Sunshine Coast Regional District

Request for Proposal

Number: 2461302

for

Refrigeration System Reconstruction Chiller Replacement

Issue Date:

February 16, 2024

Closing Date of

March 18, 2023 at 12:00 PM local time

AN OPTIONAL SITE MEETING: An optional site meeting will be held on Tuesday February 27, 2024 at 1:00 pm local time at 700 Park Rd, Gibsons BC. Proponents need to RSVP by February 26, 2024 by noon to purchasing@scrd.ca; if no RSVPs are received then the site meeting will be cancelled.

CONTACT: All enquiries related to this Request for Proposal, including any requests for information and clarification, are to be submitted by February 29, 2024 and directed, in writing, to purchasing@scrd.ca, who will respond if time permits with a Q&A on BCBid by March 7, 2024. Information obtained from any other source is not official and should not be relied upon. Enquiries and any responses providing new information will be recorded and posted to BC Bid or otherwise distributed to prospective Proponents.

DELIVERY OF PROPOSALS: Proposals must be in English and must be submitted using one of the submission methods below, and must either **(1)** include a copy of this cover page that is signed by an authorized representative of the Proponent or **(2)** be submitted by using the e-bidding key on BC Bid (if applicable), in accordance with the requirements set out in the RFP.

BC Bid Electronic Submission: Proponents may submit an electronic proposal using BC Bid. Proposals must be submitted in accordance with the BC Bid requirements and e-bidding key requirements (found at https://www.bcbid.gov.bc.ca/). Only pre-authorized electronic bidders registered on the BC Bid system can submit an electronic proposal using the BC Bid system. Use of an e-bidding key is effective as a signature.

OR

Hard Copy Submission*:* Proponents must submit **ONE (1)** hard-copies and **ONE (1)** electronic copy on a USB Drive of the proposal. Proposals submitted by hard copy must be submitted by hand or courier to:

Sunshine Coast Regional District
1975 Field Road
Sechelt, BC V7Z 0A8

Regardless of submission method, proposals must be received before Closing Time to be considered.

CONFIRMATION OF PROPONENT'S INTENT TO BE BOUND:

The enclosed proposal is submitted in response to the referenced Request for Proposal, including any Addenda. By submitting a proposal the Proponent agrees to all of the terms and conditions of the RFP including the following:

a) The Proponent has carefully read and examined the entire Request for Proposal;
b) The Proponent has conducted such other investigations as were prudent and reasonable in preparing the proposal; and
c) The Proponent agrees to be bound by the statements and representations made in its proposal.

PROPONENT NAME (please print): _____

NAME OF AUTHORIZED REPRESENTATIVE (please print):_____

SIGNATURE OF AUTHORIZED REPRESENTATIVE: _____

DATE: _____

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1. GENERAL TERMS & CONDITIONS

1.1 DEFINITIONS

Throughout this Request for Proposal, the following definitions apply:

"**Addenda**" means all additional information regarding this RFP, including amendments to the RFP;
"**BC Bid**" means the BC Bid website located at https://www.bcbid.gov.bc.ca/ ;
"**Closing Location**" includes the location or email address for submissions indicated on the cover page of this RFP, or BC Bid, as applicable;
"**Closing Time**" means the closing time and date for this RFP as set out on the cover page of this RFP;
"**Contract**" means the written agreement resulting from the RFP executed by the Regional District and the successful Proponent;
"**Contractor**" means the successful Proponent to the RFP who enters into a Contract with the Regional District;
"**Must**", or "**mandatory**" means a requirement that must be met in order for a proposal to receive consideration;
"**Proponent**" means a person or entity (excluding its parent, subsidiaries or other affiliates) with the legal capacity to contract, that submits a proposal in response to the RFP;
"**Proposal**" means a written response to the RFP that is submitted by a Proponent;
"**Request for Proposals**" or "**RFP**" means the solicitation described in this document, including any attached or referenced appendices, schedules or exhibits and as may be modified in writing from time to time by the Regional District by Addenda; and
"**Should**", "**may**" or "**weighted**" means a requirement having a significant degree of importance to the objectives of the Request for Proposals.
"SCRD", "Regional District", "Organization", "we", "us", and**"our"** mean Sunshine Coast Regional District.

1.2 FORM OF PROPOSAL

This Proposal must be completed in its entirety. Failure to properly complete this Proposal form may cause your Proposal to be rejected. The signing officer must initial all corrections. The Sunshine Coast Regional District (Regional District) reserves the right to permit a correction, clarification or amendment to the Proposal or to correct minor errors and irregularities.

1.3 SUBMISSION OF PROPOSAL

a) Proposals must be submitted before Closing Time to the Closing Location using one of the submission methods set out on the cover page of this RFP. Proposals must not be sent by fax. The Proponent is solely responsible for ensuring that, regardless of submission method selected, the Regional District receives a complete Proposal, including all attachments or enclosures, before the Closing Time.

b) For electronic submissions (BC Bid or email), the following applies:

(i) The Proponent is solely responsible for ensuring that the complete electronic Proposal, including all attachments, is received before Closing Time;

(ii) The Regional District limits the maximum size of any single email message to 20MB or less.

(iii) Proponents should endeavour to submit emailed proposal submissions in a single message and avoid sending multiple email submissions for the same opportunity. If an electronic submission exceeds the applicable maximum single message size, the Proponent may make multiple submissions (BC Bid upload or multiple emails for the same opportunity). Proponents should identify the order and number of emails making up the email proposal submission (e.g. "email 1 of 3, email 2 of 3…");

(iv) For email proposal submissions sent through multiple emails, the Regional District reserves the right to seek clarification or reject the proposal if the Regional District is unable to determine what documents constitute the complete proposal;

(v) Attachments must not be compressed or encrypted, must not contain viruses or malware, must not be corrupted, and must be able to be opened using commonly available software (e.g. Adobe Acrobat). Proponents submitting by electronic submission are solely responsible for ensuring that any emails or attachments are not corrupted. The Regional District has no obligation to attempt to remedy any message or attachment that is received corrupted or cannot be viewed. The Regional District may reject proposals that are compressed encrypted, cannot be opened or that contain viruses or malware or corrupted attachments.

c) For BC Bid e-submissions only pre-authorized e-bidders registered on BC Bid can submit electronic bids on BC Bid. BC Bid is a subscription service ($150 per year) and the registration process may take two business days to complete. If using this submission method, Proponents should refer to the BC Bid website or contact BC Bid Helpdesk at 250-387-7301 for more information. An electronic proposal submitted on BC Bid must be submitted using the e-bidding key of an authorized representative of the Proponent. Using the e-bidding key of a subcontractor is not acceptable.

d) For email proposal submissions, including any notices of amendment or withdrawal referred to in Section 1.6, the subject line of the email and any attachment should be clearly marked with the name of the Proponent, the RFP number and the project or program title.

e) The Regional District strongly encourages Proponents using electronic submissions to submit proposals with sufficient time to complete the upload and transmission of the

complete proposal and any attachments before Closing Time.

f) The Proponent bears all risk associated with delivering its Proposal by electronic submission, including but not limited to delays in transmission between the Proponent's computer and the Regional District Electronic Mail System or BC Bid.

g) While the Regional District may allow for email proposal submissions, the Proponent acknowledges that email transmissions are inherently unreliable. The Proponent is solely responsible for ensuring that its complete email proposal submission and all attachments have been received before Closing Time. If the Regional District Electronic Mail System rejects an email proposal submission for any reason, and the Proponent does not successfully resubmit its proposal by the same or other permitted submission method before Closing Time, the Proponent will not be permitted to resubmit its proposal after Closing Time. The Proponent is strongly advised to contact the Regional District Contact immediately to arrange for an alternative submission method if:

(i) the Proponent's email proposal submission is rejected by the Regional District Electronic Mail System; or

(ii) the Proponent does not receive an automated response email from the Regional District confirming receipt of each and every message transmitted, within a half hour of transmission by the Proponent.

