

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 General requirements that are common to Sections of Division 26 – Electrical.

1.2 RELATED SECTIONS

- .1 Division 01 – General Requirements.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International) Latest Edition of the following:
 - .1 CSA C22.1–18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83 (R2003) Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC) Latest Edition of the following:
 - .1 EEMAC 2Y-1, Light Gray Colour for Indoor Switch Gear.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS) Latest Edition of the following:
 - .1 Material Safety Data Sheets (MSDS).
- .4 CAN/CSA-Z460-12 Control of Hazardous Energy – Lockout and Other Methods.

1.4 SCOPE OF WORK

- .1 The work shall include all labour, materials and equipment necessary for the complete installation of the electrical systems shown on the drawings and described in these specifications.

1.5 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English and French in accordance with Departmental Representative Standards.

1.6 SUBMITTALS

- .1 Submittals: in accordance with Division 01 – General Requirements.

- .2 Shop drawings:
 - .1 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
 - .3 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 required number of copies of drawings and specifications to authority having jurisdiction and to inspection authorities.
 - .1 If changes are required, notify Departmental Representative of these changes.
 - .6 In addition to transmittal letter referred to in Division 01 – General Requirements: **Identify section and paragraph number on all shop drawings.**

1.7 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Division 01 – General Requirements. See Appendix A for Operation and Maintenance Manual Guidelines.
- .2 Include in Operation and Maintenance Data:
 - .1 Details of design elements and construction requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
 - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded view, technical descriptions of items and parts lists. Advertising or seals literature not acceptable.
 - .3 Wiring and schematic diagrams and performance curves.
 - .4 Names, addresses and telephone numbers of local suppliers for items included in maintenance manuals.
 - .5 Copy of reviewed shop drawings.
 - .6 Warranty Letter.

1.8 MAINTENANCE MATERIALS

- .1 Provide maintenance materials in accordance with Division 01 – General Requirements and as indicated in respective specification sections.

1.9 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Division 01 – General Requirements.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 – General Requirements.

1.10 FIRESTOPPING

- .1 All fire stopping work is to be performed by General Contractor.
- .2 Electrical contractor shall coordinate all fire rated assembly penetrations with General Contractor.
- .3 Electrical Contractor shall provide required clearances between outside surface of conduit and inside surface of sleeve, core drilled hole or listed fire rated system.

1.11 TESTS

- .1 Give 48 hours written notice of date for all tests.
- .2 Conceal work only after testing and approval by Departmental Representative and after authority having jurisdiction has inspected work.
- .3 Conduct tests in presence of Departmental Representative and local authority having jurisdiction where applicable.
- .4 Bear costs including retesting and making good.
- .5 Equipment: test as specified in relevant sections.
- .6 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.12 INTERPRETATION OF PLANS AND SPECIFICATIONS

- .1 These specifications are to be considered as an integral part of the plans which accompany them and neither the plans nor the specifications shall be used alone.
- .2 Misinterpretations of the plans or specifications shall not relieve this Contractor of responsibility.
- .3 Where uncertainty exists in the passing of conduits and location of equipment, the General Contractor and or project manager shall be consulted before work is started.
- .4 Drawings are diagrammatic. Building dimensions shall not be scaled from the Electrical plans but shall be obtained from on-site dimensions of the building.
- .5 Any discrepancy between the drawings and the building shall be questioned before proceeding with any installation.

1.13 CO-OPERATION OF CONTRACTORS

- .1 This Contractor shall become familiar with the work of other contractors and in laying out and installing the work shall co-operate with the other Contractors, so as to facilitate the progress of the work as a whole and avoid interference or delays. Where interference exists, this Contractor shall notify the General Contractor and/or project manager and the Departmental Representative before installing the work.

Any changes in the work or alterations of the Electrical Contractor's schedule required for such co-operation will not be considered as a claim for extra compensation.

- .2 Due to the complexities of many sub-trades, and the restrictive space available in this project, it is required that all trades co-operate closely so as to install all systems in their allotted locations as indicated on the drawings, or coordination on site.

1.14 ERRORS AND OMISSIONS

- .1 Should this Contractor discover errors or discrepancies in the plans or specification, he shall refer the matter to the Departmental Representative for change or clarification and shall not proceed with that portion of the work until advised by the Departmental Representative to do so.

1.15 DELIVERY, STORAGE, AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Division 01 – General Requirements.
- .2 Store and handle materials in accordance with Construction Plan and Manufacturer's written instructions.

