Incident Energy Level
 - .3 Required Personal Protective Equipment Category
 - .4 Type of Fire Rated Clothing
 - .5 Limited Approach Boundary
 - .6 Restricted Approach Boundary
 - .7 Prohibited Approach Boundary

.8 Related Work

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

.9 Shop Drawings

- .1 Submit shop drawings in accordance with Section 26 05 00.

2 PRODUCTS

2.1 Arc Flash Analysis Study

- .1 Present the data determined by the Arc Flash Analysis Study in a tabular format summary sheet. Include the following for each bus analyzed:
 - .1 Flash Bus Name
 - .2 Protective Device Name
 - .3 Bus Operating Voltage
 - .4 Bus Bolted Fault Current
 - .5 Protective Device Bolted Fault Current
 - .6 Protective Device Arcing Fault Current
 - .7 Trip/Delay Time (Sec)
 - .8 Breaker Opening Time (Sec)
 - .9 Ground
 - .10 Equipment Type
 - .11 Gap (mm)
 - .12 Arc Flash Boundary (in)

- .13 Working Distance (in)
- .14 Incident Energy (cal/cm²)
- .15 Required Protective FR Clothing Category

2.2 Analysis of Short Circuit Calculations

- .1 Analyze the short circuit calculations, protective device coordination, and arc flash calculations and highlight an equipment that is determined to be underrated as specified or cause abnormally high incident energy levels. Propose approaches to effectively protect the underrated equipment and to reduce the energy levels. Provide minor modifications to conform with the study (Examples of minor modifications are trip sizes within the same frame, the time curve characteristics of induction relays, CT ranges, ect.). After developing the coordination curves, highlight areas lacking coordination. Present a technical evaluation with a discussion of the logical compromises for best coordination. Proposed major corrective modifications will be taken under advisement by the Engineer, and the Contractor will be given further instructions.

2.3 Final Written Report

- .1 The results of the power system study shall be summarized in a final written report. The report shall include the following sections:
 - .1 Introduction, executive summary, recommendations, and assumptions
 - .2 Electrical One-Line(s) with previously identified specific data values
 - .3 Tabulations of equipment ratings versus calculated short circuit values and X/R ratios, arc flash values
 - .4 Protective device time versus coordination curves, tabulations of relay and circuit breaker trip settings and fuse selection with commentary
 - .5 Engineering analysis, commentary, and recommendations
 - .6 The report is to be signed and stamped by a professional engineer.

2.4 Tripping Devices

- .1 Relay style, CT ratios and fuse sizes have been selected on a preliminary basis for design purposes. Final settings, selection, types and coordination of devices shall be based on the results on the final written report and power system coordination study.

3 EXECUTION

3.1 Warning Labels

- .1 The Contractor shall prepare an Arc Flash Warning label for each piece of electrical equipment with a specific equipment ID and the previous items a-g listed. Also include the system operating

voltage and date of issue. Labels shall be printed in colour on adhesive backed nylon labels.

- .2 Review final coordination study prior to carrying out calibration, verification and energization of equipment. Coordinate any electrical equipment scheduled shutdown with Departmental representative and obtain written approval. Contractor shall apply recommended settings to all existing overcurrent protection devices. The contractor shall allow to perform this work after normal office hours as required to reduce disruption to the facility operation.
- .3 Include final copy and typed results of coordination and short circuit study in the maintenance manual.

3.2 Electrical equipment data and Information

- .1 Information on power single line diagram is shown on Appendix of the coordination study and may not be complete or accurate; the electrical contractor shall verify and report any discrepancy to Departmental representative. Contractor shall gather the latest electrical data of existing electrical equipment on the single line diagram and provide the departmental representative with all relevant data for equipment not shown or provided.

END OF SECTION

PART 1 - GENERAL

1.1 Related
Sections

- .1 Section 26 05 00 - General requirements.

1.2 Product Data

- .1 Submit product data in accordance with Division 01 - Submittal Procedures.
- .2 Include time-current characteristic curves for breakers with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

1.3 Waste
Management and
Disposal

- .1 Separate and recycle waste materials in accordance with Division 01 - Waste Management and Disposal.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 Breakers
General

- .1 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.
- .2 Common-trip breakers: with single handle for multi-pole applications.
- .3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .4 Circuit breakers with interchangeable trips as indicated.
- .5 Circuit breaker ratings and interrupting capacity as shown and to match existing breaker kA rating.
347/600V circuit breakers to have minimum of 18,000 A IC symmetrical rms interrupting capacity rating.
120/208V circuit breakers to have minimum of 10,000 A

IC symmetrical rms interrupting capacity rating

PART 3 - EXECUTION

3.1 Installation

- .1 Install circuit breakers as indicated.
- .2 Supply and install matching circuit breaker to match the existing CDP and panelboard.
- .3 Check circuit breaker operation in accordance with the manufacturer's requirements.
- .4 Check for breaker installed correspond to short circuit ratings and trip setting in accordance with coordination study, provide coordination study for review prior to field installation.
- .5 Provide *lamicoid* identification for all new breakers.

