

TABLE OF CONTENTS

PART 1 - GENERAL.....	1
1.1 General.....	1
1.2 Definitions.....	1
1.3 Cost of work breakdown	2
1.4 Schedule	2
1.5 Codes and standards.....	3
1.6 Permits and certificates	3
1.7 Licence.....	3
1.8 Drawings, specifications and site review.....	4
1.9 Plans and specifications	4
1.10 Addenda.....	4
1.11 Taxes	5
1.12 Amendments to work.....	5
1.13 Quality assurance.....	5
1.14 Health and safety.....	6
1.15 Maintenance.....	6
1.16 Delivery, storage and handling	6
1.17 Waste Management.....	7
1.18 Specified equipment and materials and equivalents	7
1.19 Submittal procedures.....	9
1.20 Equipment and materials	16
1.21 Use of the site.....	17
1.22 Execution.....	18
1.23 Work coordination.....	20
1.24 Painting repairs and restoration	21
1.25 Field quality control.....	21
1.26 Foreman.....	21
1.27 Excavation and backfill	21
1.28 Concrete bases and structural supports.....	22
1.29 Corrosion protection	22
1.30 Anchors	23
1.31 Errors and omissions	23
1.32 Cleaning	23
1.33 Owner's rights.....	23
1.34 Progressive estimates	23
1.35 Site inspection	24
1.36 Tests and certification.....	24
1.37 Closeout submittals	25
1.38 Training of operating and maintenance personnel	29
1.39 Requirements for interim inspection.....	29
1.40 Acceptance of the work	30

PART 1 - GENERAL

1.1 GENERAL

- .1 This section applies to mechanical and electrical work.
- .2 The provisions of this section complement all contract clauses, all general provisions of the architectural specifications and those of the Owner. Refer to these documents for relevant requirements applying to mechanical and electrical work.
- .3 Relevant contractual document requirements apply to mechanical and electrical work.
- .4 In the event of a conflict between the provisions of the project's contractual documents, the most stringent provisions apply.
- .5 Mechanical and electrical plans and specifications are intended for both the General Contractor and mechanical and electrical Contractors. The General Contractor assumes overall responsibility and is responsible for ensuring coordination of the work of mechanical and electrical Contractors with each other and with the entire project. The General Contractor is responsible for resolving any conflicts which arise between Subcontractors.
- .6 Unless otherwise specified, costs relating to all work shown on plans and specifications must be borne by the General Contractor, whether or not "supply and install" is indicated.
- .7 The Engineer has priority for interpreting contractual documents with respect to the work.

1.2 DEFINITIONS

- .1 Contractor or General Contractor:

A natural person doing business alone under his or her own name or under a different name, an incorporated business or a company that has entered into a contract with the Owner for performance of the work.
- .2 Specialized Contractor or subcontractor:

A natural person doing business alone under his or her own name or under a different name, an incorporated business or company that has entered into a contract with the General Contractor for performance of the work.

.3 Owner:

The natural or legal person responsible for assigning the work and concluding contracts for such work, whether the owner, tenant or occupant of the property where the work is to be performed.

.4 Engineer:

Dessau representative.

.5 Contractual documents:

All drawings and texts relating to the execution of the contract.

.6 Supply:

Unless otherwise indicated, the term "supply" means: furnish, install, support, connect, test, commission, calibrate and any other work needed for the proper operation of the equipment and systems.

.7 Install or installation:

These terms have the same meaning as "supply" unless it is specifically stated that provision of the article is excluded from the contract.

1.3 COST OF WORK BREAKDOWN

- .1 Before the start of work, and no later than ten (10) business days following award of the contract, provide an itemized cost breakdown for the different work stages: equipment, materials, permits, labour, etc. by specification section.
- .2 When submitting a payment approval request for work that has been performed, prepare the progressive estimate on the basis of the itemized list. Requests for progress payments will be rejected if a detailed estimate of work performed has not been previously submitted to the Owner.

1.4 SCHEDULE

- .1 Within fifteen (15) business days following award of the contract, submit the typical stages for completion of work, along with an activity chart and work schedule indicating the dates for the progress and completion stages to be completed within the time limits specified in the contract.
- .2 Revisions to the progress of work, based on the completion schedule submitted, shall be at the Owner's discretion. The General Contractor shall update the schedule in collaboration with the Owner.

Rev. 00: Issued for tender (2013-11-19)

- .3 For additional requirements, refer to Section 01 32 16.07 – Construction Progress Schedules – Bar (GANTT) Chart.

1.5 CODES AND STANDARDS

- .1 Unless otherwise specified, carry out work in accordance with the Quebec Construction Code (QCC) and any other applicable federal, provincial or municipal code, latest version.
- .2 Work must comply with or exceed requirements set out in standards, codes or other reference documents.
- .3 Carry out work in accordance with public utility company standards.
- .4 Applicable codes and standards are part of contractual documents.

1.6 PERMITS AND CERTIFICATES

- .1 Obtain, and pay for, all permits, inspection certificates and acceptance certificates required for successful initiation and completion of work.
- .2 Refer to the description of each section for the permits and certificates requested. These permits and certificates must be delivered to the Owner and are a condition of acceptance of work.

1.7 LICENCE

- .1 In order to submit a bid for the project, and for the duration of the work, the Contractor must hold a valid licence in accordance with the Building Act and any other applicable law. If the licence expires during performance of the work, the Contractor must provide proof that the licence has been renewed.
- .2 In the event of failure to comply with this requirement, the Owner reserves the right to reject the bid and will not recognize any claim arising from such non-compliance.

1.8 DRAWINGS, SPECIFICATIONS AND SITE REVIEW

- .1 By submitting its bid, the Contractor implicitly confirms that it has reviewed all documents in the call for proposals, has visited the project site, is familiar with local conditions and any factors likely to affect performance of the work and has taken these factors into account in its bid. Ignorance of the requirements in the call for proposals or of the conditions for performance of the work will, in no case, be a valid reason to claim a payment.

