advanced building solutions

HEALTH CANADA
Addition of a nuclear magnetic resonance equipment – Room 161

Specifications – Electrical

2019-12-10
Project: 3019-044

HEALTH CANADA

1001, SAINT-LAURENT WEST STREET

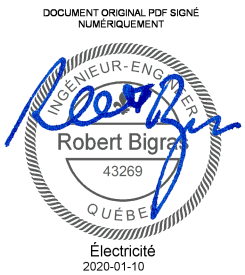
LONGUEUIL (QUÉBEC)

J4K 1C7

ADDITION OF A NUCLEAR MAGNETIC

RESONANCE EQUIPEMENT – ROOM 161

DIVISIONS 20 AND 26



For tender
December 10th 2019

TABLE OF SECTIONS

TABLE OF CONTENTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

Part 1 General

1.1 DEFINITION

.1 The terms "Contractor", "General Contractor" and "Supervisor" refer to the person or entity designated as in contract with the Owner or Manager of the works.

.2 The expressions "section", "sections", "each section", "each related section", "performed by section" and "supplied by section" refers to the firm responsible for the work of that section.

.3 The terms "Engineer" and "Engineers" mean the firm or the Designated Representative of the engineering firm that issued the engineering section, specifications or plans related to the work covered by these documents.

1.2 EXAMINATION OF THE SITES

.1 Before submitting its bid, each bidder must visit and inspect the site to become familiar with everything that could affect the works in any way. No later claims due to ignorance of local conditions will be considered by the Owner.

1.3 VERIFICATION OF THE DRAWINGS AND SPECIFICATIONS

.1 Only drawings and specifications marked "for tender" should be used for the calculation of bids.

.2 Check that the copy of the documents is complete: number of drawings, specifications' number of pages.

.3 Specialties mentioned in the titles of the drawings are to facilitate the work of each section and should not be regarded as restrictive.

.4 Drawings indicate the approximate placements of equipment. Each section must check the exact emplacements before any installation.

.5 During bids, each section must study the mechanical and electrical drawings and specifications and compare them with Architectural and structural drawings and specifications and notify the Architect or Engineer at least five working days before submission of his tender of any contradictions, errors or omissions that can be observed.

.6 During the execution of the works, notify the Architect or Engineer of any inconsistency, error or omission discovered before starting the work.

.7 The Engineer reserves the right to interpret the contents of mechanical and electrical drawings and specifications.

.8 No indemnity or compensation will be given for the displacement of ducts, pipes, etc., deemed necessary because of the Architecture, the structure or any other normal consideration.

1.4 PRODUCTS USED FOR TENDERS AND EQUIVALENCY

.1 Each section must prepare an overall price for a tender based only on the products described in the drawings and specifications. The person preparing the tender must not assume that the manufacturers' materials and equipment whose names appear on the "MANUFACTURER LIST" are automatically equivalent. Each section is solely responsible for the verification and validation of equivalence (and, where appropriate, of the special manufacturing requirements for it) of the product that will need to be used from a manufacturer on the list.

.2 Where an asterisk (*) is used in the manufacturer list at the request of the Customer, the relevant section must bid with the product from that manufacturer.

.3 All modifications required by the usage of an equivalent material or device to that specified is to be performed at the cost of the division supplying the device, even if it applies to other specialties and if implications are discovered after the acceptance of the substitution request.

1.5 SUBSTITUTION OF MATERIALS

.1 Equipment and materials from manufacturers other than those mentioned in the manufacturer list may be substituted only after the presenting the tender, provided that they are approved according to the following procedure:

.1 Equivalency requests must be made by the relevant section only. They must be submitted within a maximum of fifteen business days following the signing of the contract. They must be accompanied by the following documents:

.1 Original tender for the specified products.

.2 Tender received for products to be substituted.

.3 Justification of the request.

.4 Proofs of equivalency.

.2 The submission of equivalency requests to periods other than that mentioned above will only be considered for reasons truly exceptional and extraordinary.

.2 The main points of comparison are construction, performance, capacity, dimensions, weight, encumbrance, technical specifications, parts' availability, maintenance, delivery delays, the evidence of tried and true equipment in service and impact on other specialties.

.3 Any changes caused by the use of an equivalent equipment or material is to the cost of the section that provided the equipment, even when it applies to other specialties, and even if the implications are made apparent after the substitution request is accepted.

.4 Any request for substitution will be rejected if it were to impede or delay the execution of the works.

1.6 QUEBEC TENDER OFFICE (BDSQ)

.1 Each section whose work falls under the jurisdiction of the Submission Code of the Quebec Tender Office must submit a copy of their tender to the Engineer at the same time as their submission to the electronic submission system (TES) of the BDSQ.

1.7 IMPORTANT NOTE: SUPPLY AND INSTALL

.1 Supply and install all materials and equipment described in this specification and/or shown in the drawings, whether the term "supply and install" is used or not. See also the article "MINOR WORKS".

1.8 LAWS, REGULATIONS AND PERMITS

.1 All laws and regulations issued by the authorities having jurisdiction relating to the works described herein apply. Each section is required to comply with them without additional compensation.

.2 Each section must obtain, at its expense, all necessary permits and certificates, pay all costs for drawing approvals and for inspections required by organisations having jurisdiction.

.3 Submit to the Engineer a copy of the drawings bearing the seal of approval of the relevant inspection services.

.4 Upon completion of the works, obtain and submit to the Owner, complete with a copy of the mailing slip for the package sent to the Engineer, all permits, approval certificates, and other obtained from the different offices and departments that have jurisdiction over this building.

.5 Restrictions regarding tobacco usage:

.1 It is prohibited to smoke inside the building. Comply with restrictions applying to tobacco usage on the building property.

.6 Discovery of dangerous materials:

.1 If materials applied by spray or trowel, likely to contain asbestos, polychlorinated biphenyls (PCBs), moulds or other designated hazardous materials are discovered during demolition, immediately stop work.

.1 Take corrective action and immediately notify the Owner.

.2 Do not restart work until written instruction is received.

1.9 TAXES

.1 Pay all taxes required by law, including federal, provincial and municipal.

1.10 MINOR WORKS

.1 Each section is required to provide all the required components and to do all the jobs which, although not specified in the estimate, are necessary for the operation of the equipment and to complete the work included in his contract.

1.11 TOOLS AND SCAFFOLDING

.1 On the worksite, provide the full range of tools required for the proper execution of the work. Also supply, erect, and remove the scaffolding required to perform the work.

1.12 COOPERATION WITH OTHER TRADES

.1 Each section must:

.1 Cooperate with other trades working in the same building or on the same project.

.2 Keep itself informed of additional drawings issued to these other trades.

.3 Ensure that these drawings do not come in conflict with its work.

.4 Organize its work so as not to interfere in any way with other work done in the building.

.5 Collaborate with the other sections to determine the location of accesses in walls and ceilings.

.2 During the work, if necessary, the relevant section must remove and replace the tiles or access doors to reach its equipment and repair, at its own expense, all the damage it has caused. Protect the furniture and return the premises to a clean condition when the work is completed.

1.13 SCHEDULING OF OPERATIONS

.1 Plan and execute work in such a way as to minimally disturb the normal use of the building.

.2 During the tender process of the contract, present a schedule for the work in the form of a bar graph (Gantt diagram), specifying the expected steps in the work until completion, including the project milestones. Once the schedule is reviewed and approved, take necessary action to ensure the project progresses on schedule. Do not modify the calendar without consulting the Engineer and the Owner.

.3 The work must be completed in seven (7) weeks following the signing of the contract.

.4 Perform the following work during the day as well as on evenings, Saturdays and Sundays.

.5 Notify the Engineer and the Owner 48 h before performing work during periods of inoccupation.

1.14 MATERIALS

.1 Unless otherwise indicated, use new materials clear of imperfections or defects, in the required quality, bearing the approval labels CSA, ULC, FM, AMCA, ARI and other according to the specialties.

1.15 PROTECTION OF WORKS AND MATERIALS

.1 Each section must protect its installations against all damage, from any cause, during the execution of works until the work is accepted in a definitive manner.

.2 All equipment and materials stored on-site must be adequately protected, sheltered from bad weather, or any other possible damage.

.3 At the end of each workday, seal with a screw cap or a suitable metal cap all openings in conduits of any kind.

1.16 WASTE MANAGEMENT

.1 Perform a "waste audit" in order to determine what waste will be created by demolition and construction activities. Write a "waste reduction plan" and apply the principles of reduction, reuse and recycling of material where possible.

.2 Provide a "source material triage program" to disassemble and collect, in an orderly manner, among the "general waste" the materials bound for "environmental disposal" listed below:

.1 Brick and Portland cement concrete.

.2 Corrugated cardboard.

.3 Drywall (unfinished).

.4 Steel.

.5 Wood (except painted, treated or laminated).

.3 Submit logs of all material removed from site as "general waste" and "environmental disposal" with the following information:

.1 Time and date of removal operations.

.2 Description of the material and the quantity.

.3 Proof that the material was received at an approved waste treatment or disposal facility, as required.

1.17 SHOP DRAWINGS

.1 Before fabrication or order of any component, submit a PDF copy by email for approval. Each drawing or data sheet should be submitted as a distinct PDF file. The PDF name should include the section, article and name of the article title in the specifications (example: 00_00_00_0.00_Equipment XYZ.pdf).

.2 Drawings must include the dimensions, weight, number of attachment points, centre of gravity, seismic requirements, wiring schematics, capacities, controls schematics, curves, space requirements for maintenance and operation, and all other relevant information. If present, clearly indicate the location and dimensions of plumbing, heating, cooling, electrical, etc., connections by device. Each drawing must be verified, coordinated, signed, and dated by the relevant section before being submitted for approval.

.3 All correspondence and/or document submitted via project management software by the Contractor or a Sub Contractor will not be reviewed and will be not be considered as submitted/received.

.4 Shop drawings must be relevant to the proposed equipment. The sheets from general catalogs are not accepted as shop drawings. Each drawing must be preceded by a title page indicating with the name of the project, the consultant's name, the date and identification tag of the equipment shown in the drawings and specifications. The title page must also include the revision number of the documents as well as the expected delivery date of the product. Drawings must be prepared and signed by the supplier. Drawings pulled from the supplier’s website are not accepted.

.5 Drawings for non-catalogued items must be specifically prepared for the project.

.6 The verification of shop drawings is general and has the main purpose of avoiding as many errors as possible in manufacturing. This verification does not relieve the relevant section of its liability for errors, omissions, information, dimensions, quantity of equipment, etc., appearing in their drawings.

.7 The verification of the shop drawings by the Engineers does not diminish the responsibility of the supplier to ensure that the equipment meets all applicable codes and standards, as well as the requirements in this specification.

.8 When shop drawings are resubmitted or installed, inform the Engineer in writing of changes made, other than those requested by the Engineer.

.9 When equipment is manufactured before the verification of the shop drawings by the Engineer, the Engineer may refuse the equipment. The Contractor is responsible for any costs associated with the refusal.

.10 The drawings must be in French.

1.18 COORDINATION DRAWINGS

.1 General:

.1 Coordination drawings, also called composite drawing, are required in all cases where interference between different trades' works need such drawings to illustrate that the work is realizable.

.2 Coordination drawings must show clearly and precisely all the work involved, those of the relevant section and those done by others.

.3 Communicate with the Architect to procure Architectural base plans.

.2 Description:

.1 Coordination drawings consist of dimensioned plans, to scale, indicating the position of the equipment, ducts, piping, valves and other accessories with cuts and details required, complete with piping and duct dimensions, locations of sleeves, openings, anchorages and supports, relative positions with structure, architectural works, mechanical and electrical work, the positioning of the access doors, the clearances required for the maintenance of equipment and all other disciplines.

.2 Each mechanical and electrical section must provide on their coordination drawings the details of their levelling bases and housekeeping pads.

.3 Preparation:

.1 Each relevant section must make their coordination drawings and coordinate them with other disciplines.

.2 All drawings must be coordinated by the Contractor in collaboration with all sections.

.3 The coordination drawings for each sector must be submitted all at once for verification.

.4 The section "VENTILATION – AIR-CONDITIONING" is responsible for coordinating drawings with each section. These sections must provide all the data, diagrams, drawings and diagrams necessary for this coordination work.

.5 The section "VENTILATION – AIR-CONDITIONING" must prepare a drawing with its own work with all data and dimensions necessary and incorporate all the information provided by the other sections.

.4 Collaboration:

.1 Close collaboration must exist between the sections in order to determine the location of their respective work and avoid incompatibilities.

.5 Distribution of coordination drawings:

.1 Before submitting the drawings to the Engineer for verification, the general Contractor and each of the sections must sign the plans.

.2 Submit to the Engineer two paper copies and one emailed digital PDF copy of the scaled coordination drawings signed by the General and Sub Contractors for verification.

.3 All correspondence and/or document submitted via project management software by the Contractor or a Sub-Contractor will not be reviewed and will be not be considered as submitted/received.

.4 Once commented on, the drawings will be corrected by the relevant section, and, if required, resubmitted.

.6 Responsibility:

.1 Each section is directly responsible for the placement and exact dimensions of openings, perforations and sleeves, the location of its equipment, pipes and ducts, whether the structural, Architectural or Engineering drawings are included or not.

.2 The Division 23 (section "VENTILATION – AIR-CONDITIONING") must ensure the full coordination of its work with the coordination drawings.

.3 No compensation will be given for the modifications of the work for the purpose of coordination and integration of the electromechanical systems.

.4 Notwithstanding the responsibility of coordinating the integration, work cannot be implemented without prior verification of the coordination drawings. Each section must redo, at its expense, all work nonconforming to the coordination drawings without any compensation based on a misinterpretation of the scope and limitations of its work. Such misinterpretations do not relieve the relevant section of its responsibilities and obligations to provide complete and duly proven, ready to operate systems in fully integrated and in perfect condition.

.5 Verification of the coordination drawings by the Engineer serves to ensure that the technical requirements appear to be generally met. The Engineer does not check the quality of the coordination carried out by the Contractors.

.7 Pre-existing work:

.1 Coordination drawings should account for existing mechanical, electrical, structural and Architectural installations as well as planned work.

.8 Coordination drawings are required for:

.1 The placement of sleeves, openings and perforations expected in the walls, floors, beams and columns.

.2 Anchors.

.3 All ventilation work – air conditioning.

.4 All mechanical and electrical work in mechanical rooms, tunnels, wells, parking lots, and primary and secondary electrical rooms.

.5 Work performed by a section that could have implications on the work of another section.

.6 Places described in sections of the Divisions 21, 22, 23, 25 and 26.

.7 This clause is not restrictive. Coordination drawings may be demanded for places deemed necessary.

.9 Original coordination drawings:

.1 At the end of the work a USB flash drive (containing the "dwg" and "3D Revit model", depending on program used) is to be included with each O&M manual and two paper copies of the as-builts are to be submitted to the Owner, for no additional charge, by each section.

1.19 FRAMES AND ACCESS DOORS

.1 Unless otherwise specified, recessed frames and access doors in walls and ceilings, other than easily removable ceilings, shall be provided by the relevant section but installed by the company responsible for the construction of walls and ceilings.