1.16 SYSTEM START-UP

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

1.17 PERMITS, FEES AND INSPECTION

- .1 Submit to Electrical Inspection Department necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Obtain an electrical work permit and pay associated fees.
- .3 Notify Departmental Representative of changes required by the Provincial Inspection Department prior to making changes.

1.18 EXISTING CONDITIONS

- .1 Tie into existing systems at times coordinated with Departmental Representative.
- .2 Submit written request for approval 10 days minimum, prior to commencement of work.
- .3 Provide minimum 5 days' notice to tenant prior to any power disruption.
- .4 Prior to submitting any power disruption notice, the contractor will be required to provide specific details on the anticipated length (duration) of the power disruption.
- .5 Any electrical system shutdown to be scheduled after normal business hours and coordinated with site staff.
- .6 Be responsible for damage to existing construction by this work.

- .7 Ensure daily clean-up of existing areas.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Division 01- General Requirements.
- .2 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.
- .3 Factory assemble electrical panels and component assemblies.
- .4 Do verification requirements in accordance with Division 01 – General Requirements.

2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.
- .2 Division 26 responsibility is as follows:
 - .1 Supply and installation of breakers and/or switches.
 - .2 Supply and installation of power feeder (conduit and wire) from panel to equipment as indicated on plans.
 - .3 Supply and installation of disconnect switches at motors unless noted otherwise.
- .3 Control wiring and conduit is by Division 25 unless noted otherwise on electrical drawings.

2.3 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction, inspection authorities and Departmental Representative.
- .2 Signs, minimum size 178 x 254 mm.

2.4 WIRING TERMINATIONS

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

2.5 EQUIPMENT IDENTIFICATION

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

- .2 Sizes as follows:
- | NAMEPLATE SIZES | | | |
|------------------------|-------------|---------|--------------------|
| Size 1 | 11 x 51 mm | 1 line | 3 mm high letters |
| Size 2 | 13 x 73 mm | 1 line | 5 mm high letters |
| Size 3 | 13 x 22 mm | 2 lines | 3 mm high letters |
| Size 4 | 13 x 160 mm | 1 line | 10 mm high letters |
| Size 5 | 13 x 89 mm | 2 lines | 5 mm high letters |
| Size 6 | 25 x 102 mm | 1 line | 13 mm high letters |
| Size 7 | 25 x 102 mm | 2 lines | 13 mm high letters |
- .3 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate.
- .5 Identification to be English and French.
- .6 Nameplates for splitters to indicate equipment being fed, circuit numbers, voltage, phase and amperage.
- .7 Provide new nameplate for new breaker indicating equipment being fed.
- .8 Provide new updated, typewritten panel directories for all panels modified under this contract.

2.6 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 coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.7 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 13 mm wide auxiliary colour.

	Primary	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green

- .4 Confirm color coding requirements with user prior to start of work.

Part 3 Execution

3.1 INSTALLATION

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

3.2 NAMEPLATES AND LABELS

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

3.3 FIELD QUALITY CONTROL

- .1 Conduct and pay for following tests in accordance with Division 01 – General Requirements:
 - .1 Circuits originating from branch distribution panels.
 - .2 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .3 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
 - .4 Replace conductors as required.
- .2 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .3 Manufacturer's Field Services:
 - .1 Obtain written certificates from manufacturers verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products and with operation and maintenance manuals.

3.4 AS-BUILT DRAWINGS BY CONTRACTOR

- .1 General: To be read in conjunction with Division 01 – General Requirements.
- .2 Site Records:
 - .1 Obtain sets of white prints and mark thereon all changes as work progresses and as changes occur. Incorporate all information issued in Addenda, Site Instructions, Change Orders and all changes in actual installation as a result of site conditions and coordination.
- .3 As-Built Drawings:
 - .1 Prior to start of testing, balancing and adjusting, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 13 mm high as follows: AS-BUILT DRAWINGS (This drawing has been revised to show electrical systems as installed) (Signature of Contractor) (Date)
 - .3 Submit to the General Contractor for approval and make all corrections as directed.
 - .4 Testing, balancing and adjusting to be performed using as-built drawings.

3.5 PAINTING REPAIRS AND RESTORATION

- .1 Do painting in accordance with Section 09 91 00 - Interior Painting.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged.

3.6 DEMONSTRATION

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Departmental Representative may record these demonstrations on video tape for future reference.

3.7 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

3.8 CONTROL OF HAZARDOUS ENERGY

- .1 Lock out and tag out all electrical and other equipment before performing work as per CAN/CSA Z460-12.

END OF SECTION