1.9 PLANS AND SPECIFICATIONS

- .1 The plans and specifications constitute part of the contract and are complementary. The Contractor shall perform all work included in the plans and specifications and not described in the contract, or vice versa, as if the work were indicated in both the plans and specifications and in the contract. All work and materials not described or implicitly specified but required for the installation of a complete, operational and safe system shall be provided for in the bid submission and installed.
- .2 The Contractor shall inform the Engineer of any error or omission that it discovers in the plans or specifications when submitting its bid in order to obtain any clarification required for a complete bid. The Contractor may not invoke errors in the plans and specifications to perform defective work or to claim additional payment if, in the opinion of the Engineer, the error or omission is evident.
- .3 The Contractor shall inform the Engineer of any contradiction or inconsistency that it discovers in the project documents in order to obtain any clarification required for a complete bid. If clarification cannot be issued, the Contractor shall prepare its bid based on the most expensive solution, and the Engineer reserves the right to choose the appropriate solution even if it is the most expensive.
- .4 All annotations in the plans are part of this contract.
- .5 Any changes to the plans and specifications during the bid period must be in writing. Neither the Owner nor the Engineer shall be responsible for information given verbally.

1.10 ADDENDA

- .1 Prior to submission, the Contractor must verify, with the engineers, whether any addenda have been issued to ensure that its bid is complete.
- .2 Any failure to include the addenda in the bid will automatically lead to rejection of the bid.

1.11 TAXES

- .1 The Contractor must include in its bid all taxes applicable to materials, labour and services required for performance of the work.
- .2 The Contractor may not benefit from tax credits to which the Owner is entitled.

1.12 AMENDMENTS TO WORK

- .1 No change to the original plans and specifications may be made without a written request from the Engineer and following approval by the Engineer of an evaluation of such changes. If the Engineer requests a change that does not affect the price, the Contractor shall perform the change without further notice.
- .2 The Engineer must be consulted concerning all changes, and only the Engineer may authorize changes to the plans and specifications. The Contractor must redo any work that does not comply with the plans and specifications at no additional cost to the Owner.
- .3 During construction, the Owner is entitled to request changes to the plans and specifications which it deems appropriate. Such changes shall not affect or invalidate the terms and conditions of this contract. If these changes result in an increase or decrease in the cost of the work, the contract will be adjusted following an assessment of the cost.
- .4 Additional work is subject to the terms and conditions of the contract.

1.13 QUALITY ASSURANCE

- .1 Quality assurance: In accordance with Section 01 45 00 – Quality Assurance.
- .2 Preliminary project meetings:
 - .1 One week before start of work, hold a meeting in accordance with Section 01 32 16.06 – Construction Progress Schedule – Critical Path Method or Section 01 32 16.07 – Construction Progress Schedule – Bar (GANTT) Chart, to review the following:
 - .1 Work requirements;
 - .2 Installation and substrate conditions;
 - .3 Work performed with other building subtrades;
 - .4 Manufacturer's installation instructions and warranty requirements.
- .3 Certificates:

Rev. 00: Issued for tender (2013-11-19)

- .1 Technical data taken from catalogues and manufacturers' documentation shall be reliable, based on the results of tests carried out by the manufacturers themselves or on their behalf by independent laboratories, and shall enable to certify the compliance of the elements with current codes and standards.

1.14 HEALTH AND SAFETY

- .1 Perform construction occupational health and safety in accordance with architectural specifications, Section 01 35 29.06 – Health and Safety Requirements.

1.15 MAINTENANCE

- .1 Provide the following spare parts in accordance with Section 01 78 00 – Closeout Submittals:
 - .1 Waterproof seal set for each pump;
 - .2 Oil pan gasket for each pump size;
 - .3 Head gasket for each heat exchanger;
 - .4 Glass tube for each level indicator;
 - .5 Cartridge or filter pack for each filter battery, in addition to those that will be installed before final acceptance of installation.
- .2 Supply a kit containing special tools required to maintain equipment, according to manufacturers' recommendations and Section 01 78 00 – Closeout Submittals.
- .3 Supply a commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.
- .4 Refer to the various sections of the specifications for additional maintenance requirements.

1.16 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with architectural specifications, Section 01 61 00 – Common Product Requirements.
 - .2 Deliver and store materials in accordance with manufacturer's written instructions.

Rev. 00: Issued for tender (2013-11-19)

1.17 WASTE MANAGEMENT

- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for recycling and reuse in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.18 SPECIFIED EQUIPMENT AND MATERIALS AND EQUIVALENTS

Important note: The clauses of the item “Specified Equipment and Materials and Equivalents” have priority over corresponding clauses in the architectural specifications.

- .1 Where equipment is specified by a single brand name and model number, base the bid on that brand and model number.

Example of this type of specification: Equipment brand "A", model "X".

- .2 Where equipment is specified by a number of brand names and model numbers, base the bid on one of these brands and its model number.

Example of this type of specification: Equipment brand "A", model "X"; brand "B", model "Y"; brand "C", model "Z".

- .3 Where equipment is specified by brand name and model number with mention of other brands but without their model numbers or the term "or approved equivalent," base the bid on the equipment specified by brand name and model number and submit, if so desired, a request for equivalence for one of the other brands. The request for equivalence must be submitted with the bid indicating the amount of credit applicable. The request will be reviewed within thirty (30) days following award of the contract.

Should the equivalent equipment be refused, the Contractor must supply the specified equipment by model.

Example of this type of specification: Equipment brand "A", model "X"; brand "B"; brand "C".

- .4 Where equipment is specified by brand name and model number with mention of other brands without model numbers but with the term "or approved equivalent," base the bid on the equipment chosen by brand name and model number or on equivalent equipment among the other brands specified. The request for equivalence must be submitted following award of the contract but before submission of shop drawings.

Should the equivalent equipment be refused, the Contractor must supply the specified equipment by model.

Rev. 00: Issued for tender (2013-11-19)

Example of this type of specification: Equipment brand "A", model "X" or approved equivalent brand "B"; brand "C".