An alternate submission method may be made available, at the Regional District's discretion, immediately to arrange for an alternative submission method, and it is the Proponent's sole responsibility for ensuring that a complete proposal (and all attachments) submitted using an approved alternate submission method is received by the Regional District before the Closing Time. The Regional District makes no guarantee that an alternative submission method will be available or that the method available will ensure that a Proponent's proposal is received before Closing Time.

1.4 SIGNATURE REQUIRED

Proposals must be properly signed by an officer, employee or agent having authority to bind the Proponent by that signature.

1.5 CLARIFICATIONS, ADDENDA & MINOR IRREGULARITIES

If any Proponent finds any inconsistencies, errors or omissions in the proposal documents or requires information, clarification of any provision contained therein, they shall submit their query in writing or email, addressed as follows:

Purchasing Division
Sunshine Coast Regional District
1975 Field Road, Sechelt, BC V7Z 0A8

purchasing@scrd.ca

Any interpretation of, addition to, deletions from or any corrections to the proposal documents will be issued as written addendum by the Regional District.

All Addenda will be posted on BC Bid. It is the sole responsibility of the Proponent to check for Addenda on BC Bid. Proponents are strongly encouraged to subscribe to BC Bid's email notification service to receive notices of Addenda.

1.6 WITHDRAWAL OR REVISIONS

Proposals or revisions may be withdrawn by written notice provided such a notice of withdrawal is received prior to the closing date and time. Proposals withdrawn will be returned to the Proponent unopened. Revisions to the proposals already received shall be submitted only by electronic mail, or signed letter. The revision must state only the amount by which a figure is to be increased or decreased, or specific directions as to the exclusions or inclusion of particular words.

1.7 CONDUCT OF THE CONTRACT

Unless otherwise specified within this document, any queries regarding this Request for Proposal are to be directed to purchasing@scrd.ca. No other verbal or written instruction or information shall be relied upon by the Bidder, nor will they be binding upon the Regional District.

1.8 CONFLICT OF INTEREST/NO LOBBYING

(a) A Proponent may be disqualified if the Proponent's current or past corporate or other interests, or those of a proposed subcontractor, may, in the Regional District's opinion, give rise to an actual or potential conflict of interest in connection with the services described in the RFP. This includes, but is not limited to, involvement by a Proponent in the preparation of the RFP or a relationship with any employee, contractor or representative of the Regional District involved in preparation of the RFP, participating on the evaluation committee or in the administration of the Contract. If a Proponent is in doubt as to whether there might be a conflict of interest, the Proponent should consult with the Regional District Contact prior to submitting a proposal. By submitting a proposal, the Proponent represents that it is not aware of any circumstances that would give rise to a conflict of interest that is actual or potential, in respect of the RFP.

(b) A Proponent must not attempt to influence the outcome of the RFP process by engaging in lobbying activities. Any attempt by the Proponent to communicate, for this purpose directly or indirectly with any employee, contractor or representative of the Regional District, including members of the evaluation committee and any elected officials of the Regional District, or with the media, may result in disqualification of the Proponent.

1.9 CONTRACT

By submitting a proposal, the Proponent agrees that should its proposal be successful the Proponent will

enter into a Contract with the Regional District on substantially the same terms and Conditions set out in www.scrd.ca/bid and such other terms and conditions to be finalized to the satisfaction of the Regional District, if applicable.

1.10 SUSTAINABLE PROCUREMENT

The Regional District adheres to its sustainable consideration factors. Proposals will be considered not only on the total cost of services, but Proposals that addresses the environment and social factors.

1.11 INVOICING AND PAYMENT

Unless otherwise agreed, the Regional District payment terms are Net 30 days following receipt of services or approved invoices, whichever is later. Original invoices are to be forwarded to the accounts payable department of the Regional District. The purchase order number assigned by the Regional District must be stated on the invoice otherwise payment may be delayed.

1.12 PRICING, CURRENCY AND TAXES

Offered prices are to be attached as a price schedule in Canadian dollars with taxes stated separately when applicable.

1.13 IRREVOCABLE OFFER

This Proposal must be irrevocable for 90 days from the Proposal closing date and time.

1.14 TIME IS OF THE ESSENCE

Time shall be of the essence in this contract.

1.15 ASSIGNMENT

The Proponent will not, without written consent of the Regional District, assign or transfer this contract or any part thereof.

1.16 OWNERSHIP OF DOCUMENTS & FREEDOM OF INFORMATION

All documents submitted in response to this Request for Proposal shall become the property of the Regional District and as such will be subject to the disclosure provisions of the *Freedom of Information and Protection of Privacy Act* and any requirement for disclosure of all or a part of a Proposal under that Act.

The requirement for confidentiality shall not apply to any Proposal that is incorporated into a Contract for the Work. Further, the Regional District may disclose the top scoring proponent's aggregate pricing to the Regional District Board at a public meeting, when making a recommendation for the award of the Contract.

For more information on the application of the Act, go to http://www.cio.gov.bc.ca/cio/priv_leg/index.page.

1.17 AWARD OF CONTRACT

The Purchasing Policy at the Regional District offers contracts to businesses through an open, fair and consistent competitive bidding process. This ensures that the Regional District will receive the best overall value for the goods and services it requires. The Regional District reserves the right to cancel, award all or part of the scope of work described in this document to a single Proponent or may split the award with multiple Proponents.

All awards are subject to Board approval that meets the needs as determined by the Board. The Regional District, in receipt of a submission from a Proponent, may in its sole discretion consider the Proponent to have accepted the terms and conditions herein, except those expressly excluded or changed by the Proponent in writing.

The RFP shall not be construed as an agreement to purchase goods or services. The lowest priced or any proposal will not necessarily be accepted. The RFP does not commit the Regional District in any way to award a contract and that no legal relationship or obligation regarding the procurement of any good or service will be created between Regional District and the proponent unless and until Regional District and the proponent execute a written agreement for the Deliverables

1.18 COST OF PROPOSAL

The Proponent acknowledges and agrees that the Regional District will not be responsible for any costs, expenses, losses, damage or liability incurred by the Proponent as a result of or arising out submitting a Proposal for the proposed contract or the Regional District's acceptance or non-acceptance of their proposal. Further, except as expressly and specifically permitted herein, no Proponent shall have any claim for any compensation of any kind whatsoever, as a result of participating in this RFP, and by submitting a proposal each Proponent shall be deemed to have agreed that it has no claim.

1.19 PROPONENT'S RESPONSIBILITY

It is the Proponent's responsibility to ensure that the terms of reference contained herein are fully understood and to obtain any further information required for this proposal call on its own initiative. The Regional District reserves the right to share, with all proponents, all questions and answers related to this bid call.

1.20 EVALUATIONS

Proposals will be evaluated in private, including proposals that were opened and read in public, if applicable. Proposals will be assessed in accordance with the evaluation criteria.