.2 Each mechanical and electrical section shall determine the size and location of doors in such a way as to ensure easy access to all baffles, control devices, fire dampers, valves, vents, cleanouts, siphons, sieves, traps, ventilation units, pull boxes, electrical appliances, etc.

.3 The doors must be at the same fire resistance specified for the walls and ceilings.

.4 These frames and doors shall be built-in, constructed of 1.6129 mm (16-gauge) galvanized sheet metal with a layer of sealant. Hidden frames with exposed line with face flush with wall or ceiling, concealed hinge, 150° opening with lock and key (except on fire doors). The door must self-closing.

.5 The types of frames and doors are as follows:

.1 Walls made of brick, concrete block, finished in tile, poured cement blocks covered with gypsum boards or other similar finish: Karp no DSC-214M.

.2 Ceilings and walls of plaster or with cement finish or other similar finish: Karp KDW.

.3 Firewalls: Karp no KRP150FR, in steel, 16-gauge, with 50 mm (2") of insulation in the door, fire resistance of ULC 1½ h, with self-closing mechanism and without lock/latch.

.6 All Contractors must coordinate in order to provide the same type of door for all mechanical and electrical sections.

1.20 UP TO DATE DRAWINGS

.1 Each section must, at its expense, clearly indicate all changes, additions, etc., on a separate copy of the drawings and specifications, so as to have a complete and accurate copy of the work as executed and materials installed when the contract is completed. In particular, any displacement, even minor, of underground piping must be indicated with precision

.2 This copy of the drawings must be kept up to date and be available on site.

.3 Deliver these plans to the Owner at the end of the works

1.21 OPERATION AND EQUIPMENT MAINTENANCE INSTRUCTION MANUALS

.1 Each section must provide the Owner with four copies of manuals with detailed instructions for the operation and maintenance of all equipment and appliances included in his contract. Also provide a USB flash drive. A full, verified pdf scanned copy must be sent to the Customer.

.2 These manuals must contain:

.1 A list and illustration of all equipment components: pumps, fans, filters, controls, burners, alarm panels, lighting fixtures, transformer stations, generators, fire alarms, etc.

.2 A copy of the approved shop drawings, and as executed.

.3 The instructions for lubrication published by the manufacturers with the specifications of the oils and greases to be used and the frequency of lubrication.

.4 A diagram indicating the identification numbers of each valve, the normal operating position, the location, and flow direction for each of the piping systems.

.5 Prepare a properly attached glossary containing the number, location, and function of each valve. This glossary should contain a separate chapter for all shut down (or emergency) valves and main valves. The numbering code must be approved.

.6 A diagram of the controls with explanatory text.

.7 A list identifying access points to fire shutters and controls in the walls and ceilings.

.8 A list of legends of the piping, the piping identification codes, and ventilation systems.

.9 A list of the systems' final calibration values, as approved.

.10 A list of the different sub-Contractors with names, addresses, and phone numbers.

.11 A list of representatives and/or manufacturers of the installed equipment with names, addresses, and phone numbers.

.12 These instructions must contain all the graphics, curves, capacities and other data provided by the manufacturers concerning the operation and details of all mechanical and electrical equipment installed in the building.

.13 The fan graphics must clearly indicate the specified operating capacities and the required horsepower. These graphics should also indicate the serial number, fan model, and the operating speed.

.3 The entirety must be written in French.

.4 Divide each manual in the sections using blank sheets which have coloured tabs with the necessary identification. For example: "CENTRAL SYSTEM FAN". At the beginning of the manual, insert a table of contents with the title of each section and identification of the corresponding tab.

.5 Each manual is covered with a black cardboard, allowing the binding of loose sheets with 215 mm x 275 mm (8" x 11") binding strips.

.6 Submit one PDF copy to the Engineer for comment. Once approved, provide three (3) copies of the manual to the Owner and one to the Engineer.

.7 These manuals should be submitted before final trials. Provide an empty section to later add calibration and commissioning reports.

1.22 CONCEALED WORK

.1 Do not conceal any work, material, such as pipes, boxes, etc. before the installation has been verified.

.2 If a section does not comply with this requirement, it will have to pay the cost of all work required to proceed to the examination of the works.

.3 Unless otherwise indicated, all piping and ducts must be concealed in partitions, walls, between floors, in ceilings, etc. The cost of all necessary leveling shall be borne by the Contractor.

.4 Reread the articles "COOPERATION WITH OTHER TRADES" and "TESTING".

1.23 PLACEMENT OF PIPING AND DUCTS

.1 No pipe may be in contact with another. Allow a clearance of at least 15 mm (½") between them. No piping may be in contact with any part of the building. Take special care in the case of piping through a steel beam.

.2 Take particular care to conserve space in vital areas, including in the case of piping rising along columns.

.3 Any piping or ducting that may possibly be covered by insulation must be installed at a sufficient distance from walls, ceilings, columns or other piping, ducts, and equipment to facilitate the insulation of the pipe or duct.

.4 Any piping or ducting placed horizontally must be installed to maximize the headroom of the area. This is of particular importance in rooms where ceilings are suspended, such as in parking lots and warehouses.

.5 Exposed piping should be straight and generally, parallel to the framework.

.6 Consider the symmetry with respect to the piping of the apparent equipment. Consult the Departmental Representative if necessary.

.7 Before installing a pipe or duct, make note of the location of the other mechanical, electrical, Architectural and structural work to avoid interference, otherwise the relevant section will be required to move the pipe or duct at its expense.

.8 When uninsulated piping passes through a wall or a poured concrete floor, install rigid insulation on the pipe before casting, after the installation of the pipe, so that the concrete does not come into contact with the pipe.

1.24 MANUFACTURERS' INSTRUCTIONS

.1 Install the various pieces of prefabricated materials and equipment, in accordance with the manufacturer's instructions. Obtain all relevant instructions.

.2 Ensure the presence of the manufacturers' representative to attest the conformity of the installation.

1.25 LAYOUT AND ACCESS TO THE EQUIPMENT

.1 Install the equipment so that they are easily accessible for maintenance, disassembly, repair, and moving.

.2 Pay particular attention to the motors, belts, bushings, heat exchangers and boiler tubes, fittings, valves, controls, rotating shafts, etc.

.3 If necessary, install access doors and accessories, such as extensions for the lubrication of bushings, etc.

.4 Installation of equipment:

.1 Ensure that maintenance and disassembly can be done without having to move the connecting elements of the piping and ducts, by the use of union fittings, flanges or valves, and without the building structural members or other installations being obstacles. Dismantling must be possible without emptying networks and/or stopping the power supply to other equipment.

.2 The manufacturer plates and the seals or labels of the equipment standards and approvals organizations must be visible and legible once the equipment is installed.

.3 Provide fasteners and metal accessories of the same texture, colour and finish as the support metal to which they are attached. Use non-corrosive fasteners, anchors, and shims to secure the external and internal work.

.4 Ensure that the floors or tiles on which the equipment will be installed are level.

.5 Check fittings done at the factory and retighten them if necessary to ensure the integrity of the installation.

.6 Provide a means to lubricate the equipment, including Lifetime lubricated shaft housings.

.7 Connect the equipment's drainage piping to the drains.

.8 Align the edges of the pieces of equipment, as well as those of the rectangular identification plaques, and other similar parts with the building walls.

.5 Future provisions:

.1 In any place where a space was left free for future use, ensure that this space remains free and install materials and equipment related to the work so that future connections of the added equipment can be done without needing to redo the floor, walls or ceiling, or even, a portion of the mechanical or electrical facilities.

1.26 PAINTING

.1 Apply a base coat of sealant on any non-galvanized metal equipment or equipment supports. Before leaving the premises, touch up the base coat of all the damaged areas after removing any rust.

.2 The base coat is a sandable grey coloured water based acrylic, this product can be used as a base layer and to paint cut or perforated sections of galvanized apparatus, equipment or equipment supports, Sierra Performance S30 Griptec from Rust-Oleum or Sierra Performance S71 as an aerosol.

.3 Apply one coat of metal mordant and one additional coat of black paint to the soldered joints of uninsulated black steel pipes.

.4 On insulated black steel pipes, apply one layer of metal mordant on the soldered joints.

.5 Ensure that access doors of all kinds, including the opening convector panels, electrical panels, etc., are painted in the open position to ensure freedom of movement.

.6 See section 23 05 53.01 – Identification of systems and mechanical equipment.

1.27 FRAMES, SUPPORTS, AND BRACKETS

.1 Each relevant section must provide and erect all frames and brackets required for the equipment it installs: reservoir tanks, panels, motors, starters, key switches, etc.

.2 Install equipment at the height shown in the drawings, but never less than 75 mm (3") above the floor.

.3 Build the supports and brackets out of welded and grinded steel. If necessary, install hooks, rails, eyelets, etc., to facilitate installation and removal of equipment.

1.28 NEW OPENINGS, DRILLING IN WALLS, FLOORS, BEAMS, AND COLUMNS

.1 General:

.1 Unless otherwise indicated, all direct and indirect costs associated with tracing, marking, openings required for ductwork, piping and electrical conduits, or sleeves to install, are the responsibility of the General Contractor.

.2 The General Contractor is responsible for all damages and repair caused by the openings.

.3 Piercing holes with pneumatic or electric hammers by vibratory action as well as hand drilling and any other process by mechanical impacts are prohibited.

.4 The General Contractor must employ a specialised firm to scan and digitize the existing slabs, with Georadar (GPR) or similar technology, in order to determine the location of buried elements and services such as conduits, pipes, and reinforcements, before making openings in the existing concrete.

.2 Round, square and rectangular openings in concrete:

.1 All new openings of 150 mm (6") or less are the responsibility of the concerned section, under the instructions of the structural Engineer.

.3 Vertical openings in concrete for piping:

.1 All new vertical openings to be drilled in concrete with integrated finish or already cast finish, for the laying of pipes, must be performed as follows : in the upper part of the slab, with a sufficient diameter to affix the sealing plate of the sleeve, and in the lower part, with a sufficiently smaller diameter to accommodate the steel sleeve.

1.29 SUPERVISOR

.1 Each section must retain and pay for the services of a competent and permanent supervisor or superintendent who must remain on site until the works are accepted, and, having full authority to represent the section. All communications, orders, etc. supplied by the Engineer or Contractor are considered as given directly to the company responsible for the work of the section.

.2 Submit for approval the name, qualifications, and experience of the supervisor or superintendent. Following revisions made at the request by the Owner's representative, a lack of experience and qualifications relevant to the project will result in the mandatory replacement of the Superintendent by one meeting the requirements.

.3 This supervisor cannot be removed from the work site without a valid reason and prior written approval.

.4 Facilitate site inspections for the Owner and the Engineer at any time. During these visits, the supervisor must be available to them.

1.30 INSPECTIONS

.1 It is absolutely necessary before any inspection request to the Engineer, that the testing was previously conducted and successful.

1.31 TESTING

.1 Each section must cooperate with the other sections, so as to enable them to complete their tests within the time period allowed by the Contractor.

.2 Once the test is finished, readjust all the equipment used for this test, to permit their proper operation.

.3 General requirements:

.1 The Engineer may assist, at any time, in any test they deem necessary.

.2 All tests must be performed to the satisfaction of the Engineer.

.3 The Engineer may require a test of installations and equipment before accepting them.

.4 For temporary trials, obtain written permission to operate and test installations and permanent equipment before being accepted by the Engineer.

.5 Give a written 48 h notice to the Engineer before the date of the test.

.6 Provide equipment, meters, material and staff required to run tests during the project until the acceptance of installations by the Engineer and pay all fees.

.7 If a piece of equipment or device does not meet the manufacturer's data or the specified performance during a test, immediately replace the defective unit or part and pay all expenses incurred by the replacement. Make adjustments to the system to achieve the desired performance. Cover all costs, including those of new tests and repair.

.8 Prevent dust, dirt, and other foreign matter from entering the openings of installations and equipment during testing.

.9 Provide to the Engineer a certificate or letter from the manufacturer confirming that each section of the installation was implemented to their satisfaction.

.10 Submit the written test results to the Engineer.

.11 The tests must be performed and accepted prior to the installation of the thermal insulation.

.12 Do not conceal or embedded piping, conduits, or equipment before the tests are completed and accepted.

.13 By submitting the pipe or conduits to the test pressures required in each of the respective sections, take the necessary precautions to prevent the deterioration of equipment and accessories that cannot withstand such pressures.

.14 If it is impossible to test the entire installation in a single trial, it can be divided into several zones, each of which will be tested individually. The installation must be tested in several stages.

.15 Provide hydraulic pumps, air compressors, fans and other equipment necessary to perform all tests and related temporary work.

.16 Correct any leak detected. The defective part must be removed, repaired and the test is redone until the results are satisfactory.

.17 Whenever tests are conducted with water, place the pressure gauge at the highest point of the installation.

.18 Whenever tests are conducted with compressed air, use soap and water on the piping and apparatus to detect air leaks. The air temperature must be the same in the pressure readings. Install a thermometer for this purpose.

.19 For joints with caulking, it is not permitted to repair cracks using other materials.

.20 Provide two copies of a written report for each of the tests performed.

.4 Special requirements:

.1 For details about the tests to perform, see the other sections of this specification.

.2 The presence of a section can be required in a test conducted by another section.

1.32 "WITH RESERVATION" AND "WITHOUT RESERVATION"

.1 With reservation:

.1 The procedure for receiving the work with reserve can only be started when all the following conditions are met:

.1 Much of the work is completed;

.2 The work to be completed could not be completed due to conditions beyond the contractor's control.

.3 The value of the work to be corrected is no more than 0.5% of the total contract amount.

.4 The work to be corrected and deferred do not prevent the work from being ready in every way for the use for which it is intended.

.5 The bulletins or instruction manuals in relation to the article on certificates of compliance for installation, operation and maintenance are provided, written guarantees in relation to the requirements of the tender documents and that the training was provided and commissioning was carried out.

.2 The Contractor may request the receipt with reservation only after completing a full inspection of the work and compiling his own list of defects.

.3 The Contractor notifies the Professional in writing of the completion of the work and requests the receipt with reservation. He is obliged to accompany his request for receipt with reservation of this list of defects.

.4 Within ten (10) business days of receiving such a request, the owner, the professional and the other consultants begin a full inspection of the work after giving the Contractor notice. Unless the Professional objects or does not require it, the Contractor is required to attend this inspection visit.

.5 These lists of work to be corrected and completed are drawn up by the Professional and countersigned by the Contractor. The date of the signing of these lists is the date of receipt with reservation of the work. The list of work to be corrected also sets out the time frames within which these defects need to be corrected.

.6 An exhaustive list of documents due to the reception with reserved of the work is prepared by the Contractor in accordance with the tender documents or as specified in the minutes of the site meetings. The Certificate of Receipt with Reservation of Work must also contain a recommendation from the Professional that the work is ready for its intended use and that the Company may take possession of it.

.7 However, unqualified receipt cannot be declared until all work and defects have been completed.