- .5 Where equipment or material is specified solely with reference to a standard, choose the equipment or material which meets or exceeds the requirements of the standard.
- .6 Mention of the names of manufacturers in the plans and specifications in addition to the product specified by catalogue number does not mean that the Engineer guarantees the existence of an equivalent product among these manufacturers or that the Engineer agrees to accept a product from among these brands. It is the Contractor's responsibility to ensure equivalency of the products it proposes and to provide proof of equivalency to the Engineer's satisfaction when submitting the request for equivalence and shop drawings.

The product proposed as an equivalent must have the same characteristics as the product specified by catalogue number. The request for equivalence must be accompanied by a comprehensive chart comparing the characteristics of both the specified and the proposed equipment or material.

The Engineer is the sole judge of a product's equivalency. Should the Engineer reject a submitted product, the Contractor must supply the equipment specified by catalogue number at no additional cost to the Owner.

- .7 The Contractor is responsible for any changes to the design, drawings or work of any discipline resulting from an equivalent product and shall pay any costs arising from such changes.
- .8 It is understood that acceptance of equivalent equipment in no way alters the Contractor's responsibility.
- .9 Unless otherwise indicated, use the products of the same manufacturer where materials or equipment is of the same type or class.
- .10 Required quality or acceptable product:
 - .1 Means that the equipment or material specified and identified by catalogue number is an integral part of the specifications and is used as a performance and quality criterion for the material and for execution.
- .11 By submitting its bid, the Contractor implicitly states that it is able to procure the equipment, in accordance with the rules set out above, within the time limits of the schedule of work.
- .12 The Contractor may attach to its bid a proposal for products other than those specified in the plans and specifications and include the amount of credit or additional charge applicable. It is understood that this proposal in no way binds the Engineer or the Owner.

1.19 SUBMITTAL PROCEDURES

- .1 Administrative documents and samples to be submitted:
 - .1 Submit promptly and in orderly sequence, so as to avoid delays in the execution of the work, the submittals required by the Engineer for approval. Failure to submit in ample time is not considered sufficient reason for an extension of execution time and no claim for extension by reason of such default will be allowed.
 - .2 Do not proceed with work for which submittals are required until a review of all submittals is completed.
 - .3 Present shop drawings, technical sheets, samples and mock-ups in the units used in the plans and specifications.
 - .4 Identify equipment using symbols appearing in plans and specifications.
 - .5 Where items or information is not produced in SI metric units, converted values are accepted.
 - .6 Review submittals prior to submission to the Engineer. With this review by the Engineer, the Contractor ensures that the requirements applicable to the work have been determined and verified and that each submittal has been checked and found compliant with the work requirements and the contractual documents.
 - .7 Shop drawings must bear the Contractor's seal along with the signature of its authorized representative stating that the documents submitted have been approved, that the measures taken on site have been verified and that everything is in compliance with the contractual documents.
 - .8 Submittals not stamped, signed, dated and identified in respect of the specific project will be returned without being examined and considered rejected.
 - .9 Clearly notify the Engineer in writing, at the time of submission, of any deviations from the requirements of the contractual documents, giving reasons for such deviations.
 - .10 Ensure that field measurements and affected adjacent work are coordinated.
 - .11 The Contractor's responsibility for errors and omissions in submission is not relieved by the Engineer's review of submittals.
 - .12 The Contractor's responsibility for deviations in submissions from requirements of the contractual documents is not relieved by the Engineer's review of submittals.

Rev. 00: Issued for tender (2013-11-19)

- .13 Adjustments made to the shop drawings by the Engineer are not intended to change the contract price. If adjustments affect the value of the work, state such in writing to the Engineer prior to proceeding with the work.
- .14 For each document submitted, keep a verified copy on site.
- .15 For additional requirements, refer to architectural specifications, Section 01 33 00 – Submittal Procedures.
- .2 Shop drawings and technical sheets:
 - .1 Submit shop drawings and technical sheets according to instructions. Submit shop drawings and technical sheets in electronic format (.pdf); these will be annotated and returned by the Engineer in .pdf format. Exception: shop drawings and technical sheets exceeding 28 cm (11 in.) x 43 cm (17 in.); two (2) copies of all formats of plans must be submitted; the Engineer retains one copy and the other is forwarded to the Owner.
 - .2 Submit shop drawings and technical sheets for all project equipment and devices and for all automatic control systems.
 - .3 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by the Contractor to illustrate details of a portion of work.
 - .4 Shop drawings must include the following information:
 - .1 Preparation and revision dates;
 - .2 Project name and number;
 - .3 Specification section number;
 - .4 Name and address:
 - .1 Of the General Contractor;
 - .2 Of the subcontractor;
 - .3 Of the supplier;
 - .4 Of the manufacturer.
 - .5 Shop drawings and technical sheets must indicate the following:
 - .1 Materials and manufacturing details;

- .2 Layout showing dimensions, including identified field dimensions;
 - .3 Clearances required to operate and maintain equipment, such as the space required to operate access doors;
 - .4 Assembly or adjustment details;
 - .5 Power, speed and capacity details;
 - .6 Mechanical connection details;
 - .7 Tables and performance curves showing points of operation;
 - .8 Acoustical power data of systems and equipment;
 - .9 Power requirements and details;
 - .10 Standard specifications;
 - .11 Operating weight;
 - .12 Wire maps;
 - .13 Single line and schematic diagrams;
 - .14 Technical details for judging equipment performance;
 - .15 Hazardous materials data sheets;
 - .16 Relationship to adjacent work.
- .6 Submit the following documents with shop drawings and product data:
- .1 Detailed drawings of bases, supports, and anchor bolts;
 - .2 Document issued by the manufacturer certifying current model production;
 - .3 Certification of compliance to applicable codes;
 - .4 Along with shop drawings for Hydro-Québec main circuit breaker and metering cabinets, and for circuit breaker distribution cells, provide a protection device coordination study that includes Hydro-Québec equipment, main circuit breaker and secondary circuit breakers.
- .7 Shop drawings must be reviewed and sealed by the Engineer. The Contractor must comply with the following:

- .1 Supply equipment as shown on shop drawing ("Supply as submitted" stamp);
 - .2 Supply equipment as corrected and commented ("Supply as corrected" stamp);
 - .3 Correct and resubmit shop drawing ("Correct and resubmit" stamp);
 - .4 Submit drawings using specified equipment, when equipment is refused ("Refused" stamp).
- .8 The Engineer's comments may state that the drawings are general and serve only to indicate to the Contractor that the equipment and layout comply with the general quality and appearance desired and in no way relieve the Contractor of its obligation to supply a product that complies with accepted standards, with the plans and specifications and with prevailing regulations and standards. These comments may relate to sizes and interferences with other aspects of the project. However, the Contractor remains solely and entirely responsible for sizes and interferences.
- .9 The Owner reserves the right to remove, at the Contractor's expense, any material or product that has not been formally submitted in the shop drawings or installation drawings and which have not been approved by the Engineer.
- .10 Keep a copy of shop drawings and product data on site for reference purposes.
- .11 Shop drawings and product data must be in French.
- .12 Shop drawings for grilles and diffusers submitted as equivalent to the products specified in the plans and specifications must come with a comparison table that provides, for each grille and diffuser, sizes, noise levels, air throw and pressure drop under design conditions.
- .13 The Contractor shall allocate, in its work plan, a minimum of ten (10) business days for the Engineer to review shop drawings.
- .3 Erection plans:
- .1 General:
 - .1 Prepare and submit erection plans to coordinate the work of other construction specialties. Erection plans to be submitted for the following work:
 - .1 All ventilation and air conditioning work;
 - .2 All sprinkler and fire prevention work;

- .3 Mechanical and electrical work in mechanical and electrical rooms, tunnels, shafts, parking areas, etc.;
 - .4 Mechanical and electrical work in areas obstructed with equipment such as corridor ceilings and raised floors;
 - .5 Sleeves, openings and perforations in wall, roofs, floors, beams and columns;
 - .6 Anchors;
 - .7 Supports in technical shafts;
 - .8 In locations indicated in mechanical and electrical specifications;
 - .9 This clause is not limitative. Erection plans may be required for other locations, as deemed by the Engineer.
- .2 Erection plans must clearly and precisely indicate the work of the discipline involved and work performed by other disciplines.
- .3 All erection plans must be prepared with the latest version of AutoCAD, submitted in a .DWG file, on paper and sepia according the quantity required. The AutoCAD layers for each subcontractor must meet Quebec Association of Consulting Engineers (AICQ) standards.
- .4 Description:
- .1 Erection plans consist of scale plans, showing the position of equipment, ducts, pipes, valves and other accessories with sections and details, including piping and duct dimensions, locations of sleeves, openings, anchors and supports; positions relative to the structure, architectural work and mechanical and electrical work.
 - .2 Prepare plans to appropriate scale but no smaller than 1:50 ($\frac{1}{4}$ in. = 1 ft.).
- .5 Preparation:
- .1 Each specialty must prepare their erection plans in coordination with other specialties.
 - .2 The General Contractor is responsible for coordinating the erection plans of all mechanical and electrical trades. These disciplines must provide all the data, drawings, schematics and diagrams required for coordinating the work.

- .3 The HVAC Contractor must prepare a drawing of its own work with all required data and dimensions and incorporate any information provided by other trades.
- .4 All erection plans for a given sector must be submitted for review at the same time.
- .5 At the request of the Engineer, submit erection plans printed in different colours to differentiate the work of the various trades.
- .6 Cooperation:
 - .1 There must be close collaboration among the companies responsible for mechanical and electrical work when choosing equipment locations to avoid incompatibilities.
- .7 Distribution of erection plans:
 - .1 Submit for verification two copies approved by the General Contractor and signed by all project participants to the Engineer.
 - .2 Once reviewed, drawings must be corrected by relevant specialties and, when required, resubmitted.
- .8 Responsibility:
 - .1 Each subcontractor is directly responsible for the correct placement and size of openings, bases, perforations and sleeves, for the location of equipment, piping and ducts whether or not the structural, architectural and electrical drawings are graded.
 - .2 The HVAC Contractor must ensure erection plans are completely coordinated.
 - .3 No compensation is paid for changes imposed on the work for the purposes of coordinating and integrating mechanical and electrical systems.
 - .4 Verification of erection plans by the Engineer is limited to ensuring that technical requirements have been met (VCF valves, grilles, insulation, etc.). The Engineer does not verify the quality of contractors' coordination.
- .9 Existing work:
 - .1 Erection plans must take into account existing mechanical, electrical, structural and architectural installations in addition to the work to be performed.

Rev. 00: Issued for tender (2013-11-19)

- .10 Original erection plans:
 - .1 At the end of work, each mechanical and electrical contractor must submit CD-ROMs of AutoCAD drawings and one copy of as-built drawings to the Owner.
- .11 Verification of erection plans:
 - .1 In its work plan, the Contractor shall allocate a minimum of ten (10) business days for the Engineer to review the erection plans.
- .4 Product samples:
 - .1 Submit for review three (3) samples of products in accordance with the provisions of the technical sections of the specifications. Label samples with origin and intended use.
 - .2 Mark and identify samples according to the schedule in the plans and specifications.
 - .3 Deliver samples prepaid to the Engineer's business address.
 - .4 Notify the Engineer in writing, at time of submission, of deviations in samples from requirements of contractual documents.
 - .5 Where colour, pattern or texture is a criterion, submit a full range of samples.
 - .6 Adjustments made to samples by the Engineer are not intended to change the contract price. If adjustments affect the value of work, state such in writing to the Engineer prior to proceeding with work.
 - .7 Make changes in samples, which the Engineer may require, consistent with contractual documents.
 - .8 Samples will be delivered to the Contractor, who shall store them on site in an appropriate location and keep them until the end of work. At the end of work, the Contractor may dispose of samples as it sees fit.
 - .9 Reviewed and accepted samples will become the standard against which the quality of the materials will be evaluated.
 - .10 For additional requirements, refer to architectural specifications, Section 01 33 00 – Submittal Procedures.
- .5 Work samples:

- .1 For repetitive work, perform on site, for approval, an installation and connection prototype to serve as a model for the work.
- .2 Construct work samples at locations requested by the Engineer or indicated in the section concerned.
- .3 Prepare work samples for approval by the Engineer promptly and in orderly sequence so as to avoid delays in the execution of the work.
- .4 Failure to submit work samples in ample time is not considered sufficient reason for an extension of execution time and no claim for extension by reason of such default will be allowed.
- .5 Remove work samples at the end of work or at a time determined by the Engineer.
- .6 Work samples may be incorporated into the finished work.
- .7 Each section of the specifications dealing with work samples specifies whether these may be incorporated into the finished work or when they must be removed.
- .8 For additional requirements, refer to architectural specifications, Section 01 33 00 – Submittal Procedures.

