



City of Saint John

## TENDER

**Tender # 2023-085302T**

### **Supply of High Temperature Heat Pump Chiller**

Sealed tenders, hand delivered or couriered, addressed to Monic MacVicar, CCLP, CPPB, Supply Chain Management, 1st Floor – 175 Rothesay Avenue, Saint John, NB, E2J 2B4, and marked on the envelope:

#### **“Tender # 2023-085302T - Supply of High Temperature Heat Pump Chiller”**

will be received until 2:30:00 pm, Tuesday, July 25<sup>th</sup>, 2023 for the supply of a high temperature heat pump chiller, in accordance with the enclosed specifications, terms and conditions.

In light of the current Covid-19 pandemic, there will be no public opening. Tenders will be opened by the Tender Opening Committee, in the second-floor boardroom, 175 Rothesay Avenue, Municipal Operations Complex, immediately following the tender closing time. **Registered bidders may attend remotely via Teams invitation.**

The lowest or any tender not necessarily accepted.

**Monic MacVicar, CCLP, CPPB  
Supply Chain Management**

*Issued: Monday, July 10<sup>th</sup>, 2023*

**TENDER**  
**Tender No. 23-085302T -**  
**Supply of High Temperature Heat Pump Chiller**

**SCOPE OF WORK:**

The City of Saint John is requesting pricing on the supply of a high temperature heat pump chiller, in accordance with the enclosed specifications, terms and conditions.

**SPECIFICATIONS:**

See Appendix A.

**TERMS AND CONDITIONS**

**Governing Law, Trade Treaties and Policies**

This procurement will be in accordance with the laws of the province of New Brunswick and the federal laws of Canada.

This procurement is also subject to the following Policies, Legislation and Internal Trade Agreement(s) including:

- Canadian Free Trade Agreement (CFTA)
- New Brunswick Procurement Act and Regulation 2014-93
- City of Saint John Strategic Procurement Policy

**Submission Instructions**

Sealed tenders, hand delivered or couriered, addressed to Monic MacVicar, CCLP, CPPB, Supply Chain Management, 1st Floor – 175 Rothesay Avenue, Saint John, NB, E2J 2B4, and marked on the envelope:

**“Tender # 23-085302T -**  
**Supply of High Temperature Heat Pump Chiller”**

will be received until 2:30:00 pm, Tuesday, July 25<sup>th</sup>, 2023, for the goods contemplated in this document and in accordance with the enclosed specifications, terms, and conditions.

**Enquiries**

Bidders shall promptly examine the bid documents and report any errors, omissions or ambiguities and may direct enquiries or seek additional information in writing by email before the deadline for enquiries to the Authorized Enquiries Contact as set out below. No such communications are to be directed to anyone other than the Authorized Enquiries Contact.

**Authorized Enquiries Contact**

Monic MacVicar, CCLP, CPPB  
Supply Chain Management  
City of Saint John  
Email: [supplychainmanagement@saintjohn.ca](mailto:supplychainmanagement@saintjohn.ca)

It is the Bidder’s responsibility to seek clarification from the City on any matter it considers unclear. The City shall not be responsible for any misunderstanding on the part of the Bidder concerning this bid document or its process.

The City intends to confirm receipt of a bidder’s communication by way of an email or facsimile in reply. If a bidder has not received a reply, the bidder may wish to resend its communication as the lack of reply may have resulted from a technical problem. The City is under no obligation to respond to enquiries or provide additional information but may do so at its sole discretion.

Responses to inquiries may be distributed to all bidders on the invitation list as having received the bid documents as of the date the response is prepared. The source of the question will not be identified in the response. Verbal information shall not be binding upon the City. Inquiries received after the deadline for enquiries will not receive a response.

**Tender to be Submitted on Prescribed Form**

Bidders are to submit their tender on the prescribed form contained in this document. Failure to submit on this form may result in the disqualification of the bid.

**Taxes**

The bid price shall be all taxes extra. The City of Saint John shall be invoiced for and pay all applicable taxes related to this bid.

**Schedule for the Bid Process**

Issue Date	Monday, July 10 <sup>th</sup> , 2023
Deadline for Enquiries	Monday, July 17, 2023, 4:00:00 pm, Atlantic Time
Deadline for Issuing Addenda	Tuesday, July 18 <sup>th</sup> , 2023, 4:00:00 pm, Atlantic Time
Submission Deadline	Tuesday, July 25 <sup>th</sup> , 2023, 2:30:00 pm, Atlantic Time
Date of Award	TBD

The Schedule for the bid process is tentative only and may be changed by the City in its sole discretion.

### **Advisory Notice(s)**

Periodically, the City of Saint John is required to issue clarification notices to a bid document in the form of Advisory Notices. Normally these notifications will not have a direct bearing on the cost of a project and will not influence bidding.

Bidders are responsible for obtaining all advisory notice(s) issued by the City. Advisory Notice(s) may be obtained from the City's website ([www.saintjohn.ca](http://www.saintjohn.ca)) under the Menu option, City Hall header, then "Tender and Proposals".

Bidders are instructed to sign the Advisory Notice and return it either by fax to (506) 658-4742 or email to [supplychainmanagement@saintjohn.ca](mailto:supplychainmanagement@saintjohn.ca) prior to the closing date. Failure to comply with the instructions on an advisory may result in rejection of the bid.

### **Addenda**

Periodically, the City of Saint John is required to issue notification of changes or corrections to a bid document by way of addenda. Normally these notifications will have direct bearing on the cost of a project and will influence bidding. Therefore, it is important that the City have assurances that bidders have in-fact received the notification(s).

Bidders are responsible for obtaining all addenda issued by the City. Addenda may be obtained from the City's website ([www.saintjohn.ca](http://www.saintjohn.ca)) under the Menu option, City Hall header, then "Tender and Proposals".

**Bidders are required to sign and include all addenda with their bid submission.**

Failure to include a copy of all signed addenda with the bid submission may result in rejection of the bid regardless of whether or not the changes noted in the addendum are included in the bid submission.

### **Mandatory Requirements**

Each submission will be evaluated to ensure that it complies with the mandatory requirements and may be rejected if it does not comply. The evaluation of mandatory requirements will confirm that:

- the submission was received prior to the applicable Submission Deadline;
- the bid submission is signed;
- the bid submission is legible;
- the bid submission does not contain a substantive qualification or conditions that are contrary to the terms of the bid document;
- the bid submission does not contain a change in price that was not initialled by the person who signed the submission; and
- the bid submission is in English;

### **Payment**

Payment shall be based on Net 45 Days from date of invoice or receipt of goods/services, whichever is later. Invoices can either be mailed to: City of Saint John, Accounts Payable Department, P.O. Box 1971, Saint John, NB, E2L 4L1, or by email to the Accounts Payable department ([accountspayable@saintjohn.ca](mailto:accountspayable@saintjohn.ca)). Vendors are to ensure invoices are not sent both ways.

**Pricing**

The tender prices shall include the units, insurance, transportation, delivery, duty, and any other charges incurred in order to provide required goods on site.

**Delivery / Freight**

The net price on each of the commodity(s) and/or service(s) is to be quoted as F.O.B. delivered to Saint John, NB, prepaid.

**Substitutes**

Substitute products will not be considered.

**Verbal Agreement**

No verbal agreement or conversation with any officer, agent or employee of the owner either before or after execution of the contract shall effect or modify any of the terms or obligations contained in any of the documents comprising the said contract.