.2 Reception without reserve:

.1 As soon as the work is corrected and completed in accordance with the lists established at the time of the receipt with reservation, the Contractor must apply for an inspection in order to receive the work without reservation by the Company. On this occasion, he must provide the required certifications and documents. However, the Contractor is required to ensure that a single review inspection of defective work reported at the reservation reception will not have to be carried out by the Professional and other consultants for reception without reserve. As a result, if further inspections are required, the costs of any additional inspection by the Professional and other consultants will be borne by the Contractor and will be retained by the owner from the sums that are due. Such billing will be based on the current hourly rates of the associations of the professionals concerned.

.2 Following the contractor's request for an inspection, the Professional, in the company of the same officials as at the reception with reservation, makes an inspection of the work and prepares, if necessary, a new list of corrections or repairs that The Contractor must make before the signature of the certificate of receipt without reservation.

.3 Before the signature of the Certificate of Receipt without reservation, the Contractor transmits to the owner, through Professional, all documents and equipment due to the Contractor and prepared at the reception with reservation. The reservation without receipt cannot be declared until the maximum period for the service to the owner of the notice of preservation of the legal mortgage.

1.33 FINAL TESTING

.1 Each section must include all costs of final testing to the overall price in its tender. When the work is fully completed and settings, calibrations, and preliminary tests are successfully performed, run the final tests. Notify the Departmental Representative early enough to allow him to attend any of the tests judged necessary.

.2 In order to demonstrate that the work is complete and executed satisfactorily, each piece of equipment must run for a minimum period of fifteen days and that, prior to acceptance "with reservation". During this period, all equipment must operate simultaneously and not consecutively. The operation must be in automatic mode and set on controls as planned in the operating sequences.

.3 During this time, until the acceptance "with reservation", each section must perform the normal maintenance, in compliance with the maintenance manual supplied by the Contractor. The maintenance in the period between the acceptance "with reservation" and "without reservation" will be performed by the Owner if all relevant information has been provided and training has been completed. Otherwise the Contractor is to perform the maintenance.

1.34 INSTRUCTIONS TO THE OWNER

.1 Give to the representative of the Owner all the details on the operation of the equipment specified and installed under this contract. Provide qualified personnel to operate this equipment until the Owner's representative is adequately qualified to take charge of the operation and maintenance of said equipment.

.2 This training can be combined with the final testing period provided that the Owner's team is available.

.3 It is understood that such tests are not an automatic acceptance of equipment by the Owner.

.4 The Owner has the right to do this test as soon as the work is considered sufficiently complete by the relevant Engineer's section, and considered in accordance with the drawings and specifications

1.35 WARRANTY

.1 Each section guarantees its work for a period of one year after acceptance "with reservation" of the work by the Owner. It is required to repair or replace, at its expense, any defects that would become apparent during this period and that, within 48 h after having been formally notified.

.2 Manufacturers must offer a one (1) year warranty from the starting operation date or eighteen (18) months from the date of delivery to the site, as appropriate. The warranty must include the cost of materials and labour, and the replacement of defective parts and/or manufacturing defect. In the case of chillers, a five-year warranty applies if the refrigerant charge is contaminated due to the compressor motor burning.

.3 The warranty is for a period greater than one (1) year (extended/or special warranties), for the areas indicated in the respective specifications.

.4 This warranty is fully independent of the article of the Civil Code concerning the five (5) year warranty.

.5 General conditions:

.1 It is expected that several contracts of the same discipline may be executed by different companies, that another company may have adjustments or tests to be executed on its work, that another company may have work to be done which are a subsequent phase of its work, that each company is committed, through this specification, to accept that its work is subject to all conditions listed above without changing the terms of the warranty.

.6 The use of permanent equipment for temporary purposes does not relieve the relevant section of its responsibilities and obligations with respect to the acceptance and guarantee of its work.

.7 The Engineer and/or the Owner reserve the right start the equipment and mechanical and electrical works without affecting the section's obligation to see to the full maintenance of its work up to acceptance "with reservation".

1.36 OBLIGATIONS DURING THE WARRANTY PERIOD

.1 During the warranty period, in addition to the obligations described in the specifications, the relevant section must provide any technical assistance required by the Engineer and/or Owner with respect to the operation of the installations and their improvements or adjustments as required.

.2 The temporary use or testing with the goal of adjusting equipment or any other purpose, or permanent use by the Owner of the mechanical and electrical works before the final acceptance of the works should not be interpreted as evidence that such works are accepted by the Owner and does not alter the terms of the warranty. During this time period, the relevant section retains responsibility for the maintenance of installation. No claim for damage or failure of any part of the work put into use will be considered by the Owner.

1.37 MAINTENANCE DURING THE CONSTRUCTION PERIOD

.1 This article applies only in cases where the equipment is used during the construction period.

.2 In addition to the responsibilities and obligations of each section, as to the temporary or permanent use of its installations and the use of equipment by the Owner or any other section during construction and before final acceptance of the work, the relevant section still remains as responsible for the operation, preventive maintenance, or other, of its equipment during the same period.

.3 For these purposes, each relevant section should, in general manner, use its own labour and its own equipment and administer the direct supervision of these tasks.

.4 However, the relevant section does not have the responsibility to provide the staff required for the equipment's operation during the construction period and before final acceptance of work. However, it remains responsible for the equipment during testing, the adjustment period, calibration, and maintenance of this equipment.

.5 Supply of spare parts, such as filters, pump belts, fans, compressors and others, as well as providing the energy required for the equipment's operation during the construction period, are the Owner's responsibility.

1.38 TEMPORARY SERVICES

.1 From a mechanical and electrical point of view, temporary services include: electricity, telephone service, fire alarms, lighting, water supply, sanitation and drainage, heating, ventilation, controls, intercom systems, fire protection, refrigeration, and all the systems necessary for the completion of the works.

.2 All temporary services, as well as energy costs, are the responsibility of the general Contractor. Refer to general conditions of contract.

.3 No device that is not part of the permanent installation will be used for temporary services before the building is deemed complete.

.4 The temporary service period ends upon acceptance "with reservation".

1.39 RENOVATIONS

.1 Continuous service:

.1 The following services are not to be interrupted without prior agreement with the Owner: telephone, electricity, lighting, intercom, fire alarms, sprinklers, fire protection water, aqueduct water, domestic water, sanitary plumbing, storm drainage, external drainage systems, ventilation – air-conditioning, etc.

.2 To ensure the continuity of services at during the hours required by the Owner, each relevant section must do all temporary works required, including labour and equipment.

.3 All major service cuts must be performed outside the occupancy hours of the building. For example: medical gas, electricity, water, steam, etc.

.2 Demolition:

.1 All demolition work is the responsibility of each concerned mechanical and electrical section.

.3 Occupied rooms:

.1 The work is being done during the occupancy of rooms in the building, therefore, the work must be performed by stages in the rooms designated by the Owner.

.2 Perform work after prior agreement with the Owner and establish an acceptable work schedule with the Owner.

.3 Before undertaking work in a given area, ensure the availability of all equipment, tools, and labour required to perform the work without interruption.

.4 Follow the Owner's instructions as to the delivery to the worksite of its personnel and equipment.

.5 The Owner will indicate which staircase can be used and within what limits it is permitted to circulate in the present corridors.

.6 Take all necessary precautions to adequately protect existing installations in these areas.

.7 At no time must the traffic and the functioning of the building services be impeded. Follow all of the Owner's instructions.

.4 Noise:

.1 Because of the proximity of the occupied premises, take all necessary measures to reduce the noise from construction and demolition.

.5 Other restrictions:

.1 In order not to impair the function of the building that must remain in operation during construction:

.1 No vehicles other than trucks used to transport equipment has access to the site for the duration of the works.

.2 The use of all elevators is prohibited for construction purposes.

.3 The interior circulation outside the boundaries of the services to be renovated must be minimized.

.4 The access permitted to the various rooms, for demolition and construction purposes, must be determined by the Owner.

.2 Obey the Owner's rules and directives about signs, announcements, advertisements, smoking, etc.

.3 Limit equipment/materials to the area delimited set by the Owner for the storage of equipment. They must not congest the area. No part of the construction is to be burdened with a load of equipment that may be hazardous for it.

.4 Follow the Owner's sterility standards.

.6 Dismantling of existing piping, materials, and equipment. Unless otherwise instructed:

.1 Any removed pipe, fitting, or valve should not be reused.

.2 No device should be reused.

.3 The dismantling of pipes, materials and existing equipment is the responsibility of each concerned mechanical and electrical section unless indicated otherwise.

.4 All existing equipment and material removed and not re-used or not returned to the Owner, as described below, belong to the respective mechanical or electrical section who are to dispose of them as quickly as possible off site.

.5 Every concerned mechanical and electrical section must anticipate the cost of transporting waste off site and bear all related costs to dispose of it.

1.40 EQUIPMENT PROVIDED AND INSTALLED BY OWNER

.1 The RMN equipment is supplied and installed by the Owner.

.2 Each relevant section is liable for any damage it may cause the equipment to which it performs electromechanical connections.

.3 Refer to the drawings and specifications for the equipment.

1.41 EQUIPMENT TO BE HANDED OVER TO THE OWNER

.1 Provide the Owner with the following items:

.1 Maintenance products and portable equipment indicated in the specification.

.2 The replacement materials indicated in the specification.

.3 The keys of all supplied equipment with locks.

.2 Obtain receipts from the Owner for each of the items mentioned above and give them to the Engineer.

1.42 CERTIFICATION OF COMPLIANCE

.1 At the end of the work, each section must submit to the Engineer a certification of compliance stating that all work was performed following the drawings and specifications, and all applicable standards and codes. Refer to example form at the end of this section.

.2 Submit the certificate to the Engineer at the same time as the request for an attestation of successful work completion.

.3 Have an administrator from the company sign this form and affix their seal to it.

1.43 CLEANLINESS OF THE SYSTEMS

.1 Take every necessary measure and precaution to keep the inside of all of the ventilation systems' components and ducts clean.

.2 Duct cleanliness:

.1 All ducts and ventilation equipment should be regularly maintained for cleanliness. Along the progression and the work and nearing completion of the work, examinations will be done to ensure that dust levels do not exceed 0.75 mg/100 cm² to respect the NADCA ACR-standard. See section 23 01 31, article "QUALITY CONTROL".

1.44 CLEANING

.1 Clean the work area as work progresses. At the end of each workday, or more often if the Owner sees fit, remove the trash, carefully arrange the equipment to be used, and do the work site cleanup.

.2 Once the work is completed, remove the scaffolding, temporary protective equipment, and surplus materials. Repair any defects observed at this stage.

.3 Clean and polish glass, mirrors, hardware parts, ceramic tiles, chrome or enamel surfaces, laminated surfaces, aluminum, stainless steel or porcelain-enamel parts, floors and sanitary fixtures. Clean manufactured items in accordance with manufacturer's written instructions.

.4 Clean the areas used for the execution of works and put them in a state at least equivalent to that which existed before the work began, the cleaning must be approved by the Owner.

1.45 SECURITY SCREENING

.1 All personnel involved in the execution of the work will be subjected to a security screening. Obtain the required authorisations, as per the requirements, for all personnel who are to be present on site.

.2 Personnel will be screened every day the beginning of the workday, where they will be provided with a security pass they must carry on their person at all times, to be returned to security at the end of the day.

Part 2 Product

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

COMPLIANCE CERTIFICATE

Project: _____

Project address: _____

Discipline: _____

Specification section: _____

We certify that all materials and equipment used, as well as all apparent or concealed work that we have completed or that we have ordered completed, are in all aspects, compliant with the plans, specification, addenda, and changes prepared by the Engineers of Bouthillette Parizeau Inc., and with all applicable codes, laws and regulations in effect.

Company name: _____

Address: _____

Telephone number: _____

Signatory name: _____

Signature: _____

Signatory title: _____

COMPANY SEAL

NOTE: select the correct form based on the application used to create the construction documents

RESPONSIBILITY WAIVER – DWG PLANS

The _____

Mr./Ms. _____
Bouthillette Parizeau
9825 Verville Street
Montréal (Québec)
H3L 3E1

Project: _____

Subject: _____

We, _____ , relieve Bouthillette Parizeau of any liability resulting from the use of their digital drawings for the development of contractual documents and our coordination, and/or detail drawings, or for any other use related to the project.

We also recognize and agree that:

- That the electronic drawings in question are provided to us for our use only and that they cannot be disseminated without the permission of Bouthillette Parizeau.
- That no assurance is given to us as to the consistency and accuracy of the information contained in it.
- That Bouthillette Parizeau cannot be held responsible should the digital drawings in question contain certain inaccuracies or errors.
- That Bouthillette Parizeau cannot be held responsible for any errors that results from the use of the drawings by us, our subcontractors, or our suppliers.
- That we will remain fully responsible for our submitted drawings or orders, according to contract stipulations.

In addition, we will undertake to verify in site the accuracy of the dimensions and information contained within the digital drawings, as if we had created them ourselves.

Signature: _____

Name (in print): _____

Address: _____

Telephone: _____

Email: _____

RESPONSIBILITY WAIVER – REVIT MODEL

The _____

Mr./Ms. _____
Bouthillette Parizeau
9825 Verville Street
Montréal (Québec)
H3L 3E1

Project: _____

Subject: _____

We, _____ , relieve Bouthillette Parizeau of any liability resulting from the use of their digital drawings for the development of contractual documents and our coordination, and/or detail drawings, or for any other use related to the project.

We also recognize and agree that:

- That the Revit model in question are provided to us for our use only and that they cannot be disseminated without the permission of Bouthillette Parizeau.
- That no assurance is given to us as to the consistency and accuracy of the information contained in it.
- That Bouthillette Parizeau cannot be held responsible should the Revit model in question contain certain inaccuracies or errors.
- That Bouthillette Parizeau cannot be held responsible for any errors that results from the use of the model by us, our subcontractors, or our suppliers.
- That we will remain fully responsible for our submitted drawings or orders, according to contract stipulations.

In addition, we will undertake to verify in site the accuracy of the dimensions and information contained within the Revit model, as if we had created it ourselves.

Signature: _____

Name (in print): _____

Address: _____

Telephone: _____

Email: _____

END OF SECTION

TABLE OF CONTENTS

Partie 1 General

1.1 DOCUMENTS REQUIRED AT THE BEGINNING OF THE CONSTRUCTION SITE

.1 These requirements must be completed before the first payment request.

Description		Transmission dates
1.1	**Electrical**	
1.1.1	Licences et qualifications.	
1.1.2	List of subcontractors and their coordinates.	
1.1.3	List of suppliers with addresses and contacts.	
1.1.4	List of personal assigned to the project and their coordinates (foreman, estimator, boss/project manager).	
1.1.5	Detailed breakdown of payment requests.	
1.1.6	Copy of the feed request/declaration of work (DA/DT).	
1.1.7	Shipping delay of equipment to supply.	
1.1.8	Proof of insurance.	

1.2 DOCUMENTS REQUIRED DURING CONSTRUCTION SITE UNTIL "WITH RESERVATION" RECEPTION OF THE WORK

.1 These requirements must be completed before the request for **acceptance "with reserve" of works** (prerequisite for obtaining it) for the reception of work "with reservation".