If only one Proposal is received, the Regional District reserves the right to open the Proposal in private or if the total bid price exceeds the estimated budget for the Contract, the Regional District may cancel and re-tender, accept, not accept and cancel or re-scope the Work seeking a better response, with or without any substantive changes being made to the solicitation documents. If more than one Proposal is received from the same Proponent, the last Proposal received, as determined by the Regional District, will be the only Proposal considered.

1.21 ACCEPTANCE OF TERMS

The submission of the Proposal constitutes the agreement of the Proponent that all of the terms and conditions of the RFP are accepted by the Proponent

and incorporated in its Proposal, except those conditions and provisions which are expressly excluded and clearly stated as excluded by the Proponent's proposal.

1.22 MANDATORY REQUIREMENTS

Proposals not clearly demonstrating that they meet the mandatory requirements will receive no further consideration during the evaluation process.

1.23 INSURANCE & WCB

The Proponent shall obtain and continuously hold for the term of the contract, insurance coverage with the Regional District Listed as "Additional Insured" the minimum limits of not less than those stated below:

(a) Commercial General Liability – not less than $5,000,000 per occurrence
(b) Motor Vehicle Insurance, including Bodily Injury and Property Damage in an amount no less than $2,000,000 per accident from the Insurance Corporation of British Columbia on any licensed motor vehicles of any kind used to carry out the Work.
(c) All Risk Property insurance for Contractor's equipment.
(d) All Risk Course of Construction including equipment breakdown for full replacement value of project plus 10%.
(e) A provision requiring the Insurer to give the Owners a minimum of 30 days' notice of cancellation or lapsing or any material change in the insurance policy;

The Proponent must comply with all applicable laws and bylaws within the jurisdiction of the work. The Proponent must further comply with all conditions and safety regulations of the Workers' Compensation Act of British Columbia and must be in good standing during the tern of any contract entered into from this process.

1.24 COLLUSION

Except otherwise specified or as arising by reason of the provisions of these documents, no person, or corporation, other than the Proponent has or will have any interest or share in this proposal or in the proposal contract which may be completed in respect thereof. There is no collusion or arrangement between the Proponent and any other actual or prospective Proponent in connection with proposals submitted for this project and the Proponent has no knowledge of the context of other proposals and has no comparison of figures or agreement or arrangement, express or implied, with any other party in connection with the making of the proposal.

1.25 CONFLICT OF INTEREST

Proponents shall disclose in its Proposal any actual or potential conflict of interest and existing business relationship it may have with the Regional District, its elected or appointed officials or employees.

1.26 LIABILITY FOR ERRORS

While the Regional District has used considerable efforts to ensure an acute representation of information in these bid documents, the information contained is supplied solely as a guideline for Proponents. The information is not guaranteed or warranted to be accurate by the Regional District nor is it necessarily comprehensive or exhaustive.

1.27 TRADE AGREEMENTS

This RFP is covered by trade agreements between the Regional District and other jurisdictions, including the following:

a) Canadian Free Trade Agreement; and
b) New West Partnership Trade Agreement.

1.28 LAW

This contract and any resultant award shall be governed by and construed in accordance with the laws of the Province of British Columbia, which shall be deemed the proper law thereof.

1.29 REPRISAL CLAUSE

Tenders will not be accepted by the Regional District from any person, corporation, or other legal entity (the "Party") if the Party, or any officer or director of a corporate Party, is, or has been within a period of two years prior to the tender closing date, engaged either directly or indirectly through another corporation or legal entity in a legal proceeding initiated in any court against the Regional District in relation to any contract with, or works or services provided to, the Regional District; and any such Party is not eligible to submit a tender.

1.30 FORCE MAJEURE (ACT OF GOD)

Neither party shall be liable for any failure of or delay in the performance of this Agreement for the period that such failure or delay is due to causes beyond its reasonable control including but not limited to acts of God, war, strikes or labour disputes, embargoes, government orders or any other force majeure event. The Regional District may terminate the Contract by notice if the event lasts for longer than 30 days.

1.31 CONFIDENTIAL INFORMATION OF PROPONENT

A proponent should identify any information in its proposal or any accompanying documentation supplied in confidence for which confidentiality is to be maintained by Regional District. The confidentiality of such information will be maintained by Regional District, except the total proposed value, which must be publicly released for all proposals, or otherwise required by the Freedom of Information and Protection of Privacy Act ("FOIPPA"), law or by order of a court or tribunal. Proponents are advised that their proposals will, as necessary, be disclosed, on a confidential basis, to advisers retained by Regional District to advise or assist with the RFP process, including the evaluation of proposals. If a proponent has any questions about the collection and use of personal information pursuant to this RFP, questions are to be submitted to the RFP Contact.

1.32 DISPUTE RESOLUTION

All unresolved disputes arising out of or in connection with this Proposal or in respect of any contractual relationship associated therewith or derived therewith shall be referred to and finally resolved by arbitration as prescribed by Mediate BC services pursuant to its rules, unless otherwise mutually agreed between the parties.

1.33 DEBRIEFING

At the conclusion of the RFP process, all Proponents will be notified. Proponents may request a debriefing meeting with the Regional District.

1.34 SUBCONTRACTING

a) Unless the RFP states otherwise, the Regional District will accept proposals where more than one organization or individual is proposed to deliver the services described in the RFP, so long as the proposal identifies the lead entity that will be the Proponent and that will have sole responsibility to deliver the services under the Contract. The Regional District will enter into a Contract with the Proponent only. The evaluation of the Proponent will include evaluation of the resources and experience of proposed sub-contractors, if applicable.

b) All subcontractors, including affiliates of the Proponent, should be clearly identified in the proposal.

c) A Proponent may not subcontract to a firm or individual whose current or past corporate or other interests, may, in the Regional District's opinion, give rise to an actual or potential conflict of interest in connection with the services described in the RFP. This includes, but is not limited to, involvement by the firm or individual in the preparation of the RFP or a relationship with any employee, contractor or representative of the Regional District involved in preparation of the RFP, participating on the evaluation committee or in the administration of the Contract. If a Proponent is in doubt as to whether a proposed subcontractor might be in a conflict of interest, the Proponent should consult with the Regional District Contact prior to submitting a proposal. By submitting a proposal, the Proponent represents that it is not aware of any circumstances that would give rise to a conflict of interest that is actual or potential, in respect of the RFP.

d) Where applicable, the names of approved subcontractors listed in the proposal will be included in the Contract. No additional subcontractors will be added nor other changes made to this list in the Contract without the written consent of the Regional District.

1.35 HOLDBACK

Invoices are subject to a holdback, the Regional District shall hold back 10%, or other percentage as required by the Builders Lien Act, of any amounts due to the Contractor as a builder's lien holdback. No interest or other charges shall accrue on any amounts retained.

1.36 SUBSTANTIAL PERFORMANCE

The successful Proponent shall advise the Regional District when the work has reached substantial performance and shall review all completed work with the Regional District for the purposes of final inspection, deficiencies and commissioning. Any deficiencies identified the successful Proponent is required to provide the Regional District with a reasonable time period for the correction. The Regional District will provide acknowledgment of those corrections and time frame. The Regional District will conduct further inspections.

1.37 HOLDBACK RELEASE

The Regional District shall pay any builders lien holdbacks as required by the Builders Lien Act, or on such other dates as required by law but the Regional District may hold back the amounts for any deficiencies of filed builder's liens. The successful Proponent will provide the Regional District with a written request for its release, with a clearance letter from the Workers' Compensation Board, a certification of Substantial Performance and/or any written report confirming the satisfaction from the Regional District that all monies owing to the successful Proponent's workers, subcontractors, material and equipment suppliers and government agencies have been satisfactorily paid.

