

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 21 00 00/26 00 00 – Specific Conditions – Mechanical/Electrical.

1.2 REFERENCES

- .1 Unless otherwise indicated, all the works must be done in accordance with the latest edition of the Quebec Construction Code (QCC), Chapter I (Building Code) and Chapter V – Electricity, in effect in the Province of Quebec, latest edition.
- .2 Comply with CSA electrical certification standards and bulletins in effect at the time of the call for tenders.
- .3 Install underground networks in compliance with CSA Standard C22.3 No. 7, latest edition.
- .4 Perform work on live current-carrying equipment in accordance with CSA Z462, latest edition.

1.3 RATED VOLTAGE

- .1 Operating voltages: to CAN3-C235.

1.4 FEES, PERMITS AND INSPECTIONS

- .1 Pay all related costs.
- .2 Inform the Engineer of any modifications required by the Régie du bâtiment du Québec (RBQ) before making any changes whatsoever to the drawings or specifications. A copy of any comments from the RBQ to be supplied to the Engineer.
- .3 Submit plans and specifications to obtain permits required by the City.

1.5 MATERIALS AND EQUIPMENT

- .1 Materials and equipment to be CSA certified. Where CSA certified materials and equipment are not available, obtain special approval from the Régie du bâtiment du Québec.
- .2 Factory assemble control panels and component assemblies.

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1.6 FINISHES

- .1 Shop finish metal enclosure surfaces by application of Sico Rust-O-Leum rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1.1 standard.
 - .2 Paint indoor switchgear and distribution enclosures light gray to ASA61 standard.
- .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.

1.7 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates:
 - .1 Lamicoid 3 mm thick plastic engraving sheet, white finish face, black core, mechanically attached with self tapping screws. For devices connected to the emergency network, nameplates must be red with white lettering.

NAMEPLATE SIZES

Sizes	Dimensions	Number of lines	Height of letters
1	10 x 50 mm	1	3 mm
2	12 x 70 mm	1	5 mm
3	12 x 70 mm	2	3 mm
4	20 x 90 mm	1	8 mm
5	20 x 90 mm	2	5 mm
6	25 x 100 mm	1	12 mm
7	25 x 100 mm	2	6 mm

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

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- .6 Transformers: indicate capacity, primary and secondary voltages.

1.8 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered plastic tape or Panduit Pan-Quik type adhesive tape, 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 C22.10.
- .4 Use colour coded wires in communication cables, matched throughout system.

1.9 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes (not just covers) and metallic sheathed cables.
- .1 All conduits and all metallic cables to bear a coloured identification strip (≥ 20 mm wide) as indicated in the table below, except for fire alarm conduits, which must be ALL RED, and communications conduits, which must be ALL BLUE, with the required identification strips:
- .1 At the beginning and at the end of conduit:
- .1 Also include source (panel, circuit, etc.).
- .2 At 15 m intervals;
- .3 At each change in direction;
- .4 Where conduit or cable enters wall, ceiling, or box:
- .1 When going through walls or ceiling, also indicate source (panel, circuit, etc.).
- .2 Box covers must:
- .1 Be completely painted, inside and out, using the primary colour indicated below;
- .2 Also show cable usage (see table below).

Note:

- Normal: feed coming directly from Hydro-Québec network.

<u>White:</u> Normal Electr. / <u>Blue:</u> Communications+Misc <u>Yellow:</u> Emerg. Electr. (2 min.) / <u>Purple:</u> UPS <u>Orange:</u> Essential Electr. (10 s) / <u>Red:</u> Fire / <u>Green:</u> Ground		None —: Misc. or < 250 V <u>Black:</u> Misc. or 250 - 600 V Brown: Other	
USAGE OF CABLES IN THE CONDUIT	NOMENCLATURE	PRIMARY COLOUR	COMPLEMENTARY COLOUR
Ground	—	GREEN	—
Electricity - Normal / 0 - 250 V	Panel+Circuit	YELLOW	—
Electricity - Normal / 251 - 600 V	Panel+Circuit	YELLOW	GREEN
Electricity - Normal / 601 V ++	Panel+Circuit	YELLOW	BLUE [<5 kV]; RED [<15 kV] Show POWER
Electricity – Time Delayed / 0 - 250 V	Panel+Circuit	YELLOW	—
Electricity – Time Delayed / 251 - 600 V	Panel+Circuit	YELLOW	BLACK
Electricity – Time Delayed / 601 V ++	Panel+Circuit	YELLOW	Show POWER
Electricity - Vital / 0 - 250 V	Panel+Circuit	ORANGE	—
Telephone		GREEN	—
Backup Communications	Panel+Circuit	RED	BLUE
Fire Alarm	Panel+Circuit	RED	—
Other security systems	Panel+Circuit	RED	YELLOW
Other communications networks	Panel+Circuit	GREEN	BLUE