Description		Transmission dates
1.2	**General**	
1.2.1	Detailed timetable for start-up and commissioning.	
1.2.2	Descriptive table of planned training, as prescribed in section 26 06 00.	
1.2.3	Detailed timetable of intervention in the existing.	
1.2.4	Proof of fire rated sealing training.	
1.2.5	Technical data sheet of fire rated equipment.	
1.2.6	MSDS sheets of sealant products.	
1.2.7	Conformity letter for fire rated seals.	
1.2.8	All visits reports from the construction professional initialed as being corrected when deficiencies have been reported.	
1.3	**Electrical**	
1.3.1	Shop drawings (full).	
1.3.2	Guarantee letters from lighting fixture manufacturer.	
1.3.3	Training program, as prescribed in section 26 05 00.	
1.3.4	Thermographic inspection reports, as prescribed in section 26 05 00.01.	
1.3.5	Tableau summarizing the tests to be carried out as part of the project.	

Description		Transmission dates
1.3.6	Operation and maintenance manual table of contents.	
1.3.7	Certificate signed by the Contractor for all the conducted tests.	
1.3.8	Cable insulation report to megohmmeter, as requested in section 26 05 00.	
1.3.9	Verification sheets, certificates, calculations, erection drawings requested from the different sections of the specifications.	

1.3 DOCUMENTS REQUIRED FOR THE "NON-RESERVE" ACCEPTANCE OF WORK

.1 Theses requirements must be completed in order to accept the work "without reservation".

Description		Transmission dates
1.4	**General** All list of deficiencies of specialized contractors completed and cross-checked by the project foreman. Important notes: – A signature of the project manager and the foreman will be required to certify that the work is completed. – When the company representative has confirmed that the deficiencies are 100% complete, the Construction professional will make a final inspection of the work with the representative. If other visits are required following uncompleted corrections, the costs involved will be billed to the contractor.	
1.5	**Electrical**	
1.5.1	List of deficiencies 100% completed and signed by the project manager.	
1.5.2	Guarantee letters.	
1.5.3	Operation and maintenance manual completed and accepted by the construction professional.	
1.5.4	Certificate of conformity, signed.	
1.5.5	Equipment thermography report.	
1.5.6	"As-built" drawings.	
1.5.7	List of training with dates and participants list.	
1.5.8	List of special tools.	

END OF SECTION

ATABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

1. Content of section :

.1 The present section specifies the specific requirements of division 26.

1.2 DRAWINGS AND SPECIFICATIONS

1. Drawings indicate the approximate position of the systems and conduits; their exact location will be determined by the contractor on site. The contractor will also verify on site the available space prior the installation of equipment and conduits and coordinate their work and available spaces with other divisions.
2. No architectural or structural information will be taken from the electrical drawings.
3. No additional remuneration will be granted for the displacement of conduits and devices which will be deemed necessary because of the structure, architecture or any other normal consideration.
4. Detailed plans that could be provided to the contractor during the work will be part of contractual documents. If the contractor requires detailed plans, he will to ask construction professionals, in writing, at least fifteen (15) working days in advance.

1.3 SCOPE OF WORK

1. In general, work consists of the supply of all required materials, workforce, equipment and tools required to complete the electrical installations as described in writing, plans, and specifications.
2. This list is not exhaustive and any work described will be part of the project. Most notably, work is comprised of, but not limited to:

.1 Distribution network of 120/208 V, normal and emergency.
.2 Electrical and mechanical grounding.
.3 Interior lighting, normal.
.4 Lighting controls at 120 V.
.5 Outlets and sockets.
.6 Supply and connection of all motors and their controls.
.7 Connection of all other equipment as outlined in the plans.
.8 Fire alarm system.
.9 All steel structural supports for conductors, cables, devices, and equipment.
.10 All specified tests.
.11 Temporary installation required to maintain the continuity of services.
.12 Connections of every equipment requiring electricity, whether supplied by the electrical contractor, by contractors from other divisions or by the owner.

.13 Conduits networks and outlets feeding equipment requiring electricity and every other systems.

.14 Fasteners, supports, earthquake protection.

.15 The insurance of continuity of all existing equipment.

.16 Verification and coordination of all existing services with the owner, public services companies and services of every specialty concerned.

.17 Return to the owner every equipment indicated in the specifications and everything that he wants to recover. The contractor will get rid of the items not recovered by the owner.

.18 To the description of work, unless otherwise indicated, include supply, installation and connections and all the materials required for a complete installation of the equipment.

1.4 RESPONSIBILITY OF WORK

1. Any change made to plans and specifications, without the written authorization of the construction Professional, will make the contractor concerned solely responsible for the malfunction of the systems. He will be responsible for any defect that may occur within a year after the final acceptance of the work.

1.5 PARASISMIC DEDUCTIONS

1. The contractor is responsible for the compliance of the earthquake protection systems required by his work.

1.6 COORDINATION BETWEEN CONTRACTORS

1. To ensure full coordination of all work, in relation with architecture, coordination meetings will be held before all work is carried out on site. In the event of adjustments made necessary by a lack of one or other of the interveners, the one who will have caused this situation will be responsible.

2. Plumbing-heating contractor has priority over other contractors to pass their conduits. However, the construction professional has the right to intervene if he judges that the contractor neglect the requirements or delay the work of other contractors.

3. Electrical contractor is responsible to verify and validate with the mechanical contractors the quantity, the power source and type of control required for each of the motor that he will have to connect as part of the project prior buying and installing the electrical equipment required by these motors. Any discrepancies between the information on plans and from other contractors must be reported to the construction professional in order to establish the mitigation strategy required to meet the requirements for the electrical connection of mechanical systems.

4. Coordination and verification mentioned above will be performed by different contractors before ordering each device, and before starting the perform work. If a difficulty arises, he must submit the case to construction professional before starting work. If the contractor does not make this verification and a difficulty arises, and the contractor has to incur additional costs to overcome it, these costs will be borne by the contractor concerned.

5. Unless otherwise indicated, he must provide the necessary accessories to complete the installation on site of the elements it has manufactured.

6. No compensation is granted for the displacement of conduits, boxes, equipment, etc. interfering with the proper performance of other work or with the overall appearance.

7. Every contractor will coordinate their openings, anchors, supports and other requirements for the installation of the work mentioned and will obtain the information in time so as not to delay the execution of the work.

1.7 EQUIPMENTS AND MATERIALS

1. Unless otherwise prescribed, use products from a single manufacturer for materials and equipment of the same type or class. The equipment will be provided from the same manufacturer to obtain maximum interchangeability between items for distribution panels, switches, starters and lighting fixtures of the same type.

2. In special places, use appropriate products; for example, in damp, dusty areas, etc., the equipment must be waterproof, dust-proof, etc. Also, the ends of the ducts entering the boxes, tables and similar equipment, must be sealed with a special compound for this purpose.

3. Set-up and finish:

   .1 The entire facility must be carried out in such a way that it would facilitate inspections, repairs and maintenance maneuvers.

   .2 For the exposed part of the electrical installation, the Entrepreneur commit to respect the symmetry. Also, when the ceilings are covered with acoustic tiles and panels of any kind, the Contractor must coordinate his work with other contractors so that the lighting fixtures, etc. occupy the space of a tile or row of tiles or are centered in relation to them.

   .3 Unless otherwise stated, the reference to a device always includes its supply with its accessories, as well as the labor to install, connect and startup.

   .4 Do all work, specified or not, on drawings and specifications, which are necessary to complete work.

   .5 Apply at least one layer of corrosion-resistant primer to automatic metal fasteners, supports, suspensions and on-site-manufactured equipment (CGSB-IGP-140).

   .6 Prepare and retouch surfaces whose finish has been damaged and all to the satisfaction of the owner.

1.8 EQUIPMENTS PROTECTED BY SPRINKLERS

1. Electrical equipment inside open-ended housings in a room protected by sprinklers must be protected by non-combustible hood or armour arranged in such a way to minimize his impact on the sprinkler action radius.

1.9 THERMOGRAPHIC INSPECTIONS

1. A thermographic inspection at all cable connection points are to be done and compiled in a report signed and sealed by a recognized specialist engineer.

   The thermographic inspection will cover all new and existing electrical connections affected by related work, such as service panels, circuit breakers, switches, drive, contactors, relays, etc.

2. Thermographic inspections will be the responsibility of the Contractor who will have the inspections carried out by a recognized specialist. The Contractor will provide the labor and tools needed to dismantle and reinstall the covers and access to the distribution equipment, complete with all components including all fittings for a full inspection.

3. Thermographic inspections should be done while the power of the systems is ON at every step of the project and the detected abnormalities should be corrected immediately by the Contractor.

4. Incorporate thermographic inspections of equipment into the required equipment check sheets.

1.10 LOCATION OF SOCKETS AND OUTLETS

1. Install as indicated outlets and plugs, accordingly to section 26 05 32 - Outlet boxes, conduits and boxes fittings.

2. Do not install back-to-back outlets and sockets in a wall, allow at least 150 mm of horizontal clearance between boxes.

3. The location of outlets and sockets can be moved up until 3000 mm at no additional cost or credit if the instruction is given prior the installation.

4. Place the light switches next to the doors, on the side of the doorknob.

1.11 MOUNTING HEIGHT

1. Unless otherwise indicated, measure all heights of the center of the equipment at the finished floor level.

2. In cases where the mount height is not indicated, check with the appropriate people before starting the installation.

3. Unless otherwise indicated, install the equipment at the height shown below.

   1. Lighting switches: 1200 mm
   2. Wall outlet, in general: 400 mm

1.12 LOCATION OF OUTLETS

1. Locate outlets according to plan indications and align outlets symmetrically.
2. Install back-to-back outlets in a common wall, leaving at least 300 mm of horizontal clearance between the boxes.
3. At the engineer's request, change the location of the outlets within a 3000 mm radius, with no additional charge set or credit, if the notice of change was given prior to installation.
4. Place the lighting outlets in the ceilings suspended on the frame lines in both directions, but do not interfere with the ceiling suspensions. Make sure outlets are easily accessible.
5. Make the necessary adjustments when the walls finish is complete.
6. Place the light switches between 225 and 300 mm from the single door frame, side of the handle, between 225 and 300 mm from the end of the double doors.

1.13 FIRE PROOFING

1. When cables or ducts pass through floors and firewalls or premises with halon networks, fire and smoke sealing will be provided using 3M, CP25, 303, FS195, CS195 and sealing kits from series 7902 and 79 04, the whole thing will be installed according to the manufacturer's recommendations and the standard CAN2 19.13-M82 and modification October 1984.

1.14 COORDINATION OF PROTECTION DEVICES

1. Ensure that circuit protection devices, such as overcurrent triggers, relays and installed fuses, are in line with the required capabilities, and are adjusted to the required values, as indicated.

1.15 QUALITY CONTROL ON SITE

1. Test the following:
   - .1 Circuits from service panels.
   - .2 Lighting system and control/regulation devices.
   - .3 Motors and related control systems/regulations, including controls of sequential system operation where appropriate.
   - .4 Fire alarm system.
   - .5 . Measure of the isolation resistance:
     - .1 Measure, using a 500 V megohm meter, the isolation value of circuits, distribution cables and devices with a rated voltage of up to 350 V.
     - .2 Check the value of ground resistance before powering up.
2. Conduct the tests in the presence of the Consultant.
3. Provide the measuring devices, indicators, devices and labor required to conduct the tests during the realization and completion of the work.

1.16 EVENTS

1. The electrical contractor must work with other contractors to enable them to carry out their tests within the time required by the project manager.
2. Once the test is complete, adjust all devices for this test to allow them to function properly.
3. General requirements:
   - .1 All tests must be done in the presence and satisfaction of the Engineer.
   - .2 The Engineer may require a test of the installations and devices before accepting them.
   - .3 For temporary testing, obtain written permission to start and test permanent facilities and appliances, prior to their acceptance by the Engineer.
   - .4 Give a written notice of forty-eight (48) hours to the Engineer before the test date.
   - .5 Provide the equipment, meters, equipment and labor required to complete the tests during the project until the Engineer accepts the facilities and pays all the costs.
   - .6 If a piece of equipment or device does not meet the manufacturer's data or the performance specified during a test, replace the defective unit or part without delay and cover any costs incurred by that replacement. Make adjustments to the system to achieve the desired performance. Cover all costs, including new testing and rehabilitation.
   - .7 Prevent dust, dirt and other foreign materials from entering the openings of facilities and appliances during testing.
   - .8 Provide the Engineer with a certificate or letter from the manufacturers confirming that each network of the entire facility has been set up to their satisfaction.
   - .9 Send the written results of the tests the concerned Engineer.
   - .10 Tests must be performed and accepted before thermal insulation is placed.
   - .11 Do not hide or conceal any ducts, accessories or devices until the tests have been performed and accepted.
4. Special requirements:
   - .1 The presence of the electrical contractor may be required during a test conducted by another trade.

Part 2 Products

2.1 NOT USED

1. Not used

Part 3 Execution

3.1 NOT USED

1. Not used

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of section:

.1 This section contains specific requirements for division 26.

1.2 ADDITIONAL DRAWINGS AND SPECIFICATIONS

.1 Note that other divisions and Health Canada sections are also an integral part of this.

1.3 PROCEDURE AND SCHEDULE OF WORK

.1 The Contractor shall refer to Division 01 and Health Canada documents and follow the established construction stages as well as the work procedure.

.2 The Contractor must take into account that the establishment will remain operational during the work.

.3 The Contractor will do all preparatory work so that the construction stages are followed and he will ensure the continuity of existing services on both sides of the place where there will be work to be done, so that the occupied premises, equipment, as well as electrical and mechanical systems are always operational.

.4 The price for the execution of all work following the work procedure must be included in the bid. No additional remuneration will be granted thereafter for this purpose.

.5 Some work will be performed outside normal working hours, evening, night and weekends. The Contractor must coordinate this work with the Owner and the Health Canada representative.

.6 The price for the execution of all work in overtime, that is evening, night, weekends will be included in the bid. No additional remuneration will be granted thereafter for this purpose.

1.4 INTERRUPTION OF SERVICES

.1 For all work that may interfere with the Owner's activities, the Contractor will request a written authorization indicating the nature of the work to be performed, the time required for its execution and the date on which it must do this work. The Contractor shall wait for the Owner's authorization before proceeding.

.2 The Contractor will make a written request to the Owner, at least ten (10) days in advance, each time there is an interruption of service and interruption of power or fire alarm.

.3 In the event that the Owner has given authorization to proceed and an emergency situation arises, the Contractor must interrupt the work in progress and ensure the continuity of all services immediately.

.4 The operation and the first lockout of circuit breakers or switches supplying existing loads are the exclusive responsibility of the Establishment representative. Coordinate with the establishment's representative the maneuvers required for the execution of the work.

1.5 EXISTING SERVICES

.1 The location of certain existing services is for information only. Before the start of work, the Contractor will verify and locate all existing services with the Owner.

.2 Before starting the work, the Contractor will verify with the Health Canada representative the existing plans as well as the architectural, civil, structural, mechanical and electrical plans.

.3 Before carrying out the demolition, digging and opening work, the Contractor will carry out all the checks required so as not to damage the existing hidden services.

1.6 EXISTING HIDDEN SERVICES

.1 .1 The Contractor is responsible for damage to hidden electrical, telecommunications, mechanical or other services, as a result of drilling and cutting of concrete required by this work.