**Fax Tenders**

Tenders received by fax WILL NOT be accepted.

**Late Bids**

Bids received after the time and date as shown in this document shall not be considered.

**Cancelation Clause**

In the event that the successful bidder does not comply with the specifications and terms and conditions of this tender, at any time throughout the duration of the contract, the City of Saint John reserves the right to cancel the contract in its entirety.

**Basis for Award**

A The city does not limit itself to accepting the lowest, or any tender submitted, but reserves the right to award the tender in any manner deemed to be in the City's best interest. It is the City of Saint John's intention to award this agreement to one Vendor.

**No guarantee**

The City makes no guarantee as to the volume of the Deliverables.

### **Acceptance, Revocation and Rejection Of Tenders**

The bidder agrees that his tender is a firm offer to supply the goods and/or services specified herein at the quoted price, and in accordance with the terms and conditions herein contained. The bidder may revoke his tender at any time prior to the time fixed for tender opening by delivering, or causing to be delivered, written notice of revocation to the designated official at the City of Saint John. Revocation will take effect from the time the notice is actually received. A notice of revocation will not be accepted after the time fixed for tender opening.

The bid shall not be restricted by a statement added to the Tender Form, or by a covering letter, or by alterations to the tender form as supplied, unless otherwise provided herein and further, a tender form that has been altered in any way may be deemed to be a non-confirming bid and, therefore, rejected. Bidders shall be allowed to attach descriptive literature; whose sole purpose is to amplify the bid.

### **Due Diligence**

In the event that a health and safety offence is committed, the onus falls on the employer to prove that it exercised due diligence (i.e. did everything it reasonably could) in order to avoid the offence.

When hiring contractors, the City of Saint John is responsible for ensuring compliance with Health and Safety Legislation and must make sure that the appropriate accident prevention systems are implemented in the workplace.

Therefore, if any contractor is found to be working in an unsafe manner, or outside of current legislation, he will be made to stop work immediately. Any losses which may arise as a result of this work stoppage are the responsibility of the contractor.

Failure to comply with current legislation on the part of the contractor, may lead to cancellation of this contract and any bid deposits that may be in place.

### **Reserved Rights**

The City reserves the right to:

- a) Reject an unbalanced bid submission. For the purpose of this section, an unbalanced bid submission is a bid submission containing a unit price which deviates substantially from, or does not fairly represent reasonable and proper compensation for the unit of work bid or one that contains prices which appear to be so unbalanced as to adversely affect the interests of the City. The City reserves the right to use other bids submitted in response to this bid solicitation or for other like or similar work as a guideline in determining if a bid is unbalanced.
- b) Amend or modify the scope of the Work, and/or cancel or suspend the bid award, at any time for any reason;
- c) Require bidders to provide additional information after the submission deadline to support or clarify their bid submission;
- d) Not accept any or all bids;

- e) Not accept a bid submission from a bidder who is itself, or whose principals, owners or directors are also principals, owners or directors of another entity which is, involved in litigation, arbitration or any other similar proceeding against the City;
- f) Reject any or all bid submissions without any obligation, compensation or reimbursement to any bidder or any of its team members;
- g) Withdraw this bid solicitation and cancel or suspend the bid process;
- h) Extend, from time to time, any date, any time period or deadline provided in this bid solicitation (including, without limitation, the submission deadline), upon written notice to all bidders;
- i) Assess and reject a bid submission on the basis of:
  - (i) information provided by references;
  - (ii) the bidder's past performance on previous contracts;
  - (iii) the information provided by a bidder pursuant to the City exercising its clarification rights under this bid process;
  - (iv) the bidder's experience with performing the type and scope of work specified;
  - (v) other relevant information that arises during this procurement process;
- j) Waive formalities and accept bids which substantially comply with the requirements of this bid solicitation;
- k) Verify with any bidder or with a third party any information set out in a bid submission;
- l) Disqualify any bidder whose bid submission contains misrepresentations or any other inaccurate or misleading information;
- m) Disqualify any bidder who has engaged in conduct prohibited by the bid solicitation;
- n) Make changes, including substantial changes, to the bid solicitation provided that those changes are issued by way of addenda in the manner set out in this bid document;
- o) Select any bidder other than the bidder whose bid submission reflects the lowest cost to the City;
- p) Cancel this procurement process at any stage, for any reason;
- q) Cancel this procurement process at any stage and issue a new bid solicitation for the same or similar deliverables;
- r) Accept any bid submission in whole or in part;
- s) Waive minor non-compliance with the mandatory requirements of the bid solicitation and accept the bid submission; or

- t) Accept a bid submission which contains the following errors:
- (i) error in mathematics – whether this involves the extension of a unit price or an error in addition, the mistake will be corrected and the correct total will be used for evaluation purposes and will be binding on the bidder.
  - (ii) conflict between the written and numerical bid prices. In all cases, the total bid price will be corrected to reflect the written bid price, whether lump sum or unit price (where applicable).
  - (iii) failure to include the contingency allowance in the total bid price (where applicable). If the contingency allowance was not included in the addition, the bid price shall be corrected to reflect its inclusion.

and these reserved rights are in addition to any other express rights or any other rights which may be implied in the circumstances and the City shall not be liable for any expenses, costs, losses or any direct or indirect damages incurred or suffered by any bidder or any third party resulting from the City exercising any of its express or implied rights under this bid solicitation.

By submitting a bid, the bidder authorizes the collection by the City of the information set out at paragraph i) in the manner contemplated in that subparagraph.

#### **Limitation of Liability and Waiver**

Each bidder, by submitting a bid, agrees that:

- a) Neither the City nor any of its employees, agents, advisors or representatives will be liable, under any circumstances, for any Claim arising out of this procurement process including but not limited to costs of preparation of the bid submission, loss of profits, loss of opportunity or for any other Claim; and
- b) The bidder waives any Claim for any compensation of any kind whatsoever, including Claims for cost of preparation of the bid submission, loss of profit or loss of opportunity by reason of the City's decision to not accept the bid submitted by the bidder, to award a Contract to any other bidder or to cancel this procurement process, and the bidder shall be deemed to have agreed to waive such right or Claim.

#### **Validity Period**

The bid submission constitutes an offer which shall remain open and irrevocable until 90 days after the submission deadline.

#### **Minor Irregularities**

The City of Saint John reserves the right to waive minor non-compliances in accordance with Section 120 of the Province of New Brunswick's Regulation 2014-93 under the Procurement Act.





City of Saint John

**FORM OF TENDER**

**TENDER # 2023-085302T**

**Supply of High Temperature Heat Pump Chiller**

The undersigned bidder has carefully examined the specifications and scope of work. The undersigned bidder has determined the equipment required and has the capability to comply with the terms and conditions herein described.

The undersigned bidder further agrees to provide all necessary equipment in accordance with the contract and agrees to accept, therefore, in payment in full, in accordance with the specifications, and terms and conditions, the sums of (all taxes extra):

\$ \_\_\_\_\_

Please provide estimated delivery date of Unit.

\_\_\_\_\_

Warranties provided.