1.38 CLEANUP

The successful Proponent will maintain the site in a clean and orderly condition.

Upon attaining Substantial Performance, the successful Proponent shall remove all surplus products, tools, construction machinery and equipment relating to the work that is not required for the performance of the remaining work. The successful Proponent shall also remove waste, debris and waste products other than that cause by the Regional District or other Contractors, and leave the place of work clean and suitable for occupancy by the Regional District unless otherwise specified in the contract documents or directed.

If the successful Proponent fails or refused to remove all such products, materials, equipment and waste within a reasonable time after achieving Substantial Performance, the Regional District will issue a written notice to the Successful Proponent to remedy such failure or refusal by providing a reasonable time, the Regional District may do or cause to be done the removal and all reasonable resulting costs incurred by the Regional District may be deducted from any amounts owing to the successful Proponent.

2. INTRODUCTION

2.1 Purpose

The Regional District is seeking proposals from a qualified Contractor to replace the existing shell and tube brine chiller with a plate and frame brine chiller c/w U-Turn surge drum at the Gibsons and Area Community Center (GACC) located at 700 Park Rd, Gibsons BC. The existing shell and tube chiller was installed during the original construction of the facility in 2007 and has reached the end of its service life. This project will include related equipment such as brine pump with variable frequency drive, ammonia and brine valves, piping, controls, wiring and required DDC system upgrades. To reduce impacts of the project on the regular scheduled operations of the facility construction is planned to occur during the non-ice season May 20 to July 26, 2024. The Regional District desires a project approach that will minimize impact on facility users and staff. Proponents are encouraged to look for creative solutions to deliver a cost-effective quality installation while minimizing impacts to the regular operations of the facility. The Regional Districts budget for this project is $450,000.

A plate and frame chiller c/w U-Turn surge drum has been pre-ordered from Alfa Laval. Upon award of this contract the successful Proponent must issue a purchase order to Alfa Laval to complete the order of the chiller.

3. SITUATION/OVERVIEW

3.1 Background

The GACC is a single sheet ice arena originally constructed in 2007. The facility refrigeration system has a shell and tube chiller, one (1) Mycom N6WB compressor, one (1) Mycom N4WB compressor, BAC VC1-205 evaporative condenser, glycol under floor heating system, glycol snow melt system and Delta Controls Direct Digital Control (DDC) control system. All major refrigeration system components are original from 2007 construction.

3.2 Project Objectives

The project objectives that the Contractor needs to achieve for the successful completion of this project is as follows:

1. Reduce system ammonia charge through replacement of the existing shell and tube chiller with a plate and frame chiller c/w U-Turn surge drum.
2. Ensure refrigeration system capacity is sufficient for 12-month ice operations and considers increasing temperature extremes due to climate change.
3. Increase operating efficiency through the use variable frequency drives and or other technologies.
4. Complete project construction during the regularly scheduled non-ice season.
5. Minimize project timeline and impact on facility users and staff.

3.3 Scope

The scope of work and standards can be found:

1. Appendix A – Specifications & Drawings

4. CONTRACT

4.1 General Contract Terms and Conditions

Proponents should review carefully the terms and conditions set out in the General Service Contract, including the Schedules. The General Contract terms can be found at: Information about our General Service Terms and Conditions can be found at www.scrd.ca/bid.

4.2 Service Requirements

The Contractor's responsibilities will include the following:

a) Prior to signing the Contract, the Contractor will provide:
   a. proof that they are registered to conduct business in the Province of British Columbia; and
   b. Performance and Labour and Material Bond within 15 days of receipt of the written notice of award, will deliver to the Regional District a performance bond and a labour and material bond, each in the amount of 50% of the contract price, covering the performance of the work including the successful Proponent's obligations during the maintenance period, issued by a surety licensed to carry on the business of suretyship in the province of British Columbia and in a form acceptable to the Regional District; or
   A bank draft, in the amount of 20% of the total contract price. The bank draft less 5% of the total contract price will be returned 60 days after the completion of the contract which will be held until the end of the maintenance period; or
   A letter of credit, in the amount of 20% of the total contract price, without a termination date. The letter of credit will be returned 60 days after the completion of the contract and after the issuance of a letter of credit for the warrantee period, without a termination date in the amount of 5% of the total contract price which will be held until the end of the maintenance period.

b) Working closely with the Regional District staff and representatives throughout the term of the contract.
c) Provision of all the deliverables as outlined in Appendix A and B
d) Conformance to all applicable codes, guidelines regulations and all laws as required by the authorities having jurisdiction.
e) Ensuring that all engineering work complies with applicable Permit to Practice requirements as articulated by Engineers and Geoscientists of BC.
f) Employing skilled and qualified people to complete the work.
g) Being aware of and comply with all by-laws or regulations regarding noise for each respective jurisdiction.
h) Warranting that the work will be completed in a good and skilful manner and provide a minimum of one (1) year warranty on their work.
   If within warranty period any part of the work is found by the Regional District to be defective or faulty due to imperfect or bad construction or material, the successful Contractor will replace such defective items without expense to the Regional District; and
i) Obtain all permits, licenses, approvals, and certificates which are generally required for the performance of the work.

5. REQUIREMENTS

In order for a proposal to be considered, a Proponent must clearly demonstrate that they meet the mandatory requirements set out in Section 7.1 (Mandatory Criteria) of the RFP.

This section includes "Response Guidelines" which are intended to assist Proponents in the development of their proposals in respect of the weighted criteria set out in Section 7.2 of the RFP. The Response Guidelines are not intended to be comprehensive. Proponents should use their own judgement in determining what information to provide to demonstrate that the Proponent meets or exceeds the Regional District's expectations.

Please address each of the following items in your proposal in the order presented. Proponents may find it helpful to use the individual Response Guidelines as headings for proposal responses.

5.1 Capabilities

5.1.1 Relevant Qualifications

Proponents **need to** include a Red Seal Refrigeration Technician on the project team with a minimum of 5 years of experience with commercial ammonia refrigeration systems. Proponents **need to** hold a valid Refrigeration Contractors License with Technical Safety BC.

Proponents **need to** provide a list of key project team personnel including their qualifications.

5.1.2 Relevant Experience

The Proponent and any subcontractors of the Proponent included in its proposal **should** have a minimum of 5 years within the past 7 years providing services of a similar scope and complexity. Similar scope and complexity is defined as:

a) Ice arena ammonia refrigeration system installation in British Columbia.
b) Plate and frame ammonia/brine chiller installation.
c) Ice arena ammonia refrigeration system electrical and controls installation.

Proponents **need to** provide complete information on the experience of key personnel to be involved in the work as it relates to the scope and complexity described above.

5.1.3 References

Proponents **need to** provide a minimum of 3 references (i.e. names and contact information) of individuals who can verify the quality of work provided specific to the relevant experience of the Proponent and of any subcontractors named in the proposal. References from the Proponent's own organization or from named subcontractors are not acceptable.

The Regional District reserves the right to seek additional references independent of those supplied by the Proponent, including internal references in relation to the Proponent's and any subcontractor's performance under any past or current contracts with the Regional District or other verifications as are deemed necessary by it to verify the information contained in the proposal and to confirm the suitability of the Proponent.