1.20 EQUIPMENT AND MATERIALS

- .1 Quality:
 - .1 Unless otherwise indicated, equipment and materials used for execution of the work must be new, in perfect condition, manufactured, assembled and tested at the factory in accordance with the contractual documents. Equipment and materials must be ready to be installed for the purposes for which they are intended. If necessary, provide proof establishing the nature, origin and quality of the products provided.
 - .2 No used equipment or material may be used in the execution of the work unless specifically requested in the plans and specifications. This clause takes precedence over all other clauses in the contractual documents.
 - .3 Equipment and materials must be approved by the relevant organizations such as the CSA, ULC, ASME, FM, CGA, etc.
 - .4 Information included on equipment and materials must be in French.
 - .5 Equipment or materials found to be defective before the end of work will be rejected regardless of the conclusions of previous inspections. The Contractor

Rev. 00: Issued for tender (2013-11-19)

shall ensure removal and replacement of defective products at its own expense. The Contractor is responsible for any delays and resulting costs.

- .6 In the event of a dispute over the quality or suitability of a product, the Engineer alone may decide the issue based on the requirements in the contractual documents.
- .7 Equipment or materials must have characteristics and dimensions suitable to the locations where they are to be installed. Inform the Owner prior to proceeding with installation if equipment or material does not meet these conditions.
- .2 Delivery:
 - .1 Pay transportation costs for equipment and materials required for the work.
 - .2 Transportation costs for equipment and materials supplied by the Owner shall be paid by the Owner. Unload, handle and store equipment and materials. Costs of lifting equipment required for handling equipment and materials from the delivery point to installation shall be borne by the Contractor.
 - .3 Ensure deliveries are coordinated of and pay demurrage charges.
- .3 Storage, handling and protection of equipment or materials:
 - .1 The Contractor is responsible for inspecting, storing, installing and connecting equipment and materials that arrive at the site.
 - .2 Without damaging, marring or soiling equipment and materials, move and store in a secure location and follow manufacturer's instructions, where applicable.
 - .3 Store equipment and materials in their original packaging, taking care to leave intact the manufacturer's label and seal.
 - .4 Replace, at no additional cost, damaged equipment and materials to the Owner's satisfaction.
- .4 Unless otherwise indicated, install equipment or materials according to manufacturer's instructions.
- .5 For additional requirements, refer to architectural specifications, Section 01 61 00 – Common Product Requirements.

1.21 USE OF THE SITE

- .1 If necessary, determine with the Owner, site access roads, storage areas, suitable locations for stacking materials and location of facilities.

Rev. 00: Issued for tender (2013-11-19)

- .2 Move stored materials that hinder the Owner's operations or the operations of another Contractor.
- .3 After obtaining the required authorizations, pay the costs associated with the use of additional storage or work areas required for the work.
- .4 The Contractor is responsible for any damage caused to the building, the site or existing facilities during the period of project-related work, which ends with final acceptance by the Engineer. Consequently, the Contractor must restore any damaged part to its original state.

1.22 EXECUTION

- .1 General:
 - .1 Ensure quality of work is of the highest standard and performed in accordance with industry standards, prevailing codes and standards and manufacturer's recommendations, and executed by teams of workers experienced and skilled in the respective duties for which they are employed. Immediately inform the Engineer if the work is such as to make it impractical to achieve the required results.
 - .2 The Owner reserves the right to require the dismissal of any person deemed incompetent, careless, insubordinate or whose presence cannot be tolerated on the site.
 - .3 For additional requirements, refer to architectural specifications, Section 01 73 00 – Execution Requirements.
- .2 Cooperation:
 - .1 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision.
 - .2 Be responsible for coordination and placement of openings, sleeves and accessories.
 - .3 Ensure openings are large enough for equipment to pass.
- .3 Concealment:
 - .1 Unless otherwise indicated, in finished areas conceal pipes, ducts and electrical wiring in floors and ceilings.
 - .2 Prior to concealing raceways, inform the Engineer of any unusual situation. Install according to the Engineer's instructions.

Rev. 00: Issued for tender (2013-11-19)

- .3 No work, such as pipes, ducts, etc., is to be concealed before inspection and approval.
- .4 Cutting and patching:
 - .1 Perform cutting and patching work for those parts of the work which form a coherent whole. Coordinate works consequently.
 - .2 Structural elements may not be perforated or cut without the written approval of the structural Engineer.
 - .3 Specialists familiar with the materials affected shall perform cutting and patching. Perform in a manner to neither damage nor put at risk any portion of the work.
 - .4 All openings shown on the structural plans must be made by the General Contractor; however, the specialized Contractor concerned must verify placement and sizes before construction or concreting. The specialized Contractor shall provide the General Contractor with any size changes resulting from the final choice of equipment.
 - .5 If additional openings are required after concreting, the Contractor concerned must use a diamond drill, with the approval of the General Contractor and the permission of the structural Engineer. In addition, the Contractor concerned must repair any resulting damage.
 - .6 If openings are required after concreting or in an existing slab, the subcontractor responsible for drilling must locate any concealed services using infrared or other devices to avoid cutting existing services or utilities.
 - .7 Additional work resulting from poor coordination cannot be charged to the Owner.
- .5 Location of equipment and materials:
 - .1 The plans and specifications indicate the approximate locations of ducts, piping, pull boxes, junction boxes, etc.