Yes:

No:

COMPANY:	SIGNATURE: _____ NAME: _____ (PRINT)
DATE:	TEL. #
H.S.T.(OR B.N.)REG.#:	FAX #

**APPENDIX A – SPECIFICATIONS**

**TENDER No. 2023-085302T**  
**Supply of High Temperature Heat Pump Chiller**

<b>Description</b>	<b>Section Number</b>	<b>Section Name</b>	<b>Date</b>	<b>Number of Pages</b>
<b><u>Division 01 – General Requirements</u></b>				
	01 11 00	Summary of Work	July 2023	03
	01 33 00	Submittal Procedures	July 2023	03
	01 61 00	Common Product Requirements	July 2023	03
	01 77 00	Closeout Procedures	July 2023	02
	01 78 00	Closeout Submittals	July 2023	07
	01 82 00	Demonstration and Training	July 2023	02
	01 90 00	Warranties	July 2023	01
	01 91 13	Commissioning and Training	July 2023	05
<b><u>Technical Specifications</u></b>				
	23 64 26.16	Water Cooled Modular Heat Recovery Chiller (Supply Only)	July 2023	07
<b><u>Appendices</u></b>				
	Appendix A	MSK-1 Equipment Schedule	July 2023	01

**END OF SECTION**



**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 General description of Work.
- .2 Contract Method.
- .3 Work by other Equipment Suppliers.
- .4 Assigned contracts.
- .5 Work sequence.

**1.2 WORK COVERED BY TENDER DOCUMENTS**

- .1 Work of this Bid consists of the effort related to the supply and delivery of the mechanical equipment to the Owners site. Ship to the Canada Games Aquatic Center (CGAC) and include unloading of equipment at the receiving entrance on St. Patrick Street, Saint John, NB, Canada. **All equipment shall be on site no later than February 1<sup>st</sup>, 2024.**
  - .1 All efforts required to coordinate with the yet to be selected 'Installation Equipment Supplier' who will be responsible for the installation of the equipment. This bidding Equipment Supplier shall allow for "Just In Time" delivery as well as providing support to the Installation Equipment Supplier, which includes but is not limited to responding to all requests for information and providing any and all guidance related to the proper off loading, hoisting, assembly, installation, commissioning, and training of personnel responsible for the equipment.
  - .2 Provide sufficient resources to complete the work within the Agreement time. Any required overtime and similar costs to complete the project by the agreed completion date is included in the Bid price.
  - .3 Provide a full and complete shop drawing submission to the Consultant per requirements of Section 01 33 00 – Submittal Procedures for approval prior to shipping of equipment. **A preliminary shop drawing submission must accompany the bid submission and shall include lead time for equipment.**
  - .4 Co-ordinate and take sole responsibility as well as taking the lead role in the on-site testing, supervision of assembly and commissioning of the installation and verification of the performance of the equipment.
  - .5 Work with the Installation Trade Contractor and Owner to confirm equipment supplied as part of this tender are installed correctly and tested in advance to allow for the uninterrupted start-up and commissioning of the equipment.
  - .6 Equipment Supplier to provide the Installation Trade Contractor's controls sub-contractor with assistance, information requested and if necessary technical help to allow the sub-contractor to map the control points into the BAS (Building Automation System).
  - .7 Equipment Supplier to provide Installation Trade Contractor's controls sub-contractor with the complete point name, point mapping, point unit and point descriptors of the equipment to allow integration into the BAS for all equipment supplied. Allow time for integration planning meetings with the Owner.
  - .8 Ensure that all equipment meets all design and code requirements prior to shipment from the manufacturer's shop. Any rework on site will be at the Equipment Supplier's cost.

- .9 The Equipment Supplier shall provide on-site expertise before and during the installation of the equipment as follows:
  - .1 Technical support to the Installation Trade Contractor and the Consultant to ensure that the equipment installation requirements are achieved.
  - .2 Provide technical supervision/review of the installation to the Installation Trade Contractor of start-up and commissioning of the equipment.
  - .3 Technical supervision of start-up and commissioning of the equipment.
  - .4 Equipment start-up and test by personnel trained and certified by the equipment manufacturer.
  - .5 Complete, sign and submit all forms necessary for acceptance of the equipment by Owner.
- .10 Equipment Supplier to provide closeout documentation to the Installation Trade Contractor as per Section 01 78 00 – Closeout Submittals.
- .11 Equipment Supplier to provide operator training for operating and maintaining the equipment as per Section 01 82 00 – Demonstration & Training.
- .12 Equipment Supplier to provide warranty of equipment as per Section 01 90 00 - Warranties.
- .2 The administration of this Equipment Supplier warranty will be assigned by the Owner to the ‘Installation Trade Contractor’. This bidder to fully cooperate and provide equipment warranty and warranty services to the full extend of this agreement.
- .3 Participate in all Commissioning as requested by the Owner Commissioning Agent.

### 1.3 SCHEDULING

- .1 The Equipment Supplier shall prepare a preliminary manufacturing schedule, for presentation to the Owner for review and acceptance. The delivery schedule must comply with the delivery conditions of the award.

### 1.4 CONTRACT METHOD/COMPLETION

- .1 Construct the work under a single lump sum fixed price contract, as described in the Request for Proposal (RFP) Documents.
- .2 Deliver the equipment as outlined in the tender documents and as outlined in the RFP Documents accepted by the Owner.
- .3 The Equipment Supplier will need to work closely with the Owner, Consultant and Installation Equipment Supplier, as well as other contractors engaged to carry out related work. Work to proceed in a phased manner as follows:
  - .1 **Equipment Supplier** is awarded project.
    - .1 **Equipment Supplier** provides final shop drawings, drawings are approved and equipment is ordered.
    - .2 **Equipment Supplier** co-ordinates with Installation Equipment Supplier and Owner to deliver product to site to be installed by Installation Equipment Supplier.
    - .3 **Equipment Supplier** provides onsite expertise as per 1.3 of this Section during construction to ensure the equipment is installed correctly.

- .4 Installation Trade Contractor is required to take the leading role in the organizing, scheduling and coordinating all of the work for an efficient and speedy completion, based on their scope.
- .5 Equipment Supplier to provide sufficient labour to complete the commissioning, site support and start-up work within the Installation Contractors overall schedule for the completion of the contract.
- .6 All parties shall cooperate and resolve disputes so as not to affect progress of the work.

**1.5 PREMIUM TIME**

- .1 The Bidder shall include in their Bid all costs for any premium time, this includes but is not limited to air freight, expedited sole delivery, etc. as required to meet the delivery deadline.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**





**Part 1 General**

**1.1 ADMINISTRATIVE**

- .1 Submit to Owner submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Owner. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Owner, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Trade Contractor's responsibility for errors and omissions in submission is not relieved by Owner review of submittals.
- .9 Trade Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Owner's review.
- .10 Keep one (1) reviewed copy of each submission on site.
- .11 Within five (5) working days of Equipment Supplier's Award, the Trade Contractor will visit the site and complete a comprehensive review of existing conditions and review all questions with the Owner prior to submitting shop drawings. The site visit is to certify the Trade Contractor's work plan, engineered control drawings, preparation and layouts with site conditions.

**1.2 SHOP DRAWINGS AND PRODUCT DATA**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Trade Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow ten (10) days for Owner Construction Manager's review of each submission.
- .4 Adjustments made on shop drawings by Owner are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Owner prior to proceeding with Work.