5.1.4 Environmental Requirements

All removed existing system components and waste installation materials **should** be disposed of in a manner that meets all regulatory and environmental requirements. Upcycling or recycling **should** be considered as the preferred method of disposal whenever possible. Any excess ammonia and or brine **needs to** be disposed of in a manner that meets all regulatory and environmental requirements. Proponents **should** provide details on how they will meet any environmental requirements.

5.2 Sustainable Social Procurement

A factor in the Regional District evaluation process is sustainable social procurement and the evaluation of proposals will take this into consideration.

As part of any submission the Proponent is encouraged to identify how they may contribute to the following key social, employment and economical goals, but not limited to the following:

a) Contribute to a stronger local economy by:
- promoting a Living Wage
- Using fair employment practices;
- Increase training and apprenticeship opportunities;

b) Local expertise knowledge by:
    a. Being locally owned;
    b. Utilization of local subcontractors;

c) Environmental Cost of Ownership;
d) Energy efficient products;
e) Minimal or environmental friendly use of packing materials; and
f) Reducing hazardous materials (toxics and ozone depleting substances).

5.3 Methodology and Objectives

Proponents **should** describe its methodology, approach and outline the process to complete the services. Proponents project approach **should** focus on ways to reduce overall project time, facility downtime, impact on patrons and staff. Consideration **should** also be given to coordination of chiller replacement work with other work occurring during the annual maintenance closure which may require shared access to work areas with Regional District staff or other contractors. Proponents **should** include features of their services that give them a competitive advantage.

5.4 Work Plan

Proponents **should** provide a detailed work plan including start date, key project milestones and project completion date. Proponents will need to indicate when the order for the plate and frame chiller c/w y-turn surge drum will be placed. Proponents **need to** indicate if the project can be completed during the 2024 non-ice season scheduled for May 20 – July 26.

5.5 Safety Plan

Proponents should include a site safety plan. The plan **should i**nclude but is not limited to:

1. Hot works
2. Lifting, craning, and hoisting
3. Work site access control
4. Chemical handling

5. Emergency response

5.6 Bond

The proposal **must** be accompanied by a bid security in the form of a bid bond issued by a surety licensed to carry on the business of suretyship in British Columbia in a form reasonable satisfactory to the Regional District or a certified cheque or bank draft or letter of credit in a form acceptable to the Owner in the amount equal to 10% of the proposal price.

If the Proponent chooses to use the BC Bid e-submission method the Proponent will need to upload an electronic copy of the Bid Bond, Certified Check, Letter of Credit or Bank Draft with their BC Bid e-submission and the original will need to be received by the Regional District within 5 business days of the closing date. If the Proponent submit an e-bond the bond must be verifiable, containing a digital signature, digital corporate seal and a verification tag or a to check that the bond document has not been altered.

5.7 Price

Proponents need to submit a fee proposal provides lump sum all-inclusive price for the project, the proposal should include a breakdown of the fix prices including time, travel, hourly billable rates and material costs.

Prices quoted will be deemed to be:

- in Canadian dollars ;
- inclusive of duty, FOB destination, and delivery charges where applicable; and
- exclusive of any applicable taxes.

6. PROPOSAL FORMAT

Proponents should ensure that they fully respond to all requirements in the RFP in order to receive full consideration during evaluation.

The following format, sequence, and instructions should be followed in order to provide consistency in Proponent response and ensure each proposal receives full consideration. All pages should be consecutively numbered.

a) Signed cover page (see section 7.1 Mandatory Criteria).
b) Table of contents including page numbers.
c) A short (one or two page) summary of the key features of the proposal.
d) The body of the proposal, including pricing, i.e. the “Proponent Response”.
e) Appendices, appropriately tabbed and referenced.
f) Identification of Proponent (legal name)
g) Identification of Proponent contact (if different from the authorized representative) and contact information.

7. EVALUATION

Evaluation of proposals will be by a committee formed by the Regional District and may include other employees and contractors.

The Regional District’s intent is to enter into a Contract with the Proponent who has met all mandatory criteria and minimum scores (if any) and who has the highest overall ranking.

Proposals will be assessed in accordance with the entire requirement of the RFP, including mandatory and weighted criteria.

The Regional District reserves the right to be the sole judge of a qualified proponent.

The Evaluation Committee may, at its discretion, request clarifications or additional information from a Proponent with respect to any Proposal, and the Evaluation Committee may make such requests to only selected Proponents. The Evaluation Committee may consider such clarification or additional information in evaluating a Proposal.

7.1 Mandatory Criteria

Proposals not clearly demonstrating that they meet the following mandatory criteria will be excluded from further consideration during the evaluation process.

Mandatory Criteria
The proposal must be received at the Closing Location before the Closing Time.
The proposal must be in English.
The proposal must be submitted using one of the submission methods set out on the cover page of the RFP
The proposal must either (1) include a copy of the Confirmation of Proponent's Intent to be Bound that is signed by an authorized representative of the Proponent, this is also required for email submissions or (2) be submitted by using the e-bidding key on BC Bid (if applicable), in accordance with the requirements set out in the RFP
Bid Bond

7.2 Weighted Criteria

Proposals meeting all of the mandatory criteria will be further assessed against the following weighted criteria.

Weighted Criteria	**Weight (%)**
Qualifications	15
Experience	20
Approach and Workplan	35
Sustainable Social Procurement	5
Price	25
TOTAL	**100**

7.3 Price Evaluation

The lowest priced Proposal will receive full points for pricing. All other prices will be scored using the following formula: lowest priced proposal/price of this proposal* total points available for price.

Appendix A Specifications and Drawings

GIBSONS & AREA COMMUNITY CENTRE

ICE ARENA
REFRIGERATION PLANT

AMMONIA/BRINE CHILLER REPLACEMENT

2024

SPECIFICATIONS

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700 Park Rd
Gibsons, BC
V0N 1V0

Prepared By: **JS Refrigeration Engineering Inc.**

PERMIT TO PRACTICE #: 1004255
Tel: 604 437-3333, Cell: 778 317-9633
www.jsre.ca

TABLE OF CONTENTS

SECTION 1:
INTRODUCTION AND GENERAL DESCRIPTION

Gibsons & Area Community Centre Ice Arena is located at 700 Park Rd, Gibsons, B.C.

It is a NHL sized (85' x 200') ice arena.

An ammonia refrigeration system with one shell & tube ammonia/brine chiller was originally installed in 2006 by Pace Industrial to make and maintain ice for the Ice Arena.

Gibsons Ice Arena ice plant ammonia/brine chiller replacement and refrigeration plant 2024 upgrade project includes but is not necessarily limited to the following:

1. The replacement of the existing shell & tube brine chiller with a plate & frame chiller C/W a U-Turn surge drum package;

2. The existing cold brine pump P1 with pony motor will be replaced with a new cold brine pump together with the chiller replacement;

3. A VFD starter will be installed for the new cold brine pump;

4. The relevant ammonia and brine piping upgrade;

5. The related electrical, control, and DDC system upgrades;

6. Safety relief system and other safety upgrades;

7. Cold brine solution treatment or replacement.

This project is designed by JS Refrigeration Engineering Inc. This specification documentation covers the conditions, work scope, material and equipment specification, and installation requirements of the project.

Reference to the Refrigeration Consultant in these Specifications refers to JS Refrigeration Engineering Inc.

Reference to the Owner refers to the Sunshine Coast Regional District.

Reference to the Contractor refers to the Refrigeration Contractor.