1.10 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.
- .2 All wiring terminal to be of the compression type and size appropriate for the gauge.

1.11 MANUFACTURER AND CSA LABELS

- .1 Once material is installed, ensure that manufacturer and CSA labels are visible and legible.

1.12 WARNING SIGNS

- .1 Warning signs: in accordance with requirements of electrical installation inspection authorities.

1.13 UNIFORMITY

- .1 Contractor to ensure complete uniformity among the various parts of the systems of each specialty.
- .2 Engineer to be allowed, at any time prior to installation, if he deems it necessary, to move, within a distance of 5 m, any auxiliary services equipment, such as fans, lights, switches, electrical outlets, circuit breakers, lighting transformers, etc. at no extra cost, providing the notice of modification has been given prior to installation. Contractor to coordinate his work with other trades groups and contractors and obtain the necessary approvals from the Engineer.
- .3 No lighting fixtures to be placed above any pipes, conduits or any other obstacle.
- .4 Pull boxes and junction boxes to be selected as per requirements of Quebec Construction Code – Chapter V - Electricity and based on the number and section of conductors and conduits involved.
- .5 Pull boxes and junction boxes to be situated in protected, easily accessible locations and must remain accessible even after finishes or fixtures have been installed.
- .6 Contractor to be aware that plans supplied are intended as a guide, and that they are sometimes on a reduced scale and do not always include dimensions. The Contractor must therefore use his judgement and ensure that system accessories are fully integrated into the building's structure and architecture.

1.14 LOCATION OF OUTLETS

- .1 Locate outlets. Make any necessary adjustments, once interior finishing has been completed, at no cost to the Owner for such adjustments.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Locate light switches on latch side of doors.
- .4 Change location of outlets at no extra cost or credit, providing distance does not exceed 5000] mm, and information is given before installation.

1.15 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.

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- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1,200 mm.
 - .2 Wall receptacles:
 - .1 General: 300 mm.
 - .2 Above top of continuous baseboard heater: 200 mm.
 - .3 Above top of counters or counter splash backs: 175 mm.
 - .4 In mechanical rooms: 1,200 mm.
 - .5 Outside: 900 mm.
 - .3 Panelboards: as required by Code or as indicated on plans.
 - .4 Telephone and interphone outlets: 300 mm.
 - .5 Wall mounted telephone and interphone outlets: 1,200 mm.
 - .6 Fire alarm stations: 1,200 mm.
 - .7 Fire alarm bells: 2,100 mm or from ceiling: 300 mm.
 - .8 Television outlets: 300 mm.
 - .9 Wall mounted speakers: 2,100 mm.
 - .10 Clocks: 2,100 mm.
 - .11 Door bell pushbuttons: 1,200 mm.
 - .12 Thermostat: 1,200 mm.
 - .13 Mini-klaxon in the accommodations area: centre the cut-off switch between 1,200 mm and 1,400 mm.

1.16 LOAD BALANCE

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of final 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.

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- .3 Upon completion of work, provide a load balance report indicating phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

1.17 FIELD QUALITY CONTROL

- .1 Contractor to ensure that competent staff are present and that measurement and testing equipment is available for performing any testing requested by the Engineer to his complete satisfaction. In addition, any testing requested by the local representative of the competent authority must be carried out at no extra expense. Engineer to be informed verbally and in writing two weeks prior to the proposed testing and he may, if he so wishes, inspect the installation and be present during the tests.
- .2 All testing to take place only with the authorization of the Engineer and any other contractors involved. Any defect or fault discovered during the testing shall be corrected to the Engineer's complete satisfaction.
- .3 Perform the following tests and cover the costs thereof:
 - .1 Operation of all lighting, ventilating and heating equipment, and electrical outlets.
- .4 Carry out tests in presence of the Engineer.
- .5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .6 Submit test results to the Engineer.