.2 .2 Perform all required checks in order not to damage said services. To this end, consult:

- .1 Mechanical, electrical, telecommunications and other existing plans.
- .2 Health Canada and / or maintenance personnel with local knowledge.
- .3 Public service companies and specialized companies, having knowledge of the premises and its facilities.

.3 Execute all research preparatory work. Search with a suitable device for this purpose if there are traces of ducts in the spaces concerned. In addition, hire specialized firms to search for existing hidden conduits.

.4 If the Contractor neglects to checks, any deterioration in service will be attributable to him and he will be required to defray the cost of the repairs of the additional damage caused to the building. In addition, in the event that these deteriorations affect the functioning of the services of the existing building, the Owner may claim damages from the Contractor for the damage caused.

.5 If the Contractor carries out all the verification and he remains unable to know whether one or more conduits remain hidden, he will not be held responsible for deterioration of service if he provides the Construction Professional the evidence :

- .1 No details are specified in the plans and specifications and the Professional is unable to provide him with the relevant information.
- .2 That the Owner is unable to provide details on the layout of the conduits at the work site.
- .3 Those companies or their technical department cannot precisely locate the passage of their services.

.4 A detection test has been carried out using an appropriate device.

.5 That a specialized firm has been hired to search for existing hidden conduits.

.6 In this case, the chargeable costs will be the responsibility of the Owner and will be subject to a change order.

1.7 CONTINUITY OF SERVICES

.1 Perform the work so that the continuity of existing services are ensured throughout the duration of the work. The Contractor must provide all the services and all the electrical installations necessary to ensure the continuity of existing services.

.2 Include in the bid all necessary costs caused by damage to existing services, either by carrying out drilling or any other work. No further claims will be granted thereafter.

.3 The Contractor must provide all necessary temporary services when there are modifications to be made to existing facilities.

.4 When the normal service of the establishment is interrupted for the execution of the work, the Contractor will provide a generator for the electrical supply required for the tools and machinery it needs to perform the work.

.5 The Contractor will always provide emergency services connected to the generator set during a power outage. In the event that certain transfers (charges connected on the emergency) requiring a temporary stop of the emergency services, the Contractor must notify the Owner and he must perform the work so that the strategic places are covered by a power supply normal.

.6 The price for the execution of all work requiring interruptions of service and power interruptions in overtime will be included in the bid. The price for temporary connections must be included in the quote. No additional remuneration will be granted thereafter for this purpose.

1.8 WORKS INSIDE AND OUTSIDE OF THE OCCUPIED BUILDING

.1 Execute work with minimal disturbance to occupants. When the building security is compromised due to the work covered by the contract, take the temporary measures necessary to ensure all the security required. Take into account that the building must remain operational for the duration of the work. The Contractor will be responsible for ensuring the continuity of services.

.2 The circulation of the Contractor's team and the handling of construction materials will be done in the corridors, stairs and elevators assigned by the Owner.

.3 The Contractor must receive authorization from the Owner before moving the equipment. Report damaged items in writing to the Owner before handling them. Damage caused while moving equipment will be repaired at the Contractor's expense.

.4 The Contractor shall remove debris, scaffolding, etc., daily and leave equipment and furniture in a perfect state of cleanliness so as to allow personnel to use the building normally.

.5 Install dust screens, tarpaulins, temporary partitions, temporary warning signs in areas where renovation and repair work is carried out adjacent to the areas that will operate during this period.

.6 Protect all distribution equipment against electric shock and mechanical damage and make it inaccessible to unauthorized personnel.

.7 If the Contractor moves equipment or furniture to facilitate his work, he must put everything back in place after each work period and will ensure that the work areas, equipment and furniture are left clean and operational.

.8 To allow entry and / or exit of equipment, plan to use existing accesses.

1.9 EXECUTION OF WORK IN EXISTING CEILINGS

.1 Outside the areas where there are renovation to allow the execution of work in existing ceilings, the Contractor must:

.1 Remove acoustic tiles, tiles of any other type and suspensions (if required) on a sufficient surface for each work period.

.2 Move and replace all elements harmful to the execution of the work.

.3 Store acoustic tiles, tiles of any other type in a clean place and protect them.

.4 After each work period, restore to their original condition.

.5 At the end of the work in each sector, reinstall and / or replace the acoustic tiles, tiles of any other type and the suspension damaged by materials identical to the existing one, at no cost to Health Canada.

1.10 REMOVAL OF EXISTING EQUIPMENT BECOME UNNECESSARY

.1 In general, unless otherwise indicated, the Contractor must remove all existing equipment that has become useless and / or not reused and ensure the continuity of existing networks and services from start to finish. The Contractor will verify all the equipment to be removed and remove all the equipment in accordance with the work procedures and established construction stages. The Contractor will provide all the necessary services, electrical installations and temporary installations to ensure the continuity of the existing networks for the existing equipment which must remain operational according to the work procedure and the established construction stages. The Contractor must coordinate with the Owner the removal of existing equipment that has become unnecessary.

.2 The price for the execution of all works must be included in the Contractor's bid and no additional remuneration will be granted thereafter.

1.11 PRESERVED EQUIPMENT

.1 The Contractor must redo all existing conduits and wiring networks in the places where they are kept.

.2 The Contractor must ensure the continuity of networks, existing end-to-end services for all the equipment kept.

.3 The price for the execution of all work must be included in the Contractor's bid and no additional compensation will be granted thereafter.

1.12 HIDDEN WORKS

.1 Conceal all conduits, boxes and wiring in ceilings, between ceilings, walls, etc.

.2 Conceal all conduits, boxes and wiring, except in mechanical, electrical, telecommunications and technical rooms.

1.13 DEMOLITION

.1 Remove and carry off the site, all equipment that has become obsolete as a result of new developments, including wiring, conduits, boxes, outlets, switches, lighting fixtures, distribution devices, all auxiliary, signaling or communications system devices, all accessories part of electrical installations.

.2 Remove wiring and conduits to the panel or to the last box kept in the network.

.3 Close the openings left free according to the requirements of the article "FIRE PROOFING".

.4 Restore power, control, signaling or communications circuits, when the continuity of these circuits is broken following the demolition of existing installations.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

CO_2TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of the sections:

.1 This section focuses on equipment and accessories for cable and box connectors.

1.2 REFERENCES

.1 CSA International :

.1 CAN/CSA-C22.2 No. 18 – Outlet box, conduits box, fittings and accessories.

.2 CAN/CSA-C22.2 No. 65 – Wire connectors (trinational rules with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC):

.1 EEMAC 1Y-2-1961 – Bushing Stud Connectors and Aluminum Adapters (1 200 A Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA).

1.3 DOCUMENTS TO SUBMIT FOR APROBATION/INFORMATION

.1 Submit in accordance with Section 20 00 10.

.2 Shop drawings: connecting blocks.

.3 Drawings showing the location and dimensions of junction boxes with joints.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit in accordance with Section 20 00 10.

.2 Operating and Maintenance Sheets (E and E): Provide operating and maintenance instructions, which will be incorporated into the E and E manual

Part 2 Product

2.1 MATERIALS

.1 Fixture type splicing connectors to: CAN/CSA-C22.2 No. 65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.2 Bushing stud connectors: to EEMAC 1Y-2 and NEMA to consist of:

.1 Connector body and stud clamp for copper conductors.

.2 Clamping flenge for copper conductor.

.3 Clamping flenge bolt.

.4 Bolts for copper conductors.

.5 Bolts for aluminum alloy conductors.

.6 Sized for conductors as indicated.

2.2 WIRE CONNECTORS

.1 Mechanical connectors for conductor size 8 AWG or less, use Scotchlock Electrical Spring Connectors from 3M from Thomas & Betts.

2.3 CONDUCTOR CONNECTION

.1 The Contractor is responsible for coordinating the size of the equipment's connecting pods with the conductor's calibers. When it is impossible to connect conductors, the Contractor can use insulated compression reducer connectors

.2 Insulated Compression Reducing Connector:

- .1 Connection stem.
- .2 PVC insulation for 600 V, 90 degrees Celsius.
- .3 For use on copper and aluminum alloy conductors.
- .4 Prefilled connection of anti-oxidation compound

2.4 CONNECTING BLOCKS

.1 All conductor splices in fire alarm boxes and panels, low-voltage lighting controls, other low voltage systems, etc., will be made on terminals with sufficient terminals for each driver.

.2 Terminal blocks, such as Wieland No. 9700B or approved equivalent, 10 A, 300 V, complete with rail, end plates, identification, end straps.

2.5 ACCEPTABLE PRODUCTS

.1 Wire connectors:

- .1 3M
- .2 Burndy
- .3 Thomas & Betts
- .4 Or equivalent approved

.2 Insulated Compression Reducing Connector:

- .1 Burndy AYPO series.
- .2 Ilsco ACO series.
- .3 Thomas & Betts 619 series.

.3 Terminal Blocks:

- .1 Staffel
- .2 Weidmüller
- .3 Wieland
- .4 Or equivalent approved.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connector installation in accordance with the manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 MECHANICAL CONNECTION TIGHTENING

.1 Use a dynamo metric key adjusted to the torque for mechanical connections as recommended by the manufacturer.

.2 Following the tightening, mark them with a yellow paint marker.

3.3 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by the manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No. 65.

.2 Install fixture type connectors and tighten to. Replace insulating cap.

3.4 WIRE JUNCTIONS

.1 Tape connectors, that do not have their own insulating jacket, with at least two (2) semi-overlapping rows of Scotch 88 vinyl tape from 3M.

.2 The dielectric characteristics of the junction must not be inferior to those of the conductor insulation.

.3 Wire junctions and connectors which do not have a smooth surface should be wrapped with Scotchfil from 3M prior to being taped.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of the section:

.1 The present section covers copper conductors and ACM approved aluminum alloy conductors designed for nominal voltages from 0 to 1000 V, as well as the most common electrical insulation.

1.2 REFERENCES

.1 Canadian standard association (CSA)/CSA International :

.1 C22.2 No. 38 – Thermoset-Insulated Wires and Cables (Tri-national standard, with UL 44 and ANCE NMX-J-451-2014).

.2 C22.2 No. 131 – Type Teck 90 Cable.

.3 C22.2 No. 51 – Armoured Cables.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents and samples accordingly with section 20 00 10.

.2 Shop drawings:

.1 For each of the alloys and types of conductors / cables submit a general shop drawing including all the sizes used.

.3 Erection drawings:

.1 Erection drawings showing position and dimensions of junction and pull boxes.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 WIRE GAUGE

.1 Unless otherwise indicated, the minimum caliber of copper conductors is 10 AWG for multiple circuits in the same conduit.

.2 Conductors AWG10 and smaller will be solid type.

.3 Conductors AWG8 and bigger will be stranded.

.4 Conductor size which dimensions are indicated on plans are minimum. When conductors size is not indicated on drawings, supply and install conductors of type and size meeting the requirements of Canadian electrical code, latest edition, such as in particular :

.1 Use appendix to determine conductor gage depending on distance.

.2 Apply correction factors of the admissible current of table 5C of the Code when grouping conductors in conduits.

2.2 BUILDING WIRES

.1 Unless otherwise indicated, copper conductor for circuits of 100A and less. Where "AL", with thermoplastic insulation type RW90 XLPE, rated at 600 V.

.2 Conductors in low-voltage system (25 V or less), of size 18 AWG minimum, integrated into multi-conductor cables, with PVC insulation.

.3 Conductors and cables must bear the manufacturer's label, insulation type, size and voltage rating at regular intervals on the outer conductor or cable with permanent markings.

2.3 ARMOURED CABLES

.1 Conductors: insulated, unless otherwise indicated, copper RW-90, unless AL is specified in the plan, aluminum alloy ACM, size as indicated.

.2 Armour: interlocking type fabricated from galvanized steel aluminum strip.

.3 Including ground wire isolated with aluminum strip.

.4 Connectors: anti short connectors.

2.4 CONTROL CABLES

.1 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated.

.1 Insulation: PVC.

.2 Shielding: wire, braided or tape coated with paramagnetic material over each pair of conductors.

2.5 FIRE ALARM CABLES

.1 Twisted / shielded cables will be installed in EMT conduit type pipes, without armor and will have the following characteristics:

.1 Solid bare copper conductors.

.2 CPV insulation.

.3 Red CPV sheath.

.4 In accordance with CSA FAS-105, 300 V standard, identified FT-4.

.5 Cable (2 No. 16 twisted / shielded) for all addressable command and control networks. In the pipeline, provide one (1) green No. 14 conductor for the continuity of the masses of all the boxes and the command and control devices.

2.6 CABLE FOR VARIABLE FREQUENCY DRIVE (VFD)

.1 Power cables for three phases driving forces controlled by variable frequency drive type (VFD) starters.

.2 Install between EFVs and engine loads according to the following characteristics:

.1 One (1) stranded copper conductors.

.2 Insulation in cross-linked polyethylene (RW90 XLPE) 1000 V.

.3 Three (3) grounding conductors.

.4 Shield made of double copper tape.

.5 PVC sheath.

2.7 CONDUCTOR COLOR

.1 In the branch circuits of three-phase systems, the colors of the phases will be black, red, blue, etc., and the neutrals will be white.

.2 The grounding conductors will be installed in all conduits of the C.P.V., E.M.T. type, empty metallic flexible conduits. The conductors used for earthing will be insulated and green in color and will have the capacity required by the Electric Code.

.3 The conductors used to earth equipment, special outlets, special outlets, insulated outlets, will be insulated and green in color and will have the capacity required by the Electric Code of Quebec.

2.8 APPROVED MANUFACTURERS

.1 Conductors:

.1 Alcan (General Cable)

.2 Nexans

.3 Prysmian

.4 SouthWire

.5 Or equivalent approved

.2 AC90 and ACWU90 cables:

.1 Alcan (General Cable)

.2 Nexans

.3 Prysmian

.4 SouthWire

.5 Or equivalent approved

.3 VFD Cables:

.1 Shawflex

.2 Belden

.3 General Cable

.4 Nexans (Cerco Câble)

.5 Or equivalent

2.9 MATERIAL IDENTIFICATION

.1 Identify material, accordingly with section 26 05 53.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Perform tests before energizing electrical system.

.3 Entrust testing to qualified person.

.1 Provide necessary instruments and equipment.

.4 Verify order of phases and individually identify the conductors of each phase of each power supply.

.5 Check the continuity of all power lines. Ensure that they are free from short circuits and ground fault.

.1 Ensure resistance between ground and each circuit in not inferior to 50 megohms.

.6 Splice test:

.1 After the cables are installed, but before the splices and connections, measure the isolation resistance of each phase conductor with a 1000 V megohmeter.

.2 After completion of each splice and / or connection, check the resistance of the insulation to ensure that the cable network is ready for the acceptance test.

.7 Dielectric strength tests:

.1 Ensure that all terminations and all accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armor and conductors not tested.

.3 Perform dielectric strength tests, in accordance with Manufacturer's recommendations.

.4 Measure the dielectric value of circuits, power cables and equipment with a maximum voltage of 350 V using a 500 V megohm meter.

.5 Measure the dielectric value of circuits, power cables and equipment with a maximum voltage of 351 to 600 V using a 1000 V megohm meter.