- .5 Make changes in shop drawings as Owner may require, consistent with Contract Documents. When resubmitting, notify Owner in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter, in duplicate, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Equipment Supplier's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .7 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Equipment Supplier's stamp, signed by Equipment Suppliers authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Performance characteristics.
    - .4 Standards.
    - .5 Single line and schematic diagrams.
- .8 After Owner's review, distribute copies.
- .9 Submit in electronic format (PDF format) shop drawings for each requirement requested in specification Sections and as Owner may reasonably request.
- .10 Submit in electronic format (PDF format) product data sheets or brochures for requirements requested in specification Sections and as requested by Owner where shop drawings will not be prepared due to standardized manufacture of product.
- .11 Submit in electronic format test reports for requirements requested in specification Sections and as requested by Owner:
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .12 Submit in electronic format manufacturer's instructions for requirements requested in specification Sections and as requested by Owner:
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

- .13 Submit one (1) paper copy and one (1) electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Owner.
- .14 Delete information not applicable to project.
- .15 Supplement standard information to provide details applicable to project.
- .16 If upon review by Owner, no errors or omissions are discovered or if only minor corrections are made, transparency copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

**1.3 CERTIFICATES AND TRANSCRIPTS**

- .1 Submit transcription of insurance immediately after award of Contract.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



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**Part 1            General**

**1.1                REFERENCES**

- .1        Within text of each specifications section, reference may be made to reference standards.
- .2        Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3        If there is question as to whether products or systems are in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance.
- .4        Cost for such testing will be borne by Owner in event of conformance with Contract Documents or by Equipment Supplier in event of non-conformance.

**1.2                QUALITY**

- .1        Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2        Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3        Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4        Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant and Owner based upon requirements of Contract Documents.
- .5        Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6        Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

**1.3                AVAILABILITY**

- .1        Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Consultant and Owner of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2        In event of failure to notify the Owner at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Owner reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

**1.4 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Remove and replace damaged products at own expense and to satisfaction of the Owner.
- .5 Touch-up damaged factory finished surfaces to Owner and Consultant's satisfaction. Use touch-up materials to match original. Do not paint over nameplates.

**1.5 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.

**1.6 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Owner in writing, of conflicts between specifications and manufacturer's instructions, so that Owner Construction Manager will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Owner to require removal and re-installation at no increase in Contract Price or Contract Time.

**1.7 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the Owner if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Owner Construction Manager reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with the Owner, whose decision is final.

**1.8 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

**1.9 REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.10 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Owner.

**1.11 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**





**Part 1 General**

**1.1 INSPECTION AND DECLARATION**

- .1 Equipment Supplier's Inspection: Trade Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Owner in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - .2 Request Owner's Inspection.
- .2 Owner's Inspection: Owner, Consultant and Equipment Supplier will perform inspection of Work to identify obvious defects or deficiencies. Trade Contractor to correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
  - .1 Work has been completed and inspected for compliance with Contract Documents.
  - .2 Defects have been corrected and deficiencies have been completed.
  - .3 Equipment and systems have been tested, adjusted and are fully operational.
  - .4 Operation of systems have been demonstrated to Owner's personnel.
  - .5 Work is complete and ready for final inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Owner. If Work is deemed incomplete by Owner or Consultant complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Owner considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.
- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment: when Owner considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Owner complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1    As-built, samples, and specifications.
- .2    Equipment and systems.
- .3    Product data, materials and finishes, and related information.
- .4    Operation and maintenance data.
- .5    Spare parts, special tools and maintenance materials.
- .6    Warranties and bonds.
- .7    Final site survey.

**1.2                REFERENCES**

- .1    Canadian Environmental Protection Act (CEPA).

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- .3    Copy will be returned after final inspection, with Owner and Consultants comments.
- .4    Revise content of documents as required prior to final submittal.
- .5    Two (2) weeks prior to Substantial Performance of the Work, submit to the Owner, final copy of operating and maintenance manuals in English. Provide one (1) hard copy format and one (1) electronic copy format.
- .6    Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .7    Provide evidence, if requested, for type, source and quality of products supplied.
- .8    Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .9    Pay costs of transportation.

**1.4                FORMAT: OPERATIONS AND MAINTENANCE MANUALS**

- .1    Hard Copy (Binders) – Equipment Supplier to provide three (3) separate copies as follows:
  - .1    Organize data in the form of an instructional manual.
  - .2    Binders: vinyl, hard covered, 3 'D' ring, loose leaf (219 x 279) mm with spine and face pockets.
  - .3    When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
  - .4    Cover: Identify each binder with type or printed title “Operation & Maintenance Manuals”; list title of project and identify subject matter of contents, work and buildings.

- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: Manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .2 Electronic Copy (Searchable PDF Format):
  - .1 Provide one (1) electronic copy in PDF format of the complete operations and maintenance manual on a CD-ROM.
  - .2 Organize the data in an identical format complete with hyperlinks, tabs and bookmarks as the hard copy binder format.
  - .3 Arrange content by systems, under Section numbers and sequence of Table of Contents.
  - .4 Including all relevant information including but not limited to drawings, manufacture data, operational and maintenance procedures. Where documents are not available in electronic format, they should be scanned into PDF format.
  - .5 Provide individual files within electronic media for each section or subsection of related groupings numbered sequentially. File naming conventions shall indicate section number and what the file contains (e.g. file containing heat pump data shall be named "04 Equipment – Heat pump data.pdf").
  - .6 Provide one (1) file with all information (e.g. file containing O&M for project should be named "O&M for Building ABC, Project ABC").
  - .7 Cover: Identify each CD with printed label title. List title of project and identify subject matter of content (e.g. "Operation & Maintenance Manuals" for Building ABC, Project ABC").
  - .8 Provide section dividers in electronic version for each separate product or system, with typed description of product and major component part of equipment.
  - .9 Provide indexed and searchable electronic document format.
  - .10 The PDF document shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents. Individual files will not be accepted.
- .3 Drawings: provide with reinforced punched binder tab:
  - .1 Bind in with text; fold larger shop drawings to size of text pages. Drawings size must be 1000 x 707 mm (smaller and larger will not be accepted).

## **1.5 CONTENTS – OPERATION AND MAINTENANCE MANUALS**

- .1 Table of Contents for Each Volume: provide title of project:
  - .1 Date of submission; names.
  - .2 Addresses, and telephone numbers of Consultant and Trade Contractor Design-Builder with name of responsible parties.
  - .3 Schedule of products and systems, indexed to content of volume.

- .2 Complete PM Inventory Report Annex form, which includes:
  - .1 Warranty start and end date.
  - .2 Manufacturer's name.
  - .3 Model Number.
  - .4 Serial Number.
  - .5 Contact information for manufacturer; and
  - .6 Contact information for sub-contractor who installed the material.
- .3 For each product or system (trade):
  - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .4 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .5 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .6 Typewritten Text: as required to supplement product data.
  - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

## **1.6 EQUIPMENT AND SYSTEMS**

- .1 For each item of equipment and each system include description of unit or system, and component parts.
  - .1 Give function, normal operation characteristics and limiting conditions.
  - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panelboard circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shutdown, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.

- .11 Provide Trade Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Additional requirements: as specified in individual specification sections.

## **1.7 MATERIALS AND FINISHES**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
  - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

## **1.8 MAINTENANCE MATERIALS**

- .1 Spare Parts:
  - .1 Provide spare parts, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to location as directed; place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Owner.
    - .2 Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
  - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to location as directed; place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Owner.
    - .2 Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
  - .1 Provide special tools, in quantities specified in individual specification section.
  - .2 Provide items with tags identifying their associated function and equipment.
  - .3 Deliver to location as directed; place and store.

- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Owner.
  - .2 Include approved listings in Maintenance Manual.

## **1.9 DELIVERY, STORAGE AND HANDLING**

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Owner.

## **1.10 WARRANTIES AND BONDS**

- .1 Develop Warranty Management plan to contain information relevant to Warranties.
- .2 Submit, warranty information made available during construction phase, to Owner for approval prior to each monthly pay estimate.
- .3 Warranty Management Plan to include required actions and documents to assure that Owner receives Warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Owner.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.
  - .4 Verify that documents are in proper form, contain full information, and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .7 Leave date of beginning of time of warranty until Date of Substantial Performance is determined. Warranty for items put into use will commence on Date of Substantial Performance.
- .8 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .9 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Owner to proceed with action against Trade Contractor.

- .10 Conduct joint four (4) month and nine (9) month warranty inspection, measured from time of substantial performance, with Consultant and Owner.
- .11 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Trade Contractors, subcontractors, manufacturers or suppliers involved.
  - .2 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.
    - .3 Location where installed.
    - .4 Name and phone numbers of manufacturers or suppliers.
    - .5 Names, addresses and telephone numbers of sources of spare parts.
    - .6 Warranties and terms of warranty: include one (1) year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
    - .7 Cross-reference to warranty certificates as applicable.
    - .8 Starting point and duration of warranty period.
    - .9 Summary of maintenance procedures required to continue warranty in force.
    - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
    - .11 Organization, names and phone numbers of persons to call for warranty service.
    - .12 Typical response time and repair time expected for various warranted equipment.
  - .3 Trade Contractor's plans for attendance at four (4) and nine (9) month post-construction warranty inspections.
  - .4 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

#### **1.11 WARRANTY TAGS**

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Owner.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
  - .1 Type of product/material.
  - .2 Model number.
  - .3 Serial number.
  - .4 Contract number.
  - .5 Warranty period.
  - .6 Inspector's signature.
  - .7 Construction Contractor.



**1.12 PROJECT RECORD DRAWINGS**

- .1 Submission of Project Record Drawings, showing the built condition, shall be in DWG and PDF formats with file naming convention.

**1.13 WASTE DISPOSAL RECORDS**

- .1 Provide waste disposal weight report for project (See Construction Waste Management and Disposal).
- .2 Provide current MSDSs for any controlled products that will remain on the site for ongoing operations and/or maintenance.

**1.14 WARRANTY**

- .1 Reference Section 01 90 00 - Warranties.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Procedures for demonstration and instruction of equipment and systems to Owner's personnel.

**1.2 RELATED SECTIONS**

- .1 Section 01 78 00 - Closeout Submittals.
- .2 Division 23.

**1.3 DESCRIPTION**

- .1 Demonstrate scheduled and/or standard operation and maintenance of equipment and systems to Owner's personnel as soon as practical prior to turnover date.
- .2 Demonstrate the operation of all equipment and systems to the designated Owner's Employees and instruct such Owner's Employees in the operation, adjustment and maintenance of such equipment and systems.
- .3 The Owner in coordination with the Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

**1.4 QUALITY CONTROL**

- .1 Submit with Shop Drawings package a detailed outline and steps to be completed for the training package. This outline shall incorporate all requirements and feedback that may have been amended prior to the contract award.
- .2 When specified in individual Sections, Equipment Supplier to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed to be submitted to the Owner. A copy of the written report to be included in the closeout documentation.

**1.5 SUBMITTALS**

- .1 Submit schedule of time and date for demonstration of each item of equipment and each system two (2) weeks prior to designated dates, for Consultant's review and Owner's approval.
- .2 Submit reports within one (1) week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3 Give time and date of each demonstration, with list of persons present.

**1.6 CONDITIONS FOR DEMONSTRATIONS**

- .1 Equipment has been inspected and put into operation.
- .2 Commissioning has been performed and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

**1.7 PREPARATION**

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

**1.8 INSTRUCTIONS TO OWNER'S STAFF**

- .1 Instruct the Owner's designated staff on all aspects of the operation of systems and equipment. Advise the Owner at least one week in advance of the schedules of all instruction sessions.
- .2 Provide video recording of training sessions. If multiple training sessions are included, ensure that a single video includes all aspects of training covered. Include training video with O&M submission.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                GENERAL**

- .1            Comply with Agreement.

**1.2                SCHEDULE OF WARRANTIES**

- .1            Provide manufacturers' warranties as outlined in Division 23 as well as detailed instructions to the Owner on how to process any extended warranty claims.
- .2            Outline warranties of equipment in submission package if they differ from those outlined in Division 23.
- .3            Provide all required parts and components to service all supplied items for a warranty period of at least two (2) years, unless otherwise stated longer in Division 23.
- .4            All warranties commence as defined in Section 01 77 00 - Closeout Procedures and Section 01 78 00 - Closeout Submittals.

**Part 2            Products**

**2.1                NOT USED**

- .1            Not Used.

**Part 3            Execution**

**3.1                NOT USED**

- .1            Not Used.

**END OF SECTION**



**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 General requirements relating to commissioning verification of project's equipment and systems, specifying general requirements for start-up and functional performance verification and testing of components, equipment, sub-systems, systems, and integrated systems. Commissioning verification will be conducted by Third-Party Commissioning Agent engaged by the Owner.
- .2 Related Sections:
  - .1 Section 01 82 00 – Demonstration and Training.

**1.2 SCOPE OF WORK**

- .1 Provide material, tools, labour and supervision necessary to assist the commissioning agent in the verification of commissioning of the equipment and systems as outlined in the drawings, specifications and functional performance test forms.
- .2 Contractors and Manufacturer Representative are to participate in the commissioning process and cooperate fully with the Third-Party Commissioning Agent (CxA).
- .3 Once the Contractor and Manufacturer Representative have completed their start-up, testing, commissioning and troubleshooting, provide material, tools, labour and supervision to verify in detail with the CxA that the equipment and systems have been commissioned in accordance with this and related Sections. This includes verification of system performance as outlined in the individual equipment Specification Sections.
- .4 Commissioning to be a line item in Manufacturers cost breakdown.

**1.3 GENERAL**

- .1 Commissioning is a planned program of tests, procedures and checks systematically carried out on equipment, systems and integrated systems of the finished project to verify that they meet the owner`s project requirements. Commissioning is performed after systems and integrated systems are completely installed, functional and the Contractor`s and Manufacturer Representative`s responsibilities have been completed and approved.
- .2 Objectives:
  - .1 Verify installed equipment, systems and integrated systems operate in accordance with the owner`s project requirements, the contract documents and design criteria and intent.
  - .2 Verify equipment performance as outlined in the individual equipment Specification Sections.
  - .3 Verify that O&M personnel have been fully trained in all aspects of the installed equipment and systems.
  - .4 Verify that proper documentation relating to the commissioned equipment and systems are compiled and provided to the Owner.
- .3 A commissioning agent will perform commissioning verification of the new equipment and control sequences. This will include start-up verification activities and functional performance testing activities, including testing of system performance.