1.18 CO-ORDINATION OF PROTECTIVE DEVICES

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

1.19 HOOK-UPS TO PUBLIC UTILITIES

- .1 Contractor to coordinate with public utilities regarding hook-ups to electrical and telephone services at the points shown in the plans.
- .2 A check of the voltages and characteristics of feeds from services companies must be carried out in order to establish compatibility with the requirements contained in plans and specifications.
- .3 Unless otherwise indicated in specific clauses, Contractor to include in his tender any charges to the Owner for connections to public services, such as electricity, telephone,

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etc. and, where applicable, for disconnecting such existing services that are made outdated by the plans and specifications.

- .4 Any departure from these requirements must be sent, in writing, to the Engineer prior to service entry installation, failing which the Contractor shall be responsible for any changes that are required.

1.20 PIERCINGS, OPENINGS AND SLEEVES

- .1 Contractor to be responsible for drilling any holes required in floors, ceilings or walls and for supplying and installing all sleeves required in concrete slabs. All walls, floors, ceilings, existing or other, that are damaged by the installation of wiring or equipment shall be repaired to the same finishes as existing.

1.21 LIST OF APPROVED MANUFACTURERS

- .1 All equipment shall be equivalent in all respects to that specified and shall be limited to the manufacturers listed below:
 - .1 Starters: ALLEN BRADLEY, SQUARE D, EATON (CUTLER-HAMMER).
 - .2 Panels: SQUARE D, EATON (CUTLER-HAMMER), SIEMENS.
 - .3 Industrial type disconnecting switches: SQUARE D, SIEMENS, EATON (CUTLER-HAMMER).
 - .4 Fuses: GOULD, FERRAZ SHAWMUT, BUSSMAN.
 - .5 600 V cables: PIRELLI, PHILIPS, ALCATEL.
 - .6 Conduits: LCR, SCEPTER, COLUMBIA/MBF.
 - .7 Fittings: CROUSE-HINDS, APPLETON.
 - .8 Cable fittings: BURNDY, T & B.
 - .9 Outlet boxes: HUBBELL, COMMANDER.
 - .10 Wall switches: HUBBELL, LEVITON, BRYANT, PASS & SEYMOUR.
 - .11 Receptacles: HUBBELL, LEVITON, BRYANT, PASS & SEYMOUR.
 - .12 Plates: HUBBELL, LEVITON, BRYANT, PASS & SEYMOUR.
 - .13 Junction pull boxes: BEL PRODUCTS, COMMANDER, EUROPEC.

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- .14 Cable troughs: ELECTROVERT, PURSLEY, WIREMOLD.
- .15 Channels, supports and troughs: ELECTROVERT, B-LINE, THOMAS & BETTS.
- .16 Fluorescent ballasts: GE, SYLVANIA/OSRAM.
- .17 Grounding rod: COPPERWELD, WEAVER, BLACKBURN.
- .18 Communications and equipment cables: BELDEN, ALCATEL.
- .19 Busduct: SIEMENS.

1.22 FIREPROOFING

- .1 Whenever conduits or cables pass through firestop walls or floors, ensure that they are fire- and smoke-proof through the use of 3M, CP25, 303, FS195 or CS95 products, and series 7902 and 7904 sealing kits. Installation to comply with the requirements of CAN/CGSB Standard 19.13-M87 and manufacturer's recommendations.

1.23 ARC FLASH DANGER

- .1 Live-line work:
 - .1 Any work carried out on live equipment must be done in compliance with CSA Standard Z462, Workplace Electrical Safety. Refer to Tables 1 and 4 of CSA Z462.
 - .2 Contractor to obtain approval from the jobsite supervisor before undertaking any live-line work.
- .2 Signage: Danger electrical arc flash
 - .1 Supply and install labels on all electrical equipment (except for those that are in compliance with section 4.3.3.1 of CSA Z462), as required by the QCC-E and the type shown in Figure Q.1 of Annex Q to CSA Z462.

END OF SECTION