.6 In both (2) cases, ensure that the value of the resistance to earth before energizing is not less than the manufacturer's requirements.

.7 Provide certification that all conductors have been checked and all defective conductors have been replaced.

.8 Completely remove and replace any length of cable that does not meet test criteria.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 – Wire and Box Connectors – 0 – 1 000 V.

.2 Cable Color Coding: to Section 26 05 53.

.3 Route downhill or vertical loops the wiring concealed in the walls, to facilitate subsequent work. Unless otherwise stated, avoid routing wiring from bottom to top as well as horizontally through the walls.

.4 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be two (2) wire circuits only, i.e. common neutrals not permitted.

.5 Control wiring must be identified by collars with numbering corresponding to the legend of the shop drawings.

.6 Supply and install wires and cables required for the connection of all electrical equipment and devices to make them fully operational even if the wires or cables are not specifically shown on the drawings.

.7 Install conductors or cables in conduits or metal sheaths as indicated in this section.

.8 Install a neutral conductor bypass circuit at 120 V.

.9 Use only lubricants approved by the manufacturer for cable pulling.

.10 Install cables and leads continuously without joints from their point of origin to the powered device. If necessary, create joints in approved boxes.

.11 Support conductors in vertical conduit with Type M carriers, manufactured by O-Z Products. Conductors of size 1/0 and smaller: supports every 30 m.

.1 Incorporate 90° bends in the vertical conduit at intervals not exceeding the distances outlined in Table 21, of the Construction Code of Quebec, Chapter V – Electrical.

.2 Use a cable specifically designed for vertical installation.

3.3 INSTALLATION OF BUILDING WIRES

.1 The wiring for the connection of the motors from a junction box located near the motor will be in armored cable, "Liquid-Tight", this last box will be part of a conduit network.

.2 Unless otherwise indicated in the plans or later in this specification, all flexible connections to motors, inside a cleaning room and other devices in humid areas and exposed to drips will be made with "Seal Dry" conduits. or "Cab Tire" of 24 "minimum length, fitted with suitable watertight fittings, from a threaded galvanized steel pipe.

.3 Unless otherwise indicated on the plans, provide an additional green insulated conductor of appropriate size to ensure the continuity of the masses in each thin-walled conduit (type EMT).

.4 Install wiring:

.1 In conduits, in accordance with section 26 05 34 - Conduits, fasteners and conduit fittings.

.2 In surface conduits and cable trays for lighting fixtures, in accordance with Division 26.

3.4 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on U channels.

.2 Secure cables directly to the frame at a distance of 300 mm from each side of the outputs and at 1500 mm maximum on all lines.

.3 Cut the metal casing of the cables with a suitable tool and provide insulating sleeves at the ends.

.4 Type AC-90 (BX) cables for connection:

.1 Lighting fixtures recessed in suspended ceilings. The length of the cable should allow the lighting fixtures to be moved to any adjacent tile.

.1 Excluding tunnels, when installed in rooms with no ceiling on the vertical part only.

.2 Outlets installed in drywall or suspended ceilings.

.3 Light switches installed in drywall.

.4 Armored cable must be connected to a junction box located in the same room as the powered device. The junction boxes used to supply a device via armored cable can serve a maximum area of 36 m².

3.5 INSTALLATION OF CABLES WITH JACKET

.1 As much as possible, group the cables on U shape supports.

APPENDIX I

MAXIMUM NUMBER OF RW-90 CONDUCTORS PER CONDUIT						
Conductor Size AWG	Size of Conduit in mm					
	16	21	27	35	41	53
14	7	14	22	40	55	90
12	4	10	16	30	40	66
10	4	6	12	20	30	50
8	---	3	6	10	16	26
6	---	---	3	8	9	18
4	---	---	---	3	6	12
3	---	---	---	3	6	12
2	---	---	---	---	6	9
1	---	---	---	---	4	6
1/0	---	---	---	---	---	6

Note:
For dimensions not listed, refer to Chapter V – Electrical to Construction Code of Quebec (Quebec Electrical Code).

APPENDIX II

MAXIMUM LENGTH (IN METERS) OF A BRANCH CIRCUIT AT 120 V VERSUS VOLTAGE DROP			
Conductor Size AWG	Rating in Amps (A)		
	15	20	30
12	20	15	---
10	30	25	15
8	50	40	25
6	90	65	40

Notes :

- For non-specified loads, refer to Chapter V – Electrical to Construction Code of Quebec (Quebec Electrical Code (table No. D3).
- Distance calculated for copper conductors at a temperature of 60°C.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 GENERAL

.1 Content of the section:

.1 This section covers general and specific requirements concerning grounding.

1.2 REFERENCES

.1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE):

.1 ANSI/IEEE 837-02 – IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 CSA International:

.1 CSA Z32-F04 – Electrical Safety and Essential Electrical Systems in Health Care Facilities.

.3 Building Industry Consulting Service International (BICSI) :

.1 Telecommunications Distribution Methods Manual (TDMM), 13th Edition.

.4 American National Standards Institute/Telecommunications Industry Association :

.1 ANSI/TIA-606-B – Administration Standard for Telecommunications Infrastructure.

.2 ANSI/TIA-607-B – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents, in accordance with section 20 00 10.

.2 Certificate of conformity of grounding with results of tests.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 EQUIPMENT

.1 Insulated grounding conductors: green, copper conductors, size as indicated.

2.2 RECOMMENDED MANUFACTURERS

.1 Burndy Corp.

.2 Ilsco

.3 Thomas & Betts

.4 Or equivalent approved

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with the manufacturer's written instructions.

.1 Visual inspection of surfaces/supports in presence of a professional.

.2 Inform immediately the professional of every unacceptable site conditions.

.3 Begin work only after correction of unacceptable conditions and received the approbation of the professional.

.2 Proceed tests as accordingly with section 26 00 10.

3.2 INSTALLATION

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories as outlined in Chapter V – Electrical Code of Construction of Québec.

.2 Install a grounding conductor in every EMT tubes.

.3 Install connectors in accordance with the manufacturer's instructions.

.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

.5 Electrical network bonded to ground:

.1 Install a bonding wire on flexible conduits, carefully fixed on the outside of the conduit and connected at each end to a grounding tip, a solderless terminal, a wire clamp or a screw with Belleville washer.

3.3 CIRCUITS GROUDING

.1 Make the ground connections of the circuits.

3.4 EQUIPMENT GROUNDING

.1 Make prescribed earth connections by continuity of asses, for all the equipment, in particular: pipes, motor frames and starters.

.2 Linking built engines or other devices transmitting vibrations with a separate conductor, green, to a grounding terminal in the junction box or connection placed between the rigid pipe and the flexible conduit connecting the device.

3.5 GROUND FLANGES FOR EARTHING

.1 Make connections with crimp flanges according to the manufacturer's recommendations.

.2 Use crimp flanges of appropriate size and type on mechanical piping.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 GENERAL

.1 Content of the section:

.1 This section covers general and specific requirements concerning hangers and supports for electrical systems.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International):

.1 CAN/CSA G164 – Hot Dip Galvanizing of Irregularly Shaped Articles

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents, in accordance with section 20 00 10.

.2 Shop drawings : U shape support channels

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 mm x 41 mm, 2.5 mm thick, surface mounted or suspended.

.1 Material:

.1 Interior: galvanized steel

.2 Exterior for permanent install: aluminum.

.2 Support channels installed outside in humid area must be in stainless steel.

2.2 ROOFTOP SUPPORT CHANNELS

.1 Support channel for conduits and cabling installed on rooftops:

.1 Without penetration to the roof.

.2 Made from recycled rubber or thermoplastic.

.3 UV resistant

.4 Openings to bolt a U shape support.

.5 Minimum load capacity of 2.22 kN per unit.

2.3 ACCEPTABLE MANUFACTURERS

.1 U shaped Supports:

.1 Thomas & Betts
.2 Eaton
.3 Hilti
.4 Pentair
.5 Unistrut
.6 Or equivalent approved

.2 Rooftop support channels :

.1 Eaton – B-Line, Dura-Blok
.2 Pentair – Caddy, pyramide ST
.3 ABB – Thomas & Betts
.4 Or equivalent approved

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors nylon shields.

.2 Secure equipment to pour concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 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.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Use clamps to fix the visible cables or conduits to the frame or to the construction elements of the building.

.7 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 1 m on center spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with the manufacturer's installation recommendations.

.14 Cover with a galvanizing product all scratched, altered or cut surfaces, galvanized parts.

.15 Rooftop supports :

.1 For conduits and cables installed on the roof, install a support of the system made of U shape profiles mounted in inverted trapezoids fixed on roof frames spaced at a maximum of 1.5 m.

.2 Mount height of trapezoids as shown in the plan.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 GENERAL

.1 Content of the section:

.1 This section covers general and specific requirements concerning splitters, junction, pull boxes and cabinets.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International):

.1 CAN/CSA C22.2 No. 40 – Junction and pull boxes

.2 CAN/CSA C22.2 No. 76 – Splitters

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents, in accordance with section 20 00 10.

.2 Erection drawings:

.1 Erection drawings showing the position and dimensions of junction and pull boxes with identification of circuits.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: 14 gauge minimum steel, welded steel cans, painted with a coat of paint applied with an electrostatic process, dimensions as indicated.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on covers.

.1 General use and dimension less than 400 mm with flat covers, to be screwed.

.2 With terminal blocks or dimension 400 mm and greater with flat covers on hinges.

.4 Without knockouts, factory made.

.5 When apparent, TC type with frames, covered/concealed hinges, lock, no visible screws.

.6 Boxes with large dimensions equipped with steel angle frame to form a rigid assembly, easily removable lids.

.7 Custom-made boxes for communications and security, when necessary, in order to meet the requirements of these specifications, including, in particular, the dimensions below:

Maximum dimension of uninterrupted duct segment by the pull box mm (in)	Dimensions of pull box			For each segment additional conduit interrupted by the box width, the width must be increased by : mm (in)
	Width mm (in)	Length mm (in)	Depth mm (in)	
21 (¾)	100 (4)	300 (12)	75 (3)	50 (2)
27 (1)	100 (4)	400 (16)	75 (3)	50 (2)
35 (1¼)	150 (6)	500 (20)	75 (3)	75 (3)
41 (1½2)	200 (8)	675 (27)	100 (4)	100 (4)
53 (2)	200 (8)	900 (36)	100 (4)	125 (5)

.8 Custom-made boxes for electricity must be in painted steel of 16 gauges with hinged cover and separators, as required in the Code between different sources and voltages.

2.2 ACCEPTABLE MANUFACTURERS

.1 Junction and pull boxes:

.1 Bel Products
.2 Iberville
.3 Roger Girard
.4 Hoffman
.5 Hammond
.6 Or equivalent approved

2.3 MATERIAL IDENTIFICATION

.1 Identify material in compliance with section 26 05 53.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINET INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

.3 Install all junction and pull boxes as indicated in the plans or where necessary.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 GENERAL

.1 Content of the section:

.1 This section covers general and specific requirements concerning outlet boxes and its accessories.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International):

.1 CSA C22.1-F06 – Canadian Electrical Code, Part 1, 20th Edition.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents, in accordance with section 20 00 10.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES – GENERAL

.1 102 mm square or larger outlet boxes as required, steel, 14 gauge minimum, with thickness of 40 mm, and dimensions outlined in the Canadian Electrical Code.

.2 Gang boxes where wiring devices are grouped in the same area.

.3 Blank cover plates for boxes without wiring devices.

2.2 MOUNTING BOXES IN MASONRY OR GYPSUM BOARD

.1 Electro-galvanized sheet steel outlet boxes, single and multi, gang, flush mounting into masonry walls, block or gypsum board.

.2 Recessed box 101 mm x 101 mm, plaster to cover 12.5 mm or more.

2.3 CEILING BOXES

.1 Octagonal box projecting from 101 mm diameter, serial No. 54151, to the required depth.

2.4 FITTINGS – GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to [35] mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

2.5 SERVICE FITTINGS

.1 'High tension' receptacle fitting made of two (2) pieces with brushed aluminum housing finish for two duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 mm x 102 mm extension piece as indicated.

.2 Pedestal type 'low tension' fitting made of two (2) pieces with brushed aluminum two phone connectors

2.6 APPROVED MANUFACTURERS

.1 Outlet boxes:

.1 Hubbell
.2 Iberville
.3 Eaton Crouse-Hinds
.4 Thomas & Betts
.5 Or equivalent approved

2.7 MATERIAL IDENTIFICATION

.1 Identify material in complianec with section 26 05 53.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 When a wall has two (2) finishes of different thickness (for example, tile and plaster in a bathroom), do not place an exit on the limit line between these two (2) finishes.

.5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.6 The openings in the box must correspond to the dimensions of conduits, mineral insulated cables and armored cable. The use of reducers is not permitted.

.7 Group in one box: switches, outlets, and other similar devices, placed side by side. If there are more than two devices, GSB boxes with GBC plaster rings must be used.

.8 Outlet boxes shown as back-to-back on the plans must be placed a minimum of 300 mm apart.

.9 In the gypsum walls, attach the boxes to metal studs, as shown in the plans.

.10 For outlets installed on exterior walls and ceilings, the Contractor must use very shallow boxes (37 mm) and take great care not to break the vapor barrier. In the event that the vapor barrier is perforated, place a sheet 300 mm x 300 minimum of the same material as that damaged over the vapor barrier and glue tightly so as to restore the original properties of the insulating / cutting assembly steam.

.11 Vacuum clean interior of outlet boxes before installation of wiring devices.

.12 Identify systems for outlet boxes as required.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of the section :

.1 This section covers the general requirements for conduits, conduits fastenings and fittings.

1.2 REFERENCES

.1 CSA International :

.1 CAN/CSA-C22.2 No. 18 – Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware

.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

.5 CSA C22.2 no 211.2 – Rigid PVC (unplasticized) conduit

.6 CAN/CSA-C22.2 no 227.3 – Mechanical protection tubing (MPT) and fittings

.7 CAN/CSA-C22.2 No. 262 – Optical Fiber Cable and Communication Cable Raceway Systems.

.8 Building Industry Consulting Service International (BICSI):

.1 Telecommunications Distribution Methods Manual (TDMM), 13th Edition.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents and samples accordingly with section 20 00 10.

.2 Shop drawings:

.1 Electrical metallic tubing (EMT)

.2 Long radius elbows

.3 Screw caps

.3 Erection drawings:

.1 Erection drawings showing position and dimensions of junction and pull boxes.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 CONDUITS

.1 Colour of the conduits must be as requested in section 26 05 53 – Identification of electrical systems.

.2 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings, and expanded ends.

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

.5 Unless otherwise indicated, is a minimum of 21 mm diameter.

2.2 CONDUIT FASTENINGS

.1 One hole, steel straps to secure surface conduits where the diameter is equal to 50 mm or less.

.1 Two holes, steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Cantruss fastening to support multiple conduits.

.4 Threaded rods, 100 mm diameter, to support suspended channels.

.5 Maximum spacing of conduits fastening:

.1 All rigid metallic conduits of the same size must be securely supported to a solid surface. Maximum space between attachment points must be

.1 1.5 m for conduits of nominal size 21 mm.