- .4 Manufacturer Representative participates in the commissioning process, assisting with operation of equipment and systems, troubleshooting and making adjustments as required.
  - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be operated interactively with each other as intended in accordance with contract documents and design criteria.
  - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
  - .3 Commissioning process includes the testing and verification on the equipment performance, as outlined in the individual equipment Specification Sections.
- .5 Static Verification forms, Start-up Verification forms and Functional Performance Test forms will be provided by the Commissioning Agent for completion by the Contractor and Manufacturer.
- .6 Manufacturer factory test reports, start-up reports, installation checklists, performance measurement forms to be provided as part of the required submittals.

#### **1.4 COMMISSIONING (CX) OVERVIEW**

- .1 Contractor and Manufacturer Representative to participate fully in the commissioning process by providing required documentation and conducting the functional performance tests as led by the CxA.
- .2 Functional performance testing may be done using a random sampling methodology. Depending on the quantity and nature of a particular component, equipment or system, the CxA will decide to commission a sampling strategy of between 10% to 100%. Sampling percentage is at the sole discretion of the CxA.
- .3 Contractor and Manufacturer Representative to review functional performance test forms prior to testing for suitability with the installed equipment and systems. All concerns related to items such as invalidation of warranty, operating equipment outside recommended parameters, testing that may damage the equipment or systems, etc. are to be brought to the attention of the CxA, Design Team and Owner prior to testing.
- .4 Pay costs associated with starting, testing, adjusting and relevant instruments and supplies required to perform duties outlined in this and related Sections.
- .5 Cx activities supplement field quality and testing procedures described in relevant technical sections of the Contract Documents. Cx activities do not relieve the Contractor or Manufacturer from the contractual requirements outlined in other specification sections of the Contract Documents. Cx activities do not circumvent or relieve the Contractor or Manufacturer from warranty requirements, responsibilities or obligations.
- .6 Ensure all systems have been started, adjusted to design criteria, and are functionally operational, ready for independent testing. The CxA will not begin Functional Performance Testing until satisfied that all requirements have been met.
- .7 The CxA reserves right to request inspection reports and sign-off from Contractor, Manufacturer Representative or Consultant that equipment and systems are ready for Functional Performance Testing.
- .8 Employ experienced personnel for equipment start up and commissioning, who are able to interpret results of readings and tests, and report the system status in a clear and concise manner.



- .9 Provide all equipment required to perform testing, balancing, and commissioning of systems. Calibrate instruments used in start-up; provide calibration certificates if requested by the CxA.
- .10 Once the CxA's functional performance testing is complete and all issues have been resolved to the satisfaction of the CxA and Owner, testing required to demonstrate equipment performance will be initiated. Performance requirements are outlined in specification documents for the respective equipment.
- .11 Utilize equipment check certificates and other commissioning documents required by the CxA.
- .12 Verify that equipment is installed in accordance with Contract Documents, and reviewed shop drawings.
- .13 Commissioning will be considered complete once:
  - .1 Completed Cx documentation has been received, reviewed for suitability and approved by the CxA and the Owner.
  - .2 Equipment, components and systems have been commissioned and all issues have been addressed to the satisfaction of the Owner Representative.
  - .3 O&M training has been completed.

## **1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS**

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by the CxA to ensure effective performance.
- .2 Costs for corrective work, additional tests and inspections to determine acceptability and proper performance of such items to be borne by the Contractor and Manufacturer. Above costs to be in the form of progress payment reductions or holdback assessments.

## **1.6 PRE-REQUISITES FOR FUNCTIONAL PERFORMANCE TESTING**

- .1 Minimum prerequisites for functional testing are as follows:
  - .1 All related equipment has been started-up and start-up reports and pre-functional checklists are submitted and approved ready for functional testing.
  - .2 All control system functions for this and all interlocking systems are programmed and operable per contract documents, including final setpoints and schedules with debugging, loop tuning and sensor calibrations completed.
  - .3 Piping system flushing complete and required report approved.
  - .4 Water treatment system complete and operational.
  - .5 Vibration control report approved (if required).
  - .6 Test and balance (TAB) complete and approved for the air and hydronic systems.
  - .7 All A/E deficiency list items for the equipment specified are corrected.
  - .8 Functional test procedures have been reviewed and approved by installing contractor.
  - .9 Safeties and operating ranges reviewed by the CxA and the Contractor.
  - .10 Test requirements and sequences of operation provided.

- .11 Schedules and setpoints provided.
- .12 False loading equipment, system and procedures ready.
- .13 Crankcase heaters have been on long enough for start-up.
- .14 Sufficient clearance around equipment for servicing.
- .15 Record of all values for pre-test setpoints changed to accommodate testing has been made and a check box provided to verify return to original values (control parameters, limits, delays, lockouts, schedules, etc.).
- .16 Other miscellaneous checks of the pre-functional checklist and start-up reports completed successfully.
- .17 Points Verification Report from Control Contractor has been provided.

## **1.7 COMMISSIONING DELIVERABLES**

- .1 CxA will provide functional performance test forms prior to testing for review by the contractor. Functional performance tests will be based on equipment shop drawings, control system shop drawings and sequence of operation provided by the design team.
- .2 Contractor and Manufacturer Representative to provide following documentation to support the commissioning process:
  - .1 Static Verification Forms.
  - .2 Start-Up Verification Forms.
  - .3 Points Verification Forms.
  - .4 Manufacturer factory test reports.
  - .5 Manufacturer start-up reports.
  - .6 Manufacturer installation checklists.
  - .7 Trend logs and reports required to demonstrate equipment performance on site.
  - .8 As-built sequence of operation.
  - .9 Training agenda and attendance form.

## **1.8 EQUIPMENT AND SYSTEMS TO BE COMMISSIONED**

- .1 The following equipment and systems will be included in the commissioning process. Functional performance test forms will outline testing required.
  - .1 Hydronic Pumps.
  - .2 Heat Exchangers.
  - .3 Water Cooled Heat Recovery Chillers.
  - .4 Air Handling Equipment.
  - .5 Exhaust Air Systems.
  - .6 Adiabatic Condenser.

## **1.9 OWNER TRAINING**

- .1 Contractor and Manufacturer Representative to deliver training program as outlined in the Contract Documents.
- .2 Contractor and Manufacturer Representative to provide a detailed agenda of each training session to CxA and Owner for review a minimum of four (4) weeks prior to training session.

- .3 Contractor and Manufacturer Representative to provide an attendance form, signed by all participants.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 Air-Conditioning, Heating and Refrigeration Institute (AHRI):
  - .1 AHRI-550/590- 11, Performance Rating of Water Chilling Packages Using the Vapor Compression Cycle.
- .2 CSA Group (CSA):
  - .1 CSA B52-18, Mechanical Refrigeration Code.
- .3 Environment Canada, EC/Environmental Protection Services (EPS):
  - .1 Environmental Code of Practice for Elimination of Fluorocarbons Emissions from Refrigeration and Air Conditioning Systems, 2015.

**1.2 SUBMITTALS**

- .1 Submit drawings indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate equipment, piping and connections, valves, strainers, and thermostatic valves required for complete system.
- .2 Submit product data indicating rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.
- .3 Submit manufacturer's installation instructions.
- .4 Submit performance data indicating energy input versus cooling load output from 100 to 25 percent of full load with constant entering condenser water temperature.

**1.3 OPERATION AND MAINTENANCE DATA**

- .1 Include start-up instructions, operation data, maintenance data, controls, and accessories. Include trouble-shooting guide.