1 GENERAL

1.1 Related Work

- .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 26 05 00.
- .2 Supply shop drawings on new CDP Panel.
- .3 Shop drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.3 Plant Assembly

- .1 Install circuit breakers in panelboards before shipment from plant.
- .2 Install and prewire low voltage relays assemblies where indicated.
- .3 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
- .4 All panelboards to be of a common manufacturer.

1.4 Finish

- .1 Apply finishes in accordance with Section 26 05 00
- .2 Panel finish in electrical and equipment rooms and closets to be standard ASA Grey baked enamel.

2 PRODUCTS

2.1 Panelboards, Doors and Trims

- .1 Panelboards: to CSA C22.2 No. 29 and product of one manufacturer.
- .2 Bus and breakers rated for 18 KA symmetrical, minimum, interrupting capacity or as indicated.
- .3 Tin plated aluminum bus with full size neutral.
- .4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.
- .5 Mains, number of circuits and number and size of branch circuit breakers as indicated.
- .6 Provide all necessary connectors and mounting hardware in every space to facilitate installation of future breakers. Provide blank fillers for all spaces.

- .7 Concealed hinges and concealed trim mounting screws, hinged locking door with flush catch.
- .8 Panelboards to have flush doors. (Gasketed where required).
- .9 Provide two keys for each panelboard and key similar voltage panelboards alike.
- .10 Panel tubs to be typically 600mm [20"] wide.
- .11 Provide "sprinkler-proof" design in areas where sprinkler fire protection is installed. In any event, all surface mounted enclosures to be complete with sprinkler drip cover.

2.2 Breakers

- .1 All breakers to be bolt on type, moulded case, non adjustable and non interchangeable trip, single and two pole, 120/208V and with trip free position separate from "On" or "Off" positions.
- .2 Two pole breakers to have common simultaneous trip and able to be located in any circuit position within the panelboard. Interrupting rating of breakers to match existing and to be minimum as follows:
 - .1 120/208V panelboards - 10,000 Amps at 250 volts
 - .2 347/600V panelboards - 18,000 Amps at 600 volts.
- .3 Main breaker to be separately mounted at top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
- .4 Provide circuit breakers with indicated trip ratings as shown in the panelboard schedules.
- .5 Provide at least 10% spare 15 Amp single pole breakers whether indicated or not.
- .6 Provide GFI type breakers as indicated.
- .7 Provide Lock-on devices as indicated and in any event for Fire Alarm circuits, Security equipment circuits, door controls, EXIT sign circuits and Emergency Battery equipment circuits.

2.3 Panelboard Identification

- .1 Provide equipment identification in accordance with Section 26 05 00
- .2 Complete and update electrical panel circuit directory with typewritten card(s) located in slide-in plastic pocket(s) fixed to the back of the related door. Directory card to indicate the panel designation, mains size, voltage/phase and the location and load controlled of each circuit. Include a "letter sized" paper copy of each directory in the project maintenance manual.

- .3 Provide a plasticized typewritten information card fixed to the back of the each panel door. Information card to indicate the panel designation and location, feeder type and size and locations of any controlling contactors and feeder pullboxes. Include a "letter sized" paper copy of each information card in the project maintenance manual.

3 EXECUTION

3.1 Installation

- .1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces.
- .2 Panelboards located in service rooms, mechanical rooms, and electrical rooms to be mounted on unistrut supports. Provide all mounting support and seismic restraint for new CDP Panel installation.
- .3 Mount panelboards to height given in Section 26 05 00 or as indicated.
- .4 Perform load balance test for all new CDP Panel and existing modified panelboards and submit test reports.
- .5 Connect loads to circuits as indicated.
- .6 Connect neutral conductors to common neutral bus with respective neutral identified.
- .7 Install new circuit breakers for new mechanical equipment and branch circuit loads.
- .8 Verify all new and existing branch circuit loads and provide updated typewritten panel schedules for existing modified panelboards.
- .9 Provide new identification lamicoids for new CDP panel and panelboards.

END OF SECTION

PART 1 - GENERAL

- 1.1 Related Work .1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.
- 1.2 Shop Drawings and Product Data .1 Submit shop drawings for each type of motor starters and product data in accordance with Section 26 05 00.
- .2 Indicate:
- .1 Mounting method and dimensions.
 - .2 Starter size and type.
 - .3 Layout of identified internal and front panel components.
 - .4 Enclosure types.
 - .5 Wiring diagram for each type of starter.
 - .6 Interconnection diagrams.
- 1.3 Operation and Maintenance Data .1 Provide data for incorporation into maintenance manual specified in Division 01 and Section 26 05 00.
- .2 Include operation and maintenance data for each type and style of starter.

PART 2 - PRODUCTS

- 2.1 Materials .1 Starters: to CSA C22.2 No.14.
- .2 All motor starters supplied shall be of the same manufacturer.
- 2.2 Manual Motor Starters .1 Single phase manual motor starters of size, type, rating and enclosure type as indicated, with components as follows:
- .1 Switching mechanism, quick make and break.
 - .2 One overload heater, manual reset, trip indicating handle.
 - .3 Flush mounted in finished areas.
 - .4 Pilot light.
- .2 Accessories
- .1 Toggle switch labelled as indicated.
 - .2 Locking tab to permit padlocking in "ON" or

"OFF" position.