Before the start of work, check the size and the exact layout of equipment on the site and not to scale in the plans.
 - .2 The exact location of equipment and materials, which is approximate in the plans, will be determined jointly with the Owner on site.
 - .3 Install equipment, materials and raceways so as to limit congestion and preserve as much useful space as possible, in accordance with manufacturer's recommendations on safety, access and maintenance.

- .4 Inform the Owner of any problem which placement of equipment or material may cause and proceed with installation following the Owner's instructions.
- .5 If access doors need to be installed for maintenance or access to equipment or materials, obtain the Owner's approval before proceeding with installation. Supply and installation of access doors is without additional cost to the Owner.
- .6 The location of devices and equipment may be changed at the Owner's request without additional cost or credit, on condition that relocation does not exceed 5 metres and the request is made prior to performance of the work.
- .6 Protection of work in progress:
 - .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.
 - .2 Ensure finished work or work in progress is adequately protected. Work that has been damaged or marred due to a lack of protection must be replaced or repaired free of charge in accordance with the Owner's requirements.
 - .3 All open ends of ducts and pipes laid by the Contractor must be hermetically sealed so as to prevent dust or other waste from entering during the work. All machinery must be protected against dust and weather with a polyethylene tarpaulin.
- .7 Temporary services:
 - .1 No permanent equipment is to be used for temporary services without the Owner's written authorization.
 - .2 If the Contractor disregards this warning, the Owner reserves the right to reject such material and replace it with new material at the Contractor's expense.

1.23 WORK COORDINATION

- .1 Each specialized Contractor must review all construction plans and any other document issued following award of the contract prior to proceeding with installation of its equipment, and ensure, based on the equipment and shop drawings, that the equipment can be installed in the location specified in the plans without hindering installation of equipment of other specialties.
- .2 Special attention must be paid to the installation of equipment on or suspended from ceilings, on duct risers in shafts, and on or in walls. Equipment that must remain accessible must be installed so that other equipment, ventilation ducts or inaccessible ceilings do not obstruct access. Check the depth of equipment recessed in walls and ceilings to coordinate installation.

Rev. 00: Issued for tender (2013-11-19)

- .3 Location of lighting fixtures in mechanical rooms is determined after installation of other equipment.
- .4 When the work of one specialty may damage the work of another specialty, inform the affected Contractor with the General Contractor, and come to an agreement on the most effective way to protect the equipment.

1.24 PAINTING REPAIRS AND RESTORATION

- .1 Do painting in accordance with Section 09 91 23 – Interior Painting.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged.

1.25 FIELD QUALITY CONTROL

- .1 Manufacturer's field services:
 - .1 Obtain and submit a written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.
 - .2 Manufacturer to provide product use recommendations and perform periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Provide for site visits.

1.26 FOREMAN

- .1 Each specialty must be represented on site by a foreman.
- .2 The foreman must have sufficient expertise in the trade to enable effective collaboration with the other subcontractors and ensure that orders issued by those in authority are properly executed.
- .3 The foreman must attend all regularly schedule site meetings, unless otherwise authorized by the Architect or Engineer.
- .4 The foreman must be fluent in French.

1.27 EXCAVATION AND BACKFILL

- .1 All concreting, excavation and backfilling of trenches, ditches, sumps, bottom wells, tanks, as well as holes for poles and concrete bases is the responsibility of the

Rev. 00: Issued for tender (2013-11-19)

specialized Contractor, who must coordinate such work; however, this work is performed by the General Contractor unless otherwise indicated.

- .2 Backfilling may only be done following inspection and with the Engineer's authorization.
- .3 When trenches or concrete bases are required for equipment, each specialized Contractor must determine, for its own discipline, the size and exact location and supervise the work to ensure proper execution in accordance with the contractual documents.

1.28 CONCRETE BASES AND STRUCTURAL SUPPORTS

- .1 Equipment installed on the floor must be mounted on a concrete base. Concrete foundations on the floor must be dowelled to the floor except where insulated with vibration-absorbent material. These bases must be minimum 100 mm (4 in.) in height, and extend by 200 mm (8 in.) over the entire perimeter of the equipment base plate. Base plates must have a smooth, level finish with bevelled 45° edges. Concrete bases are to be built by the General Contractor.
- .2 Horizontal and vertical tanks and heavy parts of ventilation units must be supported by a steel structure composed of I-beams, H-beams or angle beams with reinforcement and bracing. Horizontal tanks must rest on a steel bridge with steel or cast iron cradles.
- .3 All steel supports in the floor must have, at their base, a steel plate bolted to the floor.
- .4 For ceiling or wall mountings, use suspended platforms or suspension rods, brackets or shelves. Suspend and attach to the building structure with the approval of the structural Engineer.
- .5 Supply all steel structures required for equipment installation.
- .6 Supports supplied by equipment manufacturers are specified in the section describing the equipment.
- .7 Supports not supplied by equipment manufacturers must be galvanized structural steel.
- .8 Supports must be braced to withstand seismic stress as required by the QCC.

1.29 CORROSION PROTECTION

- .1 All unprotected metal parts such as pipe brackets, anchors, machinery, etc. must be given, on site, a coat of anti-corrosion paint once metal surfaces have been cleaned.
- .2 All caps, screws and other devices outside the building must be bronze or cadmium plated.

Rev. 00: Issued for tender (2013-11-19)

- .3 Prime and touch up marred finished paintwork to match original.
- .4 Restore surface finishes that have been too severely marred for primer or touch ups.
- .5 Cut or perforated parts of devices, equipment or accessories made from galvanized steel must be protected with Galvicon paint or approved equivalent.

1.30 ANCHORS

- .1 Anchorage using fastening tools is not permitted. Expansion bolts must be used to secure ducts to walls or ceilings. The Engineer and the Architect reserve the right to require any type of anchoring they deem suited to site conditions.
- .2 Anchoring used to support equipment, apart from air ducts, in walls and concrete ceilings must be HILTI, HVA series, and in hollow block walls, HILTI, HY20 series.