**1.4 REGULATORY REQUIREMENTS**

- .1 Conform to AHRI Standard 550/590 for rating and certified testing of Water Chilling Packages using the Vapor Compression Cycle.
- .2 Conform to UL 1995 - Standard for Heating and Cooling Equipment, Safety Standard. In the event the unit is not UL approved, the manufacturer shall, at manufacturer expense, provide for a field inspection by an UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative.
- .3 Conform to ASME SECTION VIII Boiler and Pressure Vessel Code for construction and testing of unfired pressure vessels.
- .4 Conform to ANSI/ASHRAE STANDARD 15 safety code for mechanical refrigeration.
- .5 Unit shall bear the AHRI Certification Label for the specific type of water chiller as applicable.

**1.5 DELIVERY, HANDLING AND STORAGE**

- .1 Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

- .2 Unit will ship with shrink wrap covering the entirety of each module.

## **1.6 WARRANTY**

- .1 Provide a full parts warranty for one (1) year from start-up or eighteen (18) months from shipment, whichever occurs first.

## **1.7 MAINTENANCE SERVICE**

- .1 All inspections and service of units shall be accomplished by factory trained and authorized servicing technicians.
- .2 All labor for leak checking the chiller according to the manufacturer's IOM and documentation must be included.
- .3 In conjunction with and supporting Factory warranty OEM shall furnish complete factory authorized service and maintenance of Applied Chillers for 2 years from Date of Substantial Completion. All work shall be done by manufacturer's commercial warranty agent.
- .4 OEM shall provide and report quarterly, semi-annual, and annual maintenance in compliance with or better than ASHRAE Standard 180-2008.
- .5 Include maintenance items as recommended in manufacturer's operating and maintenance data.
- .6 Submit copy of service call work orders and summary report to the Owner, including description of work performed, operating performance status and noted exceptions.

## **1.8 VERIFICATION OF CAPACITY AND EFFICIENCY**

- .1 All proposals for chiller performance must include an AHRI approved selection method. Verification of date and version of computer program selection or catalog is available through AHRI.

## **Part 2 Products**

### **2.1 SUMMARY**

- .1 The contractor shall furnish and install modular water-cooled heat recovery chillers as shown and scheduled in the plans. The units shall be installed in accordance with this specification and produce the specified tonnage per the scheduled data in accordance with AHRI Standard 550/590. The unit shall be AHRI certified as applicable.
- .2 The water-cooled modular heat recovery chiller system shall consist of individual chiller modules that are assembled on site. Each heat recovery chiller module shall be completely factory wired, and tested prior to shipment. Each module shall include a compressor, evaporator, condenser, and controls. Controls shall be designed on a distributed master control system that allows the master microprocessor to operate remaining slave modules in the event of a malfunction of any slave controller. The controls shall also be designed to allow each individual slave microprocessor to operate on its own temperature sensor if there is a failure of the master microprocessor. Refer to attached equipment schedules for capacities and models of equipment.
- .3 Equipment to be delivered and unloaded at site as directed by Owner.

## **2.2 COMPRESSOR AND MOTOR**

- .1 Hermetically sealed, scroll compressor on each refrigeration circuit each with rota lock connections, oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and circuit breaker protection. There shall be two (2) independent compressors and refrigerant circuits per module. Compressors shall be mounted to the heavy gauge steel frame with rubber-in-shear vibration isolators.
- .2 Chiller should be able to unload to 25 percent of full load tonnage with constant entering condenser water temperature.
- .3 Provide constant speed 3600 rpm for 60Hz (or 3000 rpm for 50Hz) compressor motor, suction gas cooled with robust construction and system design protection, designed for across-the-line or wye-delta starting. Furnish with starter.

## **2.3 EVAPORATOR**

- .1 The evaporator shall be built in accordance with ANSI/ASHRAE 15- Safety Code for Mechanical Refrigeration. Design, test, and stamp evaporator refrigerant side for 650 psig working pressure in accordance with ANSI/ASME SEC VIII.
- .2 Dual circuit, brazed plate evaporator on each module constructed of 316 stainless steel plates and copper brazing. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Each evaporator shall be insulated with ¾" closed cell insulation. The maximum working pressure shall be 650 psi. Evaporator piping fluid velocity shall not exceed 10 fps at any point in the system.
- .3 Adjustable or float type refrigerant metering devices and thermal expansion valves (TXV) shall be inspected and adjusted by the manufacturer annually for the first five (5) years of operation to assure equivalent reliability to an electronic expansion valve (EXV) system.
- .4 Factory insulation will be ¾" insulation Armaflex II or equal (k=0.28) and cover the evaporator and motor housing. Factory installed foam insulation will be used on the suction line, liquid level sensor and oil return system assembly.

## **2.4 WATER COOLED CONDENSER**

- .1 The water-cooled condenser shall be built in accordance with ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration. Design, test, and stamp condenser refrigerant side for 650 psig working pressure in accordance with ANSI/ASME SEC VIII.
- .2 Dual circuit, brazed plate condensers constructed of 316 stainless steel plates and copper brazing. The fluid connections to each condenser shall use roll grooved couplings for service convenience and ease of installation. The maximum working pressure shall be 650 psi. Condenser piping fluid velocity shall not exceed 10 fps at any point in the system.
- .3 Water boxes shall be designed for 150 psig maximum waterside working pressure. The water boxes shall have grooved-type water connections for easy field chilled water and condenser water connections and have proper orientation as referenced in the scheduled drawings.

## **2.5 REFRIGERANT CIRCUIT**

- .1 All units shall have two (2) independent refrigerant circuits, each with a separate single compressor. If manifolded compressors are provided on a circuit, then individual compressor warranties must be provided for each compressor on the circuit.

- .2 Chiller shall be able to unload to 25% of capacity with AHRI relief and constant entering condenser water temperature.
- .3 Provide for each refrigerant circuit:
  - .1 Suction service valve.
  - .2 Discharge service valve.
  - .3 Liquid line shutoff valve.
  - .4 Refrigerant pressure relief valves for low side and high side.
  - .5 Electronic expansion valve.
  - .6 Removable core filter.
  - .7 Charging port.
  - .8 Oil separator.
- .4 The chiller shall be configured with single relief valve on both the high pressure side and low pressure side of each refrigerant circuit.

## 2.6 CONTROLS

- .1 The Master chiller module shall incorporate the Master microprocessor controller. The Master microprocessor shall communicate with the remaining Slave microprocessors in each module via a local network communications protocol. The master microprocessor shall include a phase monitor to protect against low voltage, phase unbalance, phase loss, and phase reversal conditions. The Master controller shall read all analog and fault port values from all Slave module controllers and shall pass these values to the Building Automation System via BACnet.
- .2 The controller must lead/lag the Scroll compressors, balance the run time, prevent short cycling of compressors, and register the last twenty (20) failure occurrences. Fault conditions must be alarmed so the compressor can be taken off line. Both alarm and failed conditions must be displayed on digital display on front of the master control panel. An alarm relay for remote indication of faults and failed conditions with a normally open and normally closed dry contact must be supplied. The "Master Controller" must be able to be controlled by and monitored by the central controller. The operating control of chilled water outlet temperature must be able to be reset remotely with a 4-20ma input signal. Staging of the all scroll compressors, lead/lag of the compressors, equalize runtime of compressors and preventing compressor short cycling will be done by the master controller. Compressor staging is accomplished through PID control logic, adjustable in response times and settings. The system shall provide for variable time between compressor sequencing and temperature sensing.
- .3 Each chiller control system shall include operational switches for each compressor; high and low pressure transmitters to provide indication of refrigeration pressures in each circuit; high and low refrigeration pressure alarms including shutting shutdown the responsible compressor(s); anti-short cycling compressor timers; minimum compressor run timers; connection to Building Automation System (if required).
- .4 If the chiller runs in any of the abnormal operating conditions, the chiller will continue to run, in an unloaded state, and will continue to produce chilled water in an attempt to meet the cooling load. However, if the chiller reaches the trip-out limits, the chiller controls will take the chiller off line for protection, and a manual reset is required. Once the "near trip" condition is corrected, the chiller will return to normal operation and can then produce full load cooling.