2.3 Full voltage Magnetic
Starters .1

Magnetic of size, type, rating and enclosure type as indicated with components as follows:

- .1 Contactor solenoid operated, rapid action type.
- .2 Three pole adjustable overload relay(s) with single phase protection feature
- .3 Motor overload protective device in each phase, manually reset from outside enclosure.
- .4 Wiring and schematic diagram inside starter enclosure in visible location.
- .5 Provide a fixed 10 point terminal strip for all controls.
- .6 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
- .7 Control transformers to be line voltage to 120 V of sufficient VA to handle operating coil and associated auxiliary controls. Provide primary and secondary HRC fusing.
- .8 Provide fused circuit and terminal blocks.
- .9 Provide the following accessories:
 - .1 Hand-off-auto selector switches, start/stop/reset buttons or on/off control as indicated.
 - .2 Loads served labelled as indicated.
 - .3 Indicating lights: standard type and colour as indicated.
 - .4 2-N/O and 2-N/C spare auxiliary contacts in addition to the holding contacts unless otherwise indicated.
 - .5 Support facilities for load sensing ring type CT on Phase C of motor circuit, CT for DDC controls to be supplied by other division.
- .2 Two (2) sets of auxiliary contacts - normally Open in addition to standard auxiliary holding contacts supplied with each contactor making a total of three (3) auxiliary contacts. One (1) set of auxiliary contacts to be convertible to normally closed.
- .3 CEMA 1 enclosure unless otherwise indicated.

2.4 Equipment
Identification

- .1 Provide equipment identification in accordance with Section 26 05 00.
- .2 Manual starter designation label, white plate, black letters, size 1, engraved as indicated.
- .3 Magnetic starter designation label, white plate, black letters, size 5 engraved as indicated.

PART 3 - EXECUTION

3.1 Installation

- .1 Install starters and connect power and control as per Mechanical Equipment and Control Schedule.
- .2 Ensure correct control fuses and overload devices elements installed.
- .3 Provide interlocking between starters where required.
- .4 In finished areas, provide flush mounted remote controls and manual motor protection starters complete with stainless steel coverplates and pilot lights unless otherwise indicated.
- .5 Locate new motor starters in an accessible location where is suitable operation and maintenance.
- .6 Select overload settings to suit full load current of motors installed that may differ from the design loads. Confirm with other Divisions.
- .7 Provide local disconnect switch with identification lamicoid for each motor and mechanical equipment.

3.2 Field Quality Control

- .1 Perform tests in accordance with Section 26 05 00 and manufacturer's instructions.
- .2 Prior to starting motors, verify rotation and confirm motor nameplate data with motor starter heater overloads and setting of breakers and sizing of fuses.
- .3 Operate controls, switches, contactors to verify correct functioning.
- .4 Perform starting and stopping sequences of contactors and relays.
- .5 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

PART 1 - GENERAL

1.1 Shop Drawings
and Product Data

- .1 Submit shop drawings and product data in accordance Division 01 Submittal Procedures.

PART 2 - PRODUCTS

2.1 Receptacles

- .1 Specification grade duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features:
 - .1 White or urea molded housing to match existing.
 - .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 Other receptacles with ampacity and voltage as indicated.
- .3 Receptacles of one manufacturer throughout project.

2.2 Cover Plates

- .1 Cover plates for wiring devices.
- .2 Cover plates from one manufacturer throughout project.
- .3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .4 Stainless steel, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

PART 3 - EXECUTION

3.1 Installation

- .1 Switches:
 - .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 specified in Section 26 05 00 or as indicated
 - .4 Provide identification for new light switches.
- .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 as indicated.
 - .3 Provide red color duplex receptacles connected to emergency power circuits.
 - .4 Provide ground fault receptacles with weatherproof cover for all outdoor locations
 - .5 Provide circuit identification label to all new receptacles.
- .3 Cover plates:
 - .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

1.1 Related
Sections

- .1 Section 26 05 00 - Electrical General Requirements.

1.2 Product Data

- .1 Submit product data in accordance with Division 01 Submittal Procedures.

1.3 Waste
Management and
Disposal

- .1 Separate and recycle waste materials in accordance with Division 01 - Waste Management and Disposal.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 Disconnect
Switches

- .1 Fusible, or non-fusible, horsepower rated disconnect switch in CSA Enclosure, size as indicated.
- .2 Provision for padlocking in on-off switch position.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Fuses: size as indicated, to Section 16491 - Fuses - Low Voltage.
- .5 Fuseholders: 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.
- .8 Type of enclosure to suit specific application as indicated on drawings. In general use CSA Type 1 for indoor and CSA Type 4X for outdoor.

2.2 Equipment Identification

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

PART 3 - EXECUTION

3.1 Installation

- .1 Install local disconnect switches at equipment or motor location as shown. Provide new lamicaid identification for all disconnect switches to identifying service and source of power.
- .2 Provide weatherproof disconnect switch for each new outdoor mechanical equipment location.