The Contractor shall perform the work at the Gibsons & Area Community Centre Ice Arena according to General Work Scope, Work Scope Item List and Conditions set in these Specifications and relevant drawings.

The Owner is going to pre-order the new chiller.

One 120TR TK20BW-FD plate & frame ammonia/brine chiller with a U-Turn surge drum will be pre-ordered by the Owner. A letter of intent will be issued to Alfa Laval as confirmation of the Owner's intent to proceed with the Supply and Delivery of the new chiller. Please refer to the Section 8: Appendixes of this Specifications for the new chiller feature details.

Bidders shall contact Jorge Caceres Salazar at Alfa Laval for the unit selection details and price (Alfa Laval quotation reference no: QU-2309-ED-0808900 R2). The successful Contractor must issue a Purchase Order to Alfa Laval and pay for the pre-ordered chiller after the contract is awarded. The successful Contractor shall accept Alfa Laval standard terms of payment upon approval of credit. The successful Contractor shall submit the certificate of Alfa Laval's approval of credit before the contract is awarded.

The cost of the pre-ordered chiller with surge drum shall be included in the project base price.

SECTION 2:
WORK SCOPE

2.1 General Work Scope and Requirement

The work includes but is not necessarily limited to the following:

2.1.1. Supply and install all equipment, material, labor, tools, commissioning, and warranty for the project as per the specifications. All installations shall comply with codes, standards, and regulations listed herein. Technical Safety BC (TSBC), WorkSafeBC, the Refrigeration Consultant, and the Owner are required to inspect and approve all installations.

2.1.2. All freight and local cartage costs of the equipment and material for the project to be included in the contract.

2.1.3 All travel and accommodation costs for the project to be included in the contract.

2.1.4. If overtime work is required to meet the completion date, it is to be included in the contract.

2.1.5. Off-loading and rigging costs of all equipment and material for the project to be included in the contract.

2.1.6. Provide shop drawings and as built drawings as detailed in Section 7 Submittals.

2.1.7. Provide system installation and operation manuals as detailed in Section 7 Submittals.

2.1.8. Provide refrigeration system decommissioning and related existing equipment disposal service as detailed in the Work Scope Item List.

Remove and dispose the unnecessary ammonia based on the designed new system ammonia charge.

2.1.9. Confirm available space and location on site for the new equipment installation.

2.1.10. Provide new equipment layout plan.
The Contractor shall confirm the layout and installation space of the new equipment and new piping on site.

2.1.11. Provide electrical and control wiring diagrams as detailed in Section 7

Submittals.

2.1.12. Supply and install a new P & F ammonia / brine chiller HE1 with a U-Turn surge drum, a new cold brine pump, a new VFD starter of the new cold brine pump motor, and related ammonia & cold brine piping upgrade for the Ice Arena as detailed in the Scope of Work Item List.

2.1.13. Supply and install possible plant safety upgrade as detailed in the Scope of Work Item List.

2.1.14. Supply and install necessary DDC system upgrade as detailed in the Scope of Work Item List.

2.1.15. Provide system commissioning and startup service as detailed in the Scope of Work Item List.

2.1.16. The treatment of the existing cold brine solution is included in the project work scope.

2.1.17. Supply and install necessary electrical and control system upgrades of the new installed equipment.

2.1.18. Supply and install necessary field wiring and conduits for the new equipment power supply and controls.

2.1.19. Supply and install necessary ammonia piping and brine piping as detailed in the P & I drawing and specifications.

2.1.20. Supply and install supports and hangers for the new installed pipes and conduits.

2.1.21. Supply and install secondary supports, anchors, anchor bolts, concrete house keeping pad, and seismic restraints for the new installed equipment.

2.1.22. Provide cutting, coring and patching service for any duct, pipe or conduit penetrations walls, floor, and ceiling.

2.1.23. Supply and install sleeves, cans, flashing, caulking and sealing for all duct, pipe and conduit penetrations.

2.1.24. Supply and install necessary pipe insulation and saddles for the new ammonia suction pipes and the new cold brine pipes.

2.1.25. Coordination of work with other trades, TSBC, WorkSafeBC, the Refrigeration Consultant, and the Owner shall be included in the scope of work.

2.1.26. The Contractor is responsible for obtaining and paying the fees for refrigeration installation permit, electrical installation permit, and any other necessary permits.

2.1.27. The Contractor is responsible for calling TSBC safety officer, WorkSafeBC occupational hygiene officer, and the Owner's inspector and paying all the fees for the inspections.

2.1.28. Provide pipe welding information and weld map to TSBC, provide X-ray tests, the third party weld inspection, and any other request from TSBC for piping welds.

2.1.29. Provide pressure test for the new installed pipes and system. Cooperate and coordinate with the safety officer from TSBC for testing witness and documentation sign off.

2.1.30. Supply and install a coat of priming and a coat of finish painting for steel pipes, steel supports, and any unfinished steel surfaces.

2.1.31. Supply and install valve tags, pipe labels, and new equipment identification labels.

2.1.32. Provide system As Built information and transfer information to a hard copy of the P & I drawing, which is to be posted on site during the construction period.

2.1.33. The Contractor is responsible for calling the Refrigeration Consultant for regular inspections and final inspection.

2.1.34. Provide any required piping registration for any pressure piping larger than 3” NPS according to TSBC regulation.

2.1.35. Provide any required TSBC system design registration.

2.1.36. Any required structural, seismic and other professional design, review, and reports for the refrigeration equipment and piping support installation are included in the scope of work. Issuing structural and seismic Schedule B and C-B is the responsibility of the Contractor. Schedule B and C-B shall be provided by a professional structural engineer, which is to be hired by the Contractor.

2.1.37. Provide a three-day site instruction and training period to the site operators.

2.1.38. Provide one year onsite labor and material warranty. Warranty starts from the project substantial completion day.

2.1.39. Clean up job site on completion of the work including removal of the construction debris.

2.1.40. Check job site during a site visit and confirm existing equipment, electrical panels, MCC, motors, starters, controls, DDC system, field wiring of the refrigeration system, and the available installation space for the new equipment before bidding.

2.1.42. Voltage

1. Power for three phase motors: 575V / 60HZ / 3PH

2. Control power: 120V / 60HZ / 1PH

2.1.43. Bonds
See Owner's requirements

2.2 Scope of Work Item List
The work includes but is not necessarily limited to the following:

2.2.1. Refrigeration System Decommissioning and Related Equipment & Refrigerant Disposal Service

1. Pump out ammonia refrigerant from the existing shell and tube brine chiller, evaporative condenser, and system into a Contractor provided HPR ammonia storage receiver. This HPR ammonia storage receiver shall have over pressure protection through an installed relief valve system. Ammonia with the HPR receiver shall be stored at a safe place (approved machinery room) and in a safe manner as per applicable regulations and codes.

Remove and dispose the unnecessary ammonia based on the designed new system ammonia charge after the upgraded system installation and commissioning are completed.

2. Withdraw brine from the existing shell & tube brine chiller and related brine balance tanks to an approved portable brine tank. This portable tank shall be provided by the Contractor. Brine with the portable tank shall be stored at a safe place (approved machinery room) and in a safe manner as per applicable regulations and codes.

3. Remove, demolish, and dispose of the existing shell and tube brine chiller and related insulation and piping.

4. Demolish and dispose of the two existing concrete housekeeping pads of the existing shell & tube brine chiller.

5. Remove and dispose the existing cold brine pump and related pony motor.

6. The existing cold brine balance tank will be retained, relocated, and reconnected for the new chiller system application.