- .5 The chiller control panel shall provide control of chiller operation and monitoring of chiller sensors, actuators, relays, and switches. The panel shall be a complete system for stand-alone chiller control and include controls to safely and efficiently operate the chiller.
- .6 Manufacturer shall provide a compressor that is capable of unloading to an infinite amount of positions in order to provide water temperature accuracy of +/- 0.5°F. In the event that the compressor unloads to finite steps, the manufacturer shall provide eight (8) or more steps of unloading on each compressor or provide hot gas bypass (HGBP).
- .7 The chiller control panel is to be provided with the following digital type pressure readouts:
  - .1 Evaporator refrigerant pressure
  - .2 Condenser refrigerant pressure
- .8 The front of the chiller control panel shall be capable of displaying the following clear language as standard:
  - .1 Entering and leaving evaporator water temperature.
  - .2 Entering and leaving condenser water temperature.
  - .3 Chilled water setpoint.
  - .4 Electrical 3-phase current limit and percent RLA setpoint.
  - .5 Electrical 3-phase amp draw.
  - .6 Chiller operating mode.
  - .7 Condenser refrigerant temperature.
  - .8 Elapsed time and number-of-starts counter.
  - .9 Chiller compressor run status relay.
  - .10 Diagnostics with time and date stamp.
  - .11 A relay output to start the condenser water pump and/or enable the cooling tower temperature controls.
  - .12 The control panel display shall identify the fault, indicate date, time, and operating mode at time of occurrence, and provide type of reset required and a help message. The historic diagnostic report shall display the last twenty (20) diagnostics with their times and dates of occurrence.
  - .13 A relay output that shall energize whenever an alarm is active.
  - .14 A relay output that shall energize whenever the unit is operating in a limit mode for an extended time period.
  - .15 A relay output that shall energize whenever a compressor is running.
  - .16 A relay output that shall energize whenever the chiller is operating in Adaptive Controls due to high head pressure.
- .9 The chiller control panel shall provide a programmable soft load to prevent the chiller from achieving full capacity during the pulldown period by imposing a ramped current limit, or a temperature pulldown rate. Either can be adjusted to limit how fast the chiller can load after an initial start-up.
- .10 The chiller control panel shall provide leaving chilled water temperature reset based upon return water temperature.
- .11 The chiller control panel shall provide a chilled water pump output relay that closes when the chiller is given a signal to start.

- .12 The chiller control panel shall have the ability to operate in variable evaporator flow applications. The chiller control must be able to operate with evaporator flow rate changes up to 10% during a one (1) minute time period while maintaining 0.5°F water temperature accuracy. The chiller control must also be able to operate with evaporator flow rate changes up to 30% during a one (1) minute time period while maintaining 2°F water temperature accuracy.
- .13 The chiller control panel shall have the ability to control the leaving condenser fluid temperature setpoint through the user interface or via a 0-10 VDC signal from a building automation system.
- .14 The chiller control panel shall have the ability to control the leaving condenser fluid temperature setpoint through the user interface or via a 0-10 VDC signal from a building automation system.

## **2.7 POWER CONNECTIONS**

- .1 Power Connections: Each module shall have its own electrical power panel mounted to the unit frame. Each module will be independently powered by a field installed fused disconnect switch (or equivalent module circuit breaker) supplied by others, so that any one module can be shutdown for repair without interrupting the remaining chiller modules' operation. The power panel for each module shall contain:
  - .1 Main input terminal block.
  - .2 Compressor motor contractors.
  - .3 Motor overload protection per compressor.
  - .4 Individual compressor motor fusing or breakers.
  - .5 Local manual "ON" / "OFF" compressor switch to allow service or repair to individual modules and compressors without interrupting service of the entire chiller.
- .2 All field supplied wires, bus bars, and fittings shall be copper only.

## **2.8 SOUND**

- .1 Acoustics: Manufacturer must provide sound pressure data in decibels. Sound pressure data per AHRI 575 must be provided at full load.
- .2 If manufacturer cannot meet the noise levels, sound attenuation devices must be installed to meet this performance level.

## **Part 3 EXECUTION**

### **3.1 SERVICE AND STARTUP**

- .1 Start-up - Provide all labor and materials to perform start-up. Start-up shall be performed by a factory-trained technician from the original equipment manufacturer (OEM). Technician shall confirm that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty. This shall be done in strict accordance with manufacturer's specifications and requirements. Third-party service agencies are not permitted.
- .2 A start-up log shall be furnished by the factory approved start-up technician to document the chillers' start-up date and shall be signed by the owner or his authorized representative prior to commissioning the chillers.

- .3 Chiller manufacturer shall maintain service capabilities.
- .4 Provide local service agent with direct access to factory support on equipment.
- .5 Service agreement.
  - .1 During the first twelve (12) months of operation, a factory-trained technician from the original equipment manufacturer (OEM) shall perform quarterly on-site operating inspections to confirm the chillers' operational performance. The manufacturer shall provide the owner with a report describing the condition of the equipment, current operating log, any issues found needing to be addressed, and recommended corrective actions.

**END OF SECTION**



**APPENDIX A**  
**MSK-1 –**  
**EQUIPMENT SCHEDULE**



## CHILLER / HEAT PUMP SCHEDULE

REF	LOCATION	DESCRIPTION	MANUFACTURER	MODEL	EVAPORATOR				CONDENSER				PERFORMANCE		ELECTRICAL				BREAKER	FEEDER	DISCONNECT	STARTER	PANEL	REMARKS
					FLOW L/s	EWT °C	LWT °C	PRESSURE DROP kPa	FLOW L/s	EWT °C	LWT °C	PRESSURE DROP kPa	NOMINAL TONNAGE	NPLV KW/TON	MOP	MCA	VOLT	PHASE Ø						
HTHP	BOILER ROOM	HIGH TEMPERATURE HEAT PUMP	TRANE	MWC	14.13	23.9	18.3	18	21.8	68.3	74	37	3@50T=150	0.6610	250	224	575	3	-	-	-	-	-	-



120 MILLENNIUM DRIVE, SUITE 201  
 QUISPAMIS, NB E2E 0C6  
 BUS: (506) 847-8285 FAX: (506) 848-2131  
 WWW.MCW.COM ENG. JOB NO. 12-23-012

Project  
 CANADA GAMES AQUATIC CENTER  
 THERMAL INTERCONNECT TO  
 MARKER SQUARE

Project No.  
 12-23-012

Drawn

Drawing Title  
 CHILLER / HEAT PUMP SCHEDULE

Date  
 JULY 2023

Scale  
 AS NOTED

Drawing No.

**SKM-1**