.2 2 m for conduits of nominal size 27 mm and 35 mm.

.3 3 m for conduits of nominal size 41 mm and more.

.2 If multiple conduits of different sizes are grouped, the maximum space between attachments must the one for the smallest conduit.

.3 If installing a flexible metal conduit, it must be subject to intervals not exceeding 1500 mm and less than 300 m on each side of any outlet box or trim, except in the case of a flexible metal conduit installed by pulling and in the case of lengths not exceeding 900 m if a certain flexibility is required at the terminals.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as a conduit.

.2 Ensure factory "ells (L)" where 90° bends for conduits 25 mm and larger.

.3 Watertight connectors and couplings for EMT.

2.4 FISH CORD

.1 Pull rope in polyester with integrated measurement, such as Greenlee measuring Tape N435 or equivalent.

.2 Flat pull cord, for optical fiber and multipair CAT3 wiring, 9.525mm, having a mechanical resistance of 220 lbs. This rope must have a 22-gage tracer wire.

2.5 ACCEPTABLE MANUFACTURERS

.1 EMT or rigid metal ducts:

.1 Columbia-MBF
.2 RepubliConduit
.3 Wheatland
.4 Or equivalent

.2 Flexible conduit:

.1 Anamet Canada
.2 Columbia-MBF
.3 Thomas & Betts
.4 Or equivalent

2.6 MATERIAL IDENTIFICATION

.1 Identify material accordingly to section 26 05 53.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with the manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 When conduits are indicated on plans, they are shown in schematic form only. Install the exposed conduits as as not to reduce the free height of the room. Before starting the work, confirm location of all the conduits with construction professionals.

.2 Runs of conduits installed in parallel must be the same length.

.3 Take the necessary arrangements for the openings, the drilling and other structural work necessary for the installation of electrical conduits, cables, pull wires, pull boxes and outlet boxes.

.4 Openings in concrete beams, walls and floors must be approved by construction professionals.

3.3 INSTALLATION

.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 and in unfinished areas.

.3 Use rigid galvanized steel threaded conduit except.

.4 Use epoxy coated conduit in corrosive areas.

.5 Unless otherwise indicated, use flexible galvanized steel conduits, watertight, with a maximum length of 900 mm between the duct network and the appliance's connection box :

.1 For connection of motors.

.2 For connection of vibrating materials located in a corrosive environment.

.6 Bend cold conduit.

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 21 mm diameter.

.8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.9 Supply and install a pull rope in all empty conduits for every system for future applications.

.10 Remove and replace blocked conduit sections.

.11 Do not use liquids to clean out conduits.

.12 Dry conduits out before installing wire.a minimum

.13 Do not locate conduits less than 75 mm parallel to steam or hot water lines of 25 mm at crossovers.

.14 No drilling is to be done through the beams for the passage of conduits.

.15 Unless otherwise indications conceal all ductwork in walls, floors, ceilings and suspended ceilings.

.16 Maintaining the continuity of the grounding throughout the facility, taking care to make solid connections between the conduits and equipment. A green wire grounding must be added to each flexible conduit connecting a device capable of vibrating, such as motors and all ducts are to be installed in concrete.

.17 Internal radius of conduits bending must be 6 times greater than the internal diameter of the conduit. When multiple conduits run parallel, bending must be concentric.

.18 Connect the threaded conduits to the boxes and the devices using two (2) nuts and a threaded and insulated steel sleeve.

.19 Ream ends of threaded rigid conduit to remove metal burrs. Carefully cut fillets and coat gaskets or use an equivalent product to seal. Maintain the length of fillets to the minimum necessary for the connections to the boxes.

.20 During construction, equip ducts with plugs to prevent foreign bodies from entering.

.21 Conduit raceways between two outputs, pull boxes or sliding sleeves must not have more than three 90° elbows or equivalent or be more than 60 m in length, except the external telephone network, where indicated in the plans.

.22 Attach conduits as follows:

.1 Supply and install all the necessary supports galvanized steel for electrical work.

.2 Conduits:

.1 When the insulated conduits are in contact with a surface of concrete or masonry, affix them using cast iron or steel straps.

.2 Where a group of passages (four or more) flows in parallel, affix them to the steel supports by anchoring them directly to the frame or by means of threaded rods or other supports.

.3 The size of the rods, supports, and spacing of supports are based on weight bearing as required by the code. When conduits of various sizes are grouped, the spacing of the supports is determined by the smallest conduit of the group.

.23 Continuous **nets** are not allowed. In some cases it is impossible to install ordinary fittings, in these circumstances use Erikson type fittings.

.24 Support conduits suspended using galvanized brackets, as described elsewhere in this book.

.25 Conduits emerging from sprinkler proof boxes must be equipped with liquid tight fittings.

.26 The spacing of supports and fasteners must be in accordance with the latest edition of the Electrical Code of Québec.

.27 Support vertical conduits at floor level and use intermediate supports required by the code.

.28 In suspended ceilings, support the metal sheath cables to the frame and not the ceiling structure.

3.4 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.

.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 a minimum of 25 mm at crossovers.

3.5 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings. No conduit is to be installed in concrete slabs.

3.6 DRILLING AND SLEEVES

.1 Be responsible for the location, size and establishment of all openings necessary to perform the work.

.2 Coordinate with all other contractors to make sure that the openings required are done at a good time.

When it is impossible to inform other contractors on time, execute or make execute the work at their own expense, including any repairs that become necessary later.

.3 In the case that a drilling is done after the slab, place appropriate sleeve in the hole with three (3) support studs which prevents it from sliding into the hole. Seal the space between the sleeve and the slab with a suitable and approved product.

.4 Whatever the conduit or else that cross through a fire rated partition or a wall, supply and install an appropriate sleeve. The Contractor will carry out the exterior sealing of the sleeve. When then conduit is installed before the construction of the wall, the sleeves will be in line on the conduits and positioning will be the responsibility of the one who erects the wall.

.5 If it is impossible or negligent to supply and install these sleeves, inserts, frames in time or that they are not precisely located, assume the cost of drilling and repairs following.

.6 Consult the structural professional before drilling holes in the floor, walls and ceilings, beams or any other part of the structure and obtain permission.

.7 Unless otherwise indicated on drawings, all holes and openings 150 mm in diameter and less will be executed by the contractor and coordinated with the building manager and the structural professional.

.8 Provide all openings for the passage of conduits and gutters, to allow expansion, contraction or insulation, as the case may be. In the case of an opening on the roof, take all the necessary precautions to ensure its water tightness.

.9 All drilled holes that will not be used and openings, which have become useless, must be filled by the contractors who is responsible with the same adjacent finish.

.10 Contractor is responsible for damage to existing hidden services (conduits / electrical wiring and telecommunications, piping, structure or other) during drilling required. Perform all required checks to prevent deterioration of existing services. To this end:

.1 Consult existing drawings, if available.

.2 Consult the owner and technical staff have knowledge of the site.

.3 Make small openings to ensure that major openings are located between the rebars and that they are not cut. Space holes about 150 mm apart.

.11 The contractor of each section will be responsible for the location and supply of all sleeves necessary for the execution of this work, in accordance with the preceding paragraph.

.12 Locate, supply and install bushings for the conduits at the following locations:

.1 Roof : galvanized steel sleeves to be fixed to the roof deck. The contractor must supply and install a coping and/or appropriate installation for each exit to the roof. The contractor must supply and install all required sealant materials as specified above.

.2 Masonry or gypsum walls: galvanized steel sleeves. Leave an annular free space of 6 mm between the sleeve and the piping or between the sleeve and the insulation. Install the sleeves so that they are flush with the wall surfaces. Obstruct the annular space between the duct and the sleeve (or between the insulation and the sleeve) with a fire-resistant sealant: RTV silicone foam from Dow Corning, or Flame Sage from Thomas and Betts or equivalent approved. Another Contractor must supply and install the lintels and / or reinforcements of the openings (if their size requires it) and obstruct the space between the sleeve and the opening with a material compatible with that of the wall crossed.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of the section:

.1 This section covers the general requirements for the identification of electrical equipment.

1.2 NAMEPLATE

.1 Use the coding of the devices indicated on drawings.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

Submit required documents and samples accordingly with section 20 00 10.

.1 Shop drawings: nameplates for lighting fixtures.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Product

2.1 IDENTIFICATION FOR OUTLETS AND SWITCHES

.1 Materials:

.1 Normal network: P-Touch label or equivalent approved, 9 mm thick and black letters.

.2 Emergency network: P-Touch label or equivalent approved, 9 mm thick and red letters.

2.2 IDENTIFICATION FOR ELECTRICAL EQUIPMENT

.1 Materials:

.1 Normal network: P-Touch label or equivalent approved, 12 mm thick and black letters.

.2 Emergency network: P-Touch label or equivalent approved, 12 mm thick and red letters.

2.3 IDENTIFICATION FOR FIRE ALARM

.1 Materials:

.1 Normal network: P-Touch label or equivalent approved, 12 mm thick and black letters.

2.4 UNILINGUAL LABELLING

.1 Labelling for the electrical system must be in French.

Part 3 Execution

3.1 GENERAL

.1 An identification procedure of equipments number is shown on the legend. Identify equipments according to that procedure.

.2 Labelling of circuit will be from the equipment and/or outlet until its source.

.3 Circuit numbers must be indicated on all plates of junction boxes with a felt pen.

3.2 PLUGS, SWITCHES AND OTHER SIMILAR DEVICES

.1 Install identification marks on all outlet plates, switches and other similar devices.

.2 Install tape across the full width of the plate and turn the ribbon inside each side of the plate.

.3 Write circuit numbers inside all outlet boxes and switches. Use a white ribbon and fix it on the wiring inside the box.

.4 Circuit number must be fully entered and include the number of the distribution panel followed by the circuit number (example: PS-1,22).

.5 For hospital grade outlets, install a format 7 lamicoid plate above the outlet cover plate.

3.3 LIGHTING FIXTURES

.1 Identify every lighting fixture with a 6mm red sticker with a plastic finish that resists cleaning.

3.4 FIRE ALARM

.1 Write on the base of each heat detector its address and on addressable relay.

3.5 EXISTING NETWORK

.1 Write circuit numbers on all junction boxes of existing circuits to be kept or relocated using a black felt-tip pen.

.2 When the wiring of a circuit is removed to a junction box, write on the box the circuit number with the inscription "RESERVE".

3.6 DESIGNATION OF WIRES

.1 Conductors will be identified by the colour code CSA C22.10-2007.

.2 In every fire alarm panel and in all junction boxes, every conductor will be identified by the circuit number and loop with Electrovert type Z label or equivalent approved matching the wire size or from a printer designed for this purpose.

3.7 DESIGNATION OF CONDUITS, BOX AND CABLES

.1 Color codes of metal conduits, painted by the manufacturer:

Network	Color of conduit
Emergency 120/208 V	Orange
Normal 120/208 V	Purple
Fire alarm	Red

.2 Mark permanently and indelibly with colored plastic tape the conductors for each supply circuits. The contractor must identify phases according to the color code as indicated in the table:

Color code of building wires	
Phase A	Red
Phase B	Black
Phase C	Blue
Neutral	White
Ground	Green

.1 On the box plates (appearant face), indicate circuits numbers and panel designation, or its function. Use P-Touch or equivalent approved.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of the section:

.1 This section covers wiring devices and their installation methods.

1.2 REFERENCES

.1 CSA International:

.1 CSA C22.2 no 42 – General use receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA no 42.1 - Cover Plates for Flush-Mounted Wiring Devices (binational with UL 514D).

.3 CSA C22.2 no 55-FM1986 – Special use switches.

.4 CSA C22.2 no 111 – General-use snap switches (binational with UL 20).

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

Submit required documents and samples accordingly with section 20 00 10.

.1 Shop drawings:

.1 Without limitation, shop drawings are required for the following items:

.1 Electrical plugs.

.2 Plate and covers.

.3 Dimmers.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

1.5 COLOUR CODE

.1 Assigning a color code to the sockets and switches:

.1 Normal network of 120 V, 15 A: white

.2 Emergency network of 120 V, 15 A: red

Part 2 PRODUCTS

2.1 DIMMERS

.1 Dimmers with linear cursor 0-10 V: Skylark no S-600P.

.2 Supply LED dimmers compatible with lighting fixtures, specified or not. Make sure of this compatibility with the manufacturer of the lighting fixtures and include the price at the quote.

2.2 RECEPTACLES

.1 Duplex receptacles, 5-15 CSA Type R, 125 V, 15 A, grounded U socket to conform to CSA C22.2 no. 42, with the following characteristics:

.1 Lateral or rear connection of wire size 10 AWG.

.2 Severing links for conversion in divided doses.

.3 Eight (8) rear connection ports, four (4) screw terminals for side connections.

.4 Triple sliding contacts and riveted grounding contact.

.2 Other voltage outlets and permissible intensity as indicated.

.3 All outlets and switches grouped together must be of the same model and covered with a single plaque.

.4 For the entire installation, use only components from a single manufacturer.

.5 In accommodations, residential grade, use the following models:

Description	Standard
Single receptacle: – 30 A, 120/208 V, 1 PH, 3W :	2710 (3)
Duplex receptacles – 15 A, 120 V (commercial quality)	5262

.6 Use numbered switches from Leviton company, unless otherwise stated.

.7 Provide all wiring devices with a cover plate in accordance with CSA C22.2 no. 42.1.

.8 2.5 mm plastic cover plates with identical colour as wiring device mounted in recessed outlet boxes.

.9 Generally, in nylon, unbreakable, color matched with the wiring device.

2.3 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

2.4 ACCEPTABLE PRODUCTS

.1 Switch covers and electrical plugs:

.1 Cooper (Arrow-Hart)

.2 Hubbell

.3 Leviton

.4 Pass & Seymour

.5 Temco

.6 Or equivalent

.2 Lighting dimmers:

.1 Leviton
.2 Lutron
.3 Prescolite
.4 Strand
.5 Or equivalent

2.5 IDENTIFICATION

.1 Identify accordingly with section 26 05 53.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of the Consultant.
.2 Inform the Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied, and after receipt of written approval to proceed from the Consultant.

3.2 INSTALLATION

.1 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 Where split receptacles has one portion switched, mount vertically and switch in upper position.

.2 Cover plates:

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

.3 Dimmer:

.1 Ensure compatibility between the dimmer for fluorescent lamps with the ballast of fluorescent fixtures before installation.

3.3 PROTECTION

.1 Protect equipment and installed components from damage during construction.

.2 Protect the finish of the stainless steel cover plates with a sheet of paper or plastic wrap, which will not be removed until all painting and other work, is completed.

.3 Repair damage caused to adjacent materials and equipment by installation of wiring devices.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of the section:

.1 This section targets the particular characteristics and requirements for the moulded case circuit breakers.

1.2 REFERENCES

.1 Canadian standard association (CSA)/CSA International:

.1 CSA-C22.2 no 5 – Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (triple national standard with UL 489, 10th edition and NMX-J-266-ANCE, 2nd edition)

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

Submit required documents and samples accordingly with section 20 00 10.