2.2.2. Ammonia / Brine Chiller, Oil Pot, Cold Brine Pump, Related Piping, and Electrical Upgrade

1. Supply and install a steel support frame base for the new installed equipment (plate and frame type ammonia/brine chiller with U-Turn surge drum assembly package).

Professional structural design of the steel frame is required to be provided by a professional structural engineer, which is to be hired by the Contractor.

2. Supply and install stainless steel drip pans underneath the new installed ammonia/brine chiller, cold brine pump, brine suction guide, brine strainer, control valves, and any other un-insulated cold surface to catch condensate. The drip pan shall be sloped allowing for a single drain connection. Supply and install water drain tubes from the drip pans to floor drains.

3. Supply and install a new factory pre-packaged plate & frame ammonia/brine (heat exchanger) chiller HE1 together with a U-Turn surge drum (supplied by Alfa Laval) as specified in the P & I drawing.

4. Supply and install an external oil pot and related piping as specified in the P & I drawing.

5. Supply and install ammonia isolating valves, safety valves, pressure gauges, thermometers, temperature transmitters, liquid level gauges, level probe transmitter, level controller, solenoid valve, motorized liquid make-up valve, and any other control valves for the new installed equipment as specified in the specifications and the P & I drawing.

6. Supply and install a high ammonia level float switch and connect to the compressor safety protection.

7. The high level float switch shall be connected to the DDC system & building security system for remote safety alarming and monitoring.

8. Supply and install pipe support, hangers, and seismic restrains for new installed ammonia and brine pipes.

9. Supply and install new ammonia piping and connect to the ammonia pipe headers as specified in the specifications and the P & I drawing.

10. Supply and install new 8” Sch. 40 steel pipe cold brine supply and return mains (inside the compressor room), butterfly isolating valves, chiller brine vent & drain valves, inline brine strainer and connect the new installed chiller and cold brine pump with a suction guide to the 6” existing brine supply and return headers as specified in the specifications and the P & I drawing.

11. Supply and install a flow switch for each cold brine circuit of the new chiller and wire to safety and control system.

12. Supply and install an extra large brine bypass filter system for each brine circuit.

13. Supply, install, and operate an external brine filtering system during the system commissioning to reduce the solids of the brine solution down to less than 30 ppm.

14. Supply and install a brine mixing and charging station.

15. Re-pipe and re-connect the existing brine balance tank.

16. Supply and install a new safety relief valve for the cold brine system. The safety relief valve shall be piped to a new holding tank.

17. Supply and install thermal insulation on cold surfaces with temperature below dew point (new installed U-Turn surge drum, low temperature ammonia pipe lines and cold brine pipe lines).

18. Supply and install a standalone controller and related ammonia liquid level probe sensor for chiller ammonia level and makeup liquid feed control.

The liquid level probe signal shall be inputted into both the standalone controller and the DDC system.

19. Supply and install solar powered thermometers on cold brine supply and return mains.

20. Supply and install a new 25 HP motor cold brine pump. The cold brine pump shall be installed on a concrete house keeping pad.

21. Retain the existing power supply breakers on the MCC for the new 25 HP cold brine pump motor.

22. Supply and install a new remotely mounted ABB VFD with across the line starter bypass, and line reactors for the new 25 HP cold brine pump motor.

The Contractor shall provide new field power wiring for the existing power breakers, the new VFD, and the new cold brine pumps.

23. Supply and install a new Honeywell two stage thermostat for the cold brine circuit control.

24. Supply and install new power and control wiring for all the new installed equipment and controls.

2.2.3. Plant Safety Upgrade

1. A code calculation of the pressure relief header size will be provided by the Refrigeration Consultant.

2. Supply and install pressure relief valve and relief piping for the new installed equipment (chiller and external oil pot) as specified on the P & I drawing and code calculation.

3. The individual pressure relief valve and relief piping for the new installed equipment shall be sized based on the code calculation.

4. Provide a thermal imaging test for the electrical contacts, new motors, and starters. The Contractor shall provide necessary correction actions per the test results and recommendations. The report shall be submitted to the Refrigeration Consultant for review and approval.

5. Supply and install Lock Open devices for the cold brine system as specified on the P & I drawing. The existing Lock Open devices could be retained and reinstalled.

2.2.4. DDC System Upgrade

Provide additional necessary sensors, control panels, control board, software, programming, graphic interface, equipment, tools, material, and commissioning of a DDC control system upgrade for the new installed equipment.

The existing control boards and controllers shall be retained and reconnected for the new equipment control.

1. The existing remote access from phone or off-site computers to the site installed computer shall be retained and confirmed.

2. The existing site desktop computer shall be retained and reused.

3. Retain all existing controllers and field service.

4. Supply and install new cold brine temperature transmitters (CBS, CBR) and other necessary sensors. The new installed sensors shall be wired to the existing DDC control panel.

5. Supply and install new ammonia suction main and discharge main pressure transducers and wire to the existing DDC control panel.

6. The liquid ammonia level probe shall be wired to a standalone controller.

The standalone controller shall be able to input liquid ammonia level analog signal from the standalone controller to the DDC system through Modbus or other communication protocol in the future.

7. The control of the ammonia liquid level, liquid feed solenoid valve and the motorized liquid feed valve for the new ammonia/brine chillers shall be provided by the standalone controller.

The standalone controller shall be able to input the operating status of the liquid feed solenoid valve and the motorized liquid feed valve from the standalone controller to the DDC system through Modbus or other communication protocol in the future.

8. The chiller high ammonia level switch shall be reconnected to the DDC system.

9. Provide remote shut off feature of the chiller HPL liquid makeup solenoid valve

through the DDC system in case of any plant emergency issue.

10. The DDC system shall provide operation control of the new installed cold brine pump motor with VFD operation.

11. Provide control software and graphic interface modifications to integrate the new equipment and controls to the existing DDC control system.

12. Provide qualified electricians to do all the shop and field wiring of the DDC control system.

13. All the major equipment and procedure controls (chiller liquid level control, cold brine pump VFD operation, etc.) shall be included in the upgraded DDC system.

14. Supply and install any required new control power wiring and control wiring for the new installed equipment and controls.

15. Confirm local and remote monitoring & alarm indication of all critical system operating and safety parameters (ammonia leak, high discharge pressure, high discharge temperature, and high liquid ammonia level, etc.)

16. Download the updated control program software and provide access to Owner's computers (one onsite and two offsite).

17. Provide the Owner with the backup software copy and installation instruction documentation.

System access information and password (both operator level and administrator level) shall be part of the documentation.

18. Provide DDC system commissioning service.

19. Provide onsite training to the Owner's operating engineers.

20. Provide upgraded DDC system I/O list.

21. Provide upgraded system control and DDC wiring diagram.

2.2.5. Provide System Commissioning and Startup Service

1. After the pressure test is completed and approved by TSBC inspector, the Contractor shall evacuate the system by using a vacuum pump and hold for 12 hours without rise in pressure.

2. Break the system vacuum by anhydrous ammonia.

3. Recharge the existing brine solution from the storage tank back to the new chiller system.

4. Reduce visible solids of the cold brine solution to less than 30 ppm by circulating the brine solution through an external filtering system during the system commissioning period.

5. Supply and charge additional calcium chloride to bring to specified density of the whole brine solution charge (21% for the cold brine solution).