1.31 ERRORS AND OMISSIONS

- .1 No additional charge will be allowed when work needs to be redone due to error, omission or lack of coordination on the part of the Contractor.

1.32 CLEANING

- .1 Clean the site on a regular basis and remove waste.
- .2 Clean and restore to good condition all locations used as service areas.
- .3 Upon the Owner's taking possession of the building, all equipment must be clean inside and out.
- .4 For additional requirements, refer to architectural specifications, Section 01 74 11 – Cleaning.

1.33 OWNER'S RIGHTS

- .1 The Owner reserves the right to have others, at its own expense, perform work involving the project but not included in the plans and specifications. The Contractor is not, however, released from its responsibility with respect to the work included in its contract.

1.34 PROGRESSIVE ESTIMATES

- .1 Prior to the first request for monthly payment, the Contractor shall submit for the Engineer's approval, a detailed breakdown of the contract price. This list, once approved by the Engineer, will serve as the basis for issuing monthly payment certificates.

- .2 Progressive estimates prepared by the Contractor must be submitted to the Engineer for approval before being submitted to the Owner. The latter will make no payment without such approval.
- .3 The Contractor must charge only for materials installed and not for materials available on site. The Engineer may, exceptionally, accept materials or equipment for specific contract use. The Engineer's approval of progressive estimates does not constitute partial acceptance of work.

1.35 SITE INSPECTION

- .1 Unless otherwise indicated, the Contractor shall inform the Engineer forty-eight (48) hours prior to concealing installed materials so that the latter may conduct an inspection. Omission of this procedure will require the Contractor, if the Engineer so demands, to uncover said materials in order that an inspection may be conducted.
- .2 The Engineer will regularly visit the site to observe the progress of the work. If a defect is brought to the attention of the Contractor, the Contractor must promptly correct the anomaly. Refusal by the Contractor to comply with such an order may result in work stoppage until an understanding has been reached between the Engineer and the Contractor.

1.36 TESTS AND CERTIFICATION

- .1 At the end of work, start up electro-mechanical equipment and systems, check that they function properly, test, adjust, balance and ensure that they meet all requirements in the plans and specifications; submit reports on these activities.
- .2 Subsequently, demonstrate systematically, in the presence of the Engineer, that all equipment and systems function as specified in the plans and specifications. A second series of tests will be run, if necessary, within two (2) weeks of the first series. Following these tests, deliver a report to the Owner. Commissioning must be carried out during the relevant season. Start up of the heat transport systems must be done during their respective operating period, assuming a time lag between heating and air conditioning periods.
- .3 Conduct tests and supply all required material. Inform the Owner twenty-four (24) hours in advance so that it can delegate operations and maintenance personnel to attend the tests, if so desired.
- .4 For all major equipment (such as boilers, chillers, cooling towers, humidifiers, dust collectors) or at the request of the Engineer, the manufacturer shall check compliance of the installation of its equipment at the site, draw up (if necessary) a list of deficiencies and issue a certificate of conformity once such deficiencies have been corrected. This work shall be done in coordination with all parties involved in the work in question. The

Rev. 00: Issued for tender (2013-11-19)

equipment manufacturer will also be present during start up at the site and will give any necessary instructions to maintenance personnel.

- .5 Refer to the descriptions of each section for specifically requested tests.
- .6 Test reports are a condition for the acceptance of work by the Owner. Provide all certificates required by the regulations, laws and the contract.

1.37 CLOSEOUT SUBMITTALS

- .1 Operating and Maintenance Manual:
 - .1 Submit closeout submittals incorporated into the "Operating and Maintenance Manual".
 - .2 Supply the operating, maintenance and performance technical sheets and incorporate them into the "Operating and Maintenance Manual".
 - .3 Operating, maintenance and performance technical sheets must be verified prior to final inspection by the Owner, who will keep final copies.
 - .4 Operating sheets to include:
 - .1 Control schematics for each system including environmental controls;
 - .2 Description of each system or installation, and their controls;
 - .3 Description of the operation of each system or installation at various loads together with reset schedules and seasonal variances;
 - .4 Operating instructions for each system, installation and component;
 - .5 Description of actions to be taken in event of equipment failure;
 - .6 Valves schedule and flow diagram;
 - .7 Colour coding chart.
 - .5 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment;
 - .2 Information concerning the frequency of tasks as well as the tools, parts and time required for these tasks.

Rev. 00: Issued for tender (2013-11-19)

- .6 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation once commissioning is complete;
 - .2 Equipment performance verification test results;
 - .3 Any other special performance data as specified in contractual documents;
 - .4 System testing, adjustment and balancing test reports.
- .7 Operating and maintenance manuals must also include:
 - .1 Any reviewed and corrected shop drawings;
 - .2 Layout of all equipment as installed in the project;
 - .3 Exact description of operating stages for each system;
 - .4 Step-by-step description of start and stop procedures for reliable and safe operation;
 - .5 List of equipment parts likely to need replacement on a regular basis with replacement intervals;
 - .6 List of spare parts with names, addresses and telephone numbers of suppliers for all equipment, motors and accessories provided and installed, with a reference to the relevant sections in the specifications.
- .8 Approval:
 - .1 Submit a draft "Operating and Maintenance Manual" to the Owner for approval. Unless otherwise indicated by the Owner, do not submit individual data sheets.
 - .2 Make changes to the "Operating and Maintenance Manual" as required and re-submit as directed by the Owner.
 - .3 Provide three final copies of the "Operating and Maintenance Manual".
- .9 Additional data:
 - .1 Prepare and insert into the "Operating and Maintenance Manual" additional data when the need for it becomes apparent during specified demonstrations and instructions.