.1 Shop drawings:

.1 Without limitation, shop drawings are required for the following items: all types of circuits breakers covered by this section.

.2 Authentification:

.1 Before proceeding with any installation of circuit breaker either in a new or existing installation, the contractor must submit three (3) copies of certificate of authenticity, written in French, from the manufacturer. The certificates must be signed by the factory and the local representative of the manufacturer, attesting that all the circuit breakers come from there, that they are new, and that they meet the standards and regulations. These certificates must be provided to the professional for acceptance.

.2 Production delay of a authenticity certificate will not justify a contract extension or any additional compensation.

.3 All manufacturing, assembly or installation work must begin only after the acceptance of the certificate by the professional. If the Contractor does not comply to this requirements, the professional and the customer can mandate the manufacturer of the breaker to certify all the new breakers on the contract at the contractors expense. In general, the certificate of origin of authentification must contain:

.1 Name and coordinates of manufacturer and the person responsible for authentication. The person must sign and date the certificate.

.2 Name and coordinates of authorized distributor, as well as the distributor representative responsible for the contractors account.

.3 Name and coordinates of contractor and the project manager.

.4 Name and address of the building where breakers were installed.

.1 Title of project (as indicated on drawings and specifications).

.2 The reference number of customer.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 GENERAL REQUIREMENTS

.1 Moulded-case circuit breakers and protection accessories against high current fault.

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications. Do not use single pole circuit breaker connected to each other by pin interlock.

.4 Moulded case for thermomagnetic tripping, bolted, multipole, simultaneous opening with incorporated fuses, where indicated, breaking capacity and short circuit value, as indicated.

.5 Circuit breakers to have interrupting capacity rating as indicated.

.6 Minimum short-circuit interrupting capacity, 120/208 V: 10 kA.

2.2 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 ENCLOSURE

.1 Sprinkler-proof housing.

2.4 ACCEPTABLE PRODUCTS

.1 Siemens.

2.5 MATERIAL IDENTIFICATION

.1 Identify the material accordingly to section 26 05 53 – Identification of electrical systems.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated. Provide hardware fittings when required.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 GENERAL

.1 Content of section :

.1 The present section targets contactors and install methods.

1.2 REFERENCES

.1 CSA International :

.1 CSA C22.2 no. 14-10 – Industrial control equipment.

.2 National Electrical Manufacturers Association (NEMA) :

.1 NEMA ICS 2 – Controllers, Contactors and Overload Relays Rated 600 V.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents, in accordance with section 20 00 10.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 CONTACTORS

.1 Electrically held, permanent magnet latch type, mechanically held, controlled by pilot devices as indicated and rated for type of load controlled. Half size contactors not accepted.

.2 Complete with two (2) normally open and two (2) normally closed auxiliary contacts unless indicated otherwise.

.3 Mount in CSA enclosure unless otherwise indicated. NEMA-1 inside and NEMA-4X outside.

.4 Include following options in cover:

.1 Red, green, indicating lamp.

.2 Stop-start push button.

.3 Selector "manual-stop-auto".

.4 Auto on and off selector switch.

.5 Control transformer: factory wired and installed in contactor enclosure.

2.2 MATERIAL IDENTIFICATION

.1 Identify accordingly to 26 05 53.

.2 Nameplate with controlled load, size as indicated.

2.3 ACCEPTABLE MANUFACTURERS

.1 Eaton.

.2 General Electric.

.3 Schneider Group.

.4 Siemens.

.5 Or equivalent approved.

.6 Assemblers such as Techno-Contact, Moteurs Électriques Laval Ltée and Dracon Automatisation are accepted as long as main components are from Schneider, GE, Eaton, ABB or Siemens.

Part 3 Execution

3.1 INSTALLATION

.1 Install contactors and connect power wires and auxiliary control devices as indicated.

.2 On contactors, apply label or plates indicating circuit number and panels.

.3 Test contactors according to section 26 05 00.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of section :

.1 This section precise characteristics of manufacturing, performance, accessories and other particular requirements of motor starters up to 600V.

1.2 REFERENCES

.1 Canadian standard association (CSA) :

.1 CAN/CSA-C22.2 no 60947-4-1 – Low-voltage switchgear and control gear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters (binational standard with UL 60947-4-1).

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROBATION/INFORMATION

.1 Submit required documents, in accordance with section 20 00 10.

.2 Shop drawings:

.1 Each starter type.
.2 Overload relays
.3 Communication module.

.3 Installation sheet:

.1 Information required for starters:

.1 Identification of starters according to section 26 05 53.
.2 Conductors size.
.3 Correspondence to the shop drawings.
.4 Dieletric tests.
.5 Verification of rotation.
.6 Adjustement of starter class.
.7 A dusting the overload relay.
.8 Tightening torque used.
.9 Marked tightening.
.10 Cleaning and visual inspection.
.11 Infrared photo of fittings.

1.4 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF WORK

.1 Submit required documents/elements in accordance with section 20 00 10.

.2 Operation and maintenance instructions, which will be incorporated to the manual.

Part 2 Products

2.1 MATERIALS

.1 NEMA standards starters.

.2 Starter caliber must comply with NEMA standard. Half-caliber and IEC starters are not accepted.

.3 All starters will be minimum gauge 1.

.4 Minimum resistance to short-circuit current as indicated.

2.2 FULL VOLTAGE MAGNETIC STARTERS

.1 Combination type starters to include fused disconnect switch with operating lever on outside of enclosure to control and provision for:

.1 Locking in "off" position with up to one (1), two 2) or three (3) padlocks.

.2 Independent locking of enclosure door.

.3 Provision for preventing switching to "on" position while enclosure door open.

.4 NEMA-3R enclosure.

.2 Accessories:

.1 Push buttons, selector switches: standard, heavy-duty, labelled as indicated.

.2 Indicating lights: standard, heavy-duty, type and color as indicated.

.3 Auxiliary control devices as indicated.

.4 Two (2) N.O. and two (2) N.C. spare auxiliary contacts unless otherwise indicated.

2.3 CONTROL TRANSFORMER

.1 Single phase, dry type, control transformer with primary voltage as indicated and 24 V secondary, complete with secondary fuse, installed in with starter as indicated.

.2 Size control transformer for control circuit load plus 20% spare capacity.

2.4 ACCESSORIES

.1 Push button: heavy-duty, oil tight as required.

.2 Selector switches: heavy-duty, oil tight as required.

.3 Indicating lights: heavy-duty, oil tight, type and color as indicated.

.4 Buttons made for intensive use, installed in a recessed housing, with a face plate of stainless steel in all finished areas.

.5 Sufficient number of buttons complete with contact blocks, as shown on the plans. These contact blocks are manufactured to be able to add, change, or remove contacts without difficulty. The contacts are silver alloy, double opening type or double closure, as applicable, and self-rubbing.

.6 Every button or lamp will be provided with a nameplate in French, abbreviation is not accepted.

.7 Push buttons of different colors for each function:

.1	Start:	green
.2	Stop:	red
.3	Low-speed:	green
.4	High-speed:	amber or yellow
.5	Reverse, high-speed:	blue

2.5 OVERLOAD RELAYS

.1 The overload relay will be an electronic sensor type (solid state) with following capacities:

.1 Select relay class according to the characteristics of engine on site.
.2 Phase lose protection.
.3 Manual or remote reset.
.4 Trip current adjustment.
.5 Unbalancing phases.
.6 Ground fault.

.2 Communications:

.1 The protection relay must be compatible with TCP/IP Modbus communication protocol.
.2 Communication must give access to:
.1 Command.
.2 Settings
.3 Current read.
.4 Ground fault current.
.5 Percentage of unbalanced phase.
.6 Starter monitoring.

2.6 FINISH

.1 Enclosure finish according to section 26 05 00.

2.7 MATERIAL IDENTIFICATION

.1 Material identification according to section 26 05 53.

2.8 ACCEPTABLE MANUFACTURERS

.1 Eaton.
.2 General Electric.
.3 Schneider Group.

.4 Siemens.

.5 Or equivalent approved.

.6 Assemblers such as Techno-Contact, Moteurs Électriques Laval Ltée and Dracon Automatization are accepted as long as main components are from Schneider, GE, Eaton, ABB or Siemens.

Part 3 Execution

3.1 INSTALLATION

.1 Install and wire starters and controls as indicated. Connect power cable and control as indicated.

.2 Connect thermal protection of motor and protection relay.

.3 Ensure correct fuses installed.

.4 Confirm motor nameplate and adjust overload device to suit.

3.2 FIELD QUALITY CONTROL

.1 Perform tests according to section 26 05 00.

.2 Operate switches and contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

.5 The manufacturer will provide the services of a qualified representative to supervise assembly, installation, tests, calibration and start-up of engines described in specifications.

3.3 ENGINE STARTUP

.1 Before operating the engine for the first time, the electrical contractor must:

.1 Ensure the presence of the section that refers to the engine.

.2 Check the direction of rotation of motors. If rotation is wrong, make corrections and new fittings on the engine and not in the ignition, in order to respect the color coding of the wiring.

.3 Before starting the engine, ensure the free movement of any layer of shaft mechanical seal pump.

.4 Check protection overload and over current to ensure they are adequate.

.5 Check the “megger” insulation.

.6 Measure the voltage of the electric circuit powering the motor.

.7 Check voltage (volt) and current (ampere) of each of the motors upon starting and at normal operation on each phase.

.8 Check the operation positions of the controls and switches.

.2 Ensure the presence of the manufacturer of the engine and / or the device.

.3 At all costs, the engines should not be started unless the requirements mentioned above have been executed.

.4 Engine manufacturers must provide the start-up curves of their engines.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 SUMMARY

.1 Content of section:

.1 This section covers lighting fixtures, their components and installation methods.

1.2 REFERENCES

.1 American National Standards Institute/Institute of electrical and electronics engineers (ANSI/IEEE):

.1 ANSI/IEEE C62.41-1991 – IEEE Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits

.2 ASTM International Inc.:

.1 ASTM-F1137-00 (2006) – Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners

.3 Canadian Standard Association (CSA)/CSA International:

.1 CSA-C108.6 – Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

.4 Rules from federal communications commissions (FCC) – Part 15.

.5 ICES-005 – Lighting Equipment.

.6 Underwriter Laboratories Canada (ULC).

.7 IESNA, lighting manual, 10th edition.

1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION

.1 Submit the requested documents, in accordance with section 20 00 10 – mechanical and electrical general instructions.

.2 Specifications sheets:

.1 Submit photometric studies of suggested lighting fixtures, established by a independent laboratory.

1.4 RESPONSIBILITY

.1 Before submitting shop drawings, the Contractor is responsible to ensure that every lighting fixture submitted can be controlled according to characteristics and performance requirements of the lighting control system of this project.

.2 Acceptance of shop drawings by the Engineers does not release the electrical Contractor from his responsibility to check the compatibility between the lighting fixtures and the lighting control system. In the event that a lighting fixtures turn to be incompatible, the Contractor and the manufacturer of the fixture will be held jointly responsible and must replace the incompatible components, at no additional costs to the Owner.

.3 The brands and model numbers of the lighting fixtures used to define the requirements in terms of physical criteria, performance criteria, operating criteria and installation criteria. The Contractor is responsible for ensuring that the devices offered meet these criteria. If equivalents are proposed, the Contractor must strictly comply with the requirements described in section 26 05 00 – Electricity – general requirements concerning the results of the work.

.4 In the event that a product is supplied in substitution for what is prescribed in the plans and specifications, the Contractor is responsible for:

.1 Supply a photometric calculation, point-by-point, with AGi32 for the whole project. This calculation must be supplied in PDF format, signed and sealed by an engineer member of Quebec engineer order.

.2 Proof that the substitution satisfy the same performance criteria as specified equipment.

.3 Supply the equipment as specified in the case that the Contractor can't supply the requested documents.

1.5 DOCUMENTS/ELEMENTS TO BE SUBMITTED ON COMPLETION OF THE WORK

.1 Submit required documents/elements, in accordance with section 20 00 10.

.2 Operation and maintenance sheets : Provide the operating and maintenance instructions, which will be incorporated into the manual.

Part 2 Product

2.1 GENERALS

.1 All devices must be products distributed in Canada and for which it is possible to have support in French.

.2 All lighting fixtures must be guaranteed for ten (10) years by the manufacturer for a 24 h/7 use.

.3 All lighting fixtures must have a glare ratio less than 19 taking into account the installation method.

2.2 DRIVERS

.1 Nominal voltage at 120 or 208V, depending on plans, 60 Hz.

.2 Enclosed and designed for a use at a temperature of 40°C.

.3 Thermal protection

.1 The driver must reduce the output power in the vent of a high operating temperature until the shutdown of the fixture in the event of a critical temperature.

.2 When the operating temperature returns to normal, the pilot must automatically reenergize the fixture.

.4 0-10 V dimming, unless otherwise indicated.

.5 UL class 2 pilots must meet UL1310 standard.

.6 UL class 1 pilots must meet UL1012 standard.

.7 Harmonic distortion rates must not exceed 10%.

.8 Service life grater than or equal to the service life of the light-emitting diode (LED) modules of the fixture.

.9 Be equipped with short-circuit protection.

.10 Be equipped with protection against open circuits or partial loads.

.11 Be equipped with surge protection.

.12 Make an inaudible sound level to the human ear.

.13 Be of adequate power with the load connected.

.14 Power factor greater than 0.9.

.15 Possibility of having the pilot deported, as indicated.

2.3 FINISHES

.1 Light fixture finish and construction to meet ULC listing and CSA certification related to intended installation.

2.4 OPTICAL CONTROL DEVICES

.1 As indicated in luminary schedule.

2.5 LUMINAIRES

.1 As indicated in luminary schedule.

Part 3 Execution

3.1 GENERAL

.1 The closes below apply to all lighting fixtures, including specialized fixtures, unless otherwise indicated.

3.2 INSTALLATION

.1 Locate and install luminaries as indicated.

.2 Refer to architectural drawings for exact positions of lighting fixtures in architectural mounting.

.3 Coordinate on site the exact position of all luminaries installed in mechanical rooms or in ventilation units after the mechanical equipment has been installed.

.4 The lighting fixtures will be connected to the distribution networks in conduits. A maximum length of three (3) meters of armored cable (AC90 or BX) will be accepted.

.5 Provide adequate support to suit ceiling system.

.6 Perform the lighting installation work only after more dirty work has been completed.

.7 In some places, some light fixtures are installed in ventilation ducts.

.8 Provide and install all materials (brackets, plaster frames, supports, etc.) required for the complete installation of lighting.

3.3 WIRING

.1 Connect lighting fixtures to lighting circuits.

.1 Install wiring in rigid or flexible conduits, as indicated.

.2 In accordance with standards, class 2 control wiring cannot be installed in the same conduit as the lighting fixture power supply.

3.4 SEISMIC PROTECTION FOR LIGHTING FIXTURES

.1 Fixtures in suspended ceiling must be secured to the structure by gauge 16 aviation cable or a gauge 12 steel wire at least at the two (2) opposite corners.

.2 If the suspended ceiling is seismic certified, light fixtures weighing less than 9 kg can be attached to the structure of the bars of the suspended ceiling instead of directly to the structure of the building.

END OF SECTION