6. Provide treatment of the existing brine solution to bring all the parameters to acceptable control range.

7. Provide system start-up and commissioning service for the new installed equipment and system. Operate equipment and system for three days continuously after the installation is completed.

8. Provide test and reports for brine solution and ammonia. The test and reports shall be provided by certified labs.

9. Remove and dispose the unnecessary ammonia in a safe manner as per applicable regulations and codes by a professional ammonia disposing company. No refrigerant shall be discharged into the environment.

The amount of the system ammonia charge must be confirmed on site based on the new plate & frame brine chiller operating liquid level and the high pressure receiver operating liquid level. The final ammonia charge shall be approved by the Refrigeration Consultant.

SECTION 3: SCHEDULE

1. Site ready: May 21st, 2024

2. System start-up: July 26th, 2024

3. Substantial completion: See Schedule provided by the Owner

SECTION 4:
QUALITY ASSURANCE & WORKMANSHIP

4.1 Code Compliance

Refrigeration system and Class T compressor room are required to be installed, constructed, operated and maintained in accordance with all current applicable codes and regulations (Provincial and Local codes, rules, regulations and ordinances, Technical Safety BC regulations, WorkSafeBC regulations, and etc.) including but not necessarily limited to the following:

- CSA B52:18 Mechanical Refrigeration Code
- CSA B51:19 Boiler, Pressure Vessels and Pressure Piping Code
- ASME Boiler and Pressure Vessel Code, Section VIII Pressure Vessels, Div. 1 - 2023
- ASME B31.5 - 2022 Refrigeration Piping and Heat Transfer Components Code
- ASHRAE15 – 2022 Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants
- ANSI/ASHRAE Standard 62.1 - 2022 Ventilation for Acceptable Indoor Air Quality
- CSA C22.1 - 23 Canadian Electrical Code, Part I
- CSA C22.2 No. 0-10, Canadian Electrical Code, Part II
- CSA C22.2 No 14, Industrial Control Equipment
- 2023 BC Building Code
- 2023 BC Fire Code
- OSHA Regulations
- Technical Safety BC Regulations and Safety Orders
- Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation under the Safety Standards Act
- WorkSafe BC Regulations

4.2. All pressure vessels, evaporator units, heat exchangers, valves and other pressure containing components shall be with CRN and registered for use in B.C.

4.3. Provide Schedule B and Schedule C-B for structural & seismic support of major equipment and ammonia piping system (by the structural engineer).

4.4. Provide piping design registration for pressure piping bigger than NPS 3”.

4.5. Provide TSBC system design registration.

4.6. All work shall be site inspected and approved by the TSBC safety officer, the WorkSafeBC occupational hygiene officer, the Refrigeration Consultant, and the Owner's inspector.

4.8. Only qualified welders with certificate registered to the TSBC will be allowed to do the welding work. Welder's updated log book will be inspected and approved by the TSBC safety officer prior to starting any welding work on site.

4.9. All refrigeration piping welds shall be stamped by the welders. A weld map is to be prepared for the approval of the safety officer from the TSBC.

4.10. Welding procedure applied for the ammonia pressure pipe welds shall be registered to TSBC.

4.11. All tradesmen working on this project shall be qualified under provincial regulations and experienced in ammonia plant installation.

4.12. Workmanship of the refrigeration upgrade installation shall conform to a standard of best industrial practice.

4.13. The refrigeration system shall be commissioned by a qualified refrigeration mechanic with at least 5-year ammonia refrigeration experience.

4.14. Ammonia shall not be charged to the system until all the safety equipment and devices are installed and commissioned. The safety equipment and devices shall be inspected and approved by the TSBC safety officer.

4.15. System shall not be started up until the installation inspected and approved by the Refrigeration Consultant and the TSBC safety officer.

4.16. The Contractor's job site superintendent shall be approved by the Refrigeration Consultant and the Owner. This superintendent shall cooperate and coordinate with the Owner and the Refrigeration Consultant to supervise the whole project.

SECTION 5:
MAJOR EQUIPMENT AND MATERIAL

5.1 Standards

5.1.1. All equipment and material shall carry CSA approval and conform to all Federal, Provincial, Municipal regulations and standards.

5.5.2. All equipment and material shall be new, of the best quality, and supplied by the specified manufacturer.

5.2 Alternates

Any request to the use of alternate materials and equipment must be submitted to the Regional District in writing for approval, five days prior to the closing date of tender.

The Regional District will submit the request to the Refrigeration Consultant for review.

5.3 Major Equipment and Devices

5.3.1 Ammonia / Brine HE-1 for Ice Arena

New installed equipment (plate & frame chiller ammonia / brine chiller package C/W a U-Turn surge drum) shall be installed on a steel support frame stand base together with ammonia liquid feed valves & relevant ammonia liquid level control assembly, and required ammonia & brine piping as specified in the equipment layout drawing.

The height of the steel support frame stand shall satisfy the external oil pot and the cold brine pump piping installation as specified in the equipment layout drawing.

1. TK20 WB-FD Semi Welded Plate & Frame Ammonia / Brine Chiller package C/W a U-Turn surge drum

The chiller with a U-Turn surge drum package is to be fabricated by Alfa Laval.

2. Chiller material and gaskets to be suitable for ammonia and CaCl2 application.

3. Gaskets to be suitable for the designed CaCl2 operating temperature range.

4. Design Capacity

i. Ammonia side
Ammonia flow rate at full capacity: according to refrigeration capacity
9 F ammonia E.T.
90 F condensing
Total chiller design capacity: 120 TR

ii. CaCl2 brine circuit
120 TR refrigeration capacity
Brine flow rate: 1,010 USGPM 21% CaCl2 brine
12 degree F brine outlet temperature
15.3 degree F brine inlet temperature
Pressure drop: no more than 3 psig

5. Design pressure (DWP): 250 psig ammonia side, 150 psig brine side

6. U-Turn Surge Drum

i) Maximum 120 TR (total compressor capacity) for the U-Turn selection

ii) Model UL/UR128CT2012
Confirm Left hand or right version per installation layout requirement

7. Package shall be designed, constructed, and tested to ASME Sec VIII, Div 1, ASME B31.5, and CSA B51 Code.

8. Package shall be with CRN and registered for installation and operation in B.C.

9. After pressure testing at manufacturer's shop, package shall be cleaned, dried and charged with nitrogen gas. All vessel nozzles shall be sealed before and after shipping to job site.

10. The plate & frame heat exchanger with U-turn surge drum package shall be fabricated by a CSA certified shop. The package MDR's and other construction data reports need to be submitted to TSBC and approved by TSBC.

11. Acceptable manufacturers: Alfa Laval

5.3.2 Cold Brine Pump P1

1. Capacity: 1,010 usgpm of 22% CaCl2 @ 59.5 ft discharge head, with 25 HP motor.

2. Base mounted, end suction, horizontal centrifugal pump construction, open drive with flex coupling, coupling guard, steel base, and drain pan.

3. Pumps to be suitable for CaCl2 application, all iron construction C/W mechanical shaft seal and stainless steel shaft sleeves.

4. TEFC pump motor, 1775 rpm, 25 HP, inverter duty, NEMA premium energy

efficient with 1.15 SF.

5. Accepted pump manufacturer and pump model: Armstrong model 4030 6x5x10 series.

5.3.3 Cold Brine Pump P1 Motor VFD drive

1. Power: 575V, 3 phase, 60HZ service