- .10 The “Operating and Maintenance Manual” must be in French, inserted into a binder and organized according to the order of specification sections.
- .11 For additional requirements, refer to architectural specifications, Section 01 78 00 – Closeout Submittals and Section 21 00 50/26 00 50 – Mechanical/Electrical – Commissioning of Mechanical/Electrical Work.
- .2 Personnel Safety Guidelines:
 - .1 Provide three (3) copies of the Personnel Safety Guidelines.
 - .2 Document content - the manual must contain information on:
 - .1 Potential emergency situations, including: fire and smoke, power failures, water supply interruptions and loss of water pressure, chemical spills and refrigerant leaks;
 - .2 Elevator, service elevator and escalator failures;
 - .3 HVAC and fuel supply failures;
 - .4 Intrusions and security breaches;
 - .5 Natural disasters, bomb threats and other disruptive situations;
 - .6 Emergency power supply for high security and medical facilities and computer systems;
 - .7 Emergency procedures in case of fire, power failures and major equipment failures;
 - .8 Names and addresses persons to contact in an emergency;
 - .9 This document must be easy to obtain and understand even for users with no technical knowledge;
 - .10 For additional requirements, refer to architectural specifications, Section 01 78 00 – Closeout Submittals and Section 21 00 50/26 00 50 – Mechanical/Electrical – Commissioning of Mechanical/Electrical Work.
- .3 As-built drawings:
 - .1 Site records:
 - .1 Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

Rev. 00: Issued for tender (2013-11-19)

- .2 Transfer information to printed copies, revising reproductibles to show mechanical systems and equipment as actually installed.
- .3 Make available for reference purposes and inspection.
- .2 As-built drawings:
 - .1 Before starting tests, system balancing and adjustments, update as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm (1/2 in.) high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AND EQUIPMENT AS INSTALLED", "Signature of Contractor" and "Date".
 - .3 Submit drawings to the Engineer for approval and make corrections as directed.
 - .4 Test, balance and adjust systems, equipment and networks based on as-built drawings.
 - .5 Submit completed as-built drawings with "Operating and Maintenance Manuals".
- .3 Submit a copy of as-built drawings and include them in the final report on testing, balancing and adjustment of systems and facilities.
- .4 As-built drawings must be provided prior to requesting acceptance of work.
- .5 For additional requirements, refer to architectural specifications, Section 01 78 00 – Closeout Submittals.
- .4 Warranty:
 - .1 Guarantee the work and its proper operation under this contract.
 - .2 Provide guarantees demonstrating that the work supplied under this contract has been done with care using high-quality materials, tested in accordance with these specifications and that the results of these tests comply with the requirements of the approved specifications and drawings.
 - .3 No payment certificate issued or paid, nor any partial or total occupation of the project, relieves the Contractor of its responsibility for defective materials or poor workmanship that becomes apparent during the warranty period.

- .4 Correct any fault detected in the work during the warranty period, whether due to defective material, workmanship or to any other cause that is the responsibility of the Contractor.
- .5 Defective work must be corrected promptly and at the Contractor's expense, by replacing, repairing or redoing the work according to the nature of the problem, to the Owner's satisfaction. Damage and work arising from corrective work, such as cutting, resurfacing, painting, equipment removal, etc., shall be at the Contractor's expense.
- .6 If the Contractor fails to remedy a defect within three (3) days following notice given by the Owner, or if the work does not progress at a suitable pace, the Owner may perform repairs or corrections itself or through another designated person. The cost of this work shall be borne by the Contractor.
- .7 The Contractor guarantees that corrective work meets the performance, resistance and operating characteristics set out in the plans and specifications.
- .8 For additional requirements, refer to architectural specifications, Section 01 78 00 – Closeout Submittals.

1.38 TRAINING OF OPERATING AND MAINTENANCE PERSONNEL

- .1 Supply tools, equipment and qualified instructors to provide training to operating and maintenance personnel in the operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance and delivery of systems and equipment.
- .2 Where specified in other provisions or at the request of the Engineer, manufacturers shall conduct demonstrations and staff training.
- .3 Training must be based on the contents of the "Operating and Maintenance Manual" and as-built drawings.
- .4 For training duration, refer to Section 21 00 20 – Scope of Mechanical Work.

1.39 REQUIREMENTS FOR INTERIM INSPECTION

- .1 Before requesting final work inspection, the Contractor shall:
 - .1 Complete the work as far as possible; otherwise, the Engineer may refuse to draw up an overlong list of deficiencies. In addition, the Contractor may be charged for any unnecessary travel undertaken by the Engineer due to lack of coordination or negligence;

- .2 Clean the exterior and interior of all project devices and touch up paint on equipment, where necessary;
 - .3 Submit as-built drawings;
 - .4 Display all certificates;
 - .5 Provide instruction manuals;
 - .6 Deliver balancing reports;
 - .7 Supply required replacement parts.
- .2 During the inspection, the Contractor must:
- .1 Systematically demonstrate that all systems and equipment operate in compliance with the requirements of the plans and specifications;
 - .2 Provide the Engineer with the resources to conduct inspections, such as availability of a person to place stools and ladders where required, removing ceiling tiles, opening access doors, starting and stopping systems, etc.

1.40 ACCEPTANCE OF THE WORK

- .1 Upon receipt of written notice by the Contractor that the work is completed and that an acceptance certificate is required, the Engineer will conduct a first general inspection of the work.
- .2 The Engineer will draw up a list of deficiencies to be corrected. This list shall be called "LIST OF DEFICIENCIES No. 1."
- .3 Following written confirmation by the Contractor that all work is completed and complies with the contractual documents and the "FIRST LIST OF DEFICIENCIES" issued by the Engineer, the latter will conduct a second inspection and prepare, if necessary, a "SECOND LIST OF DEFICIENCIES" If installation is compliant and acceptable, an official document approving the mechanical and electrical work will be issued.
- .4 The Contractor shall pay all costs subsequent to the first general inspection if this inspection is insufficient for the Engineer to issue a "FINAL ACCEPTANCE OF WORK."
- .5 Consequently, subsequent lists of deficiencies (second, third, etc.), required for final acceptance of work, will be charged on an hourly basis to the Owner by the Engineer. The Owner will then deduct this amount from the amount in the Contractor's contract.

END OF SECTION

Rev. 00: Issued for tender (2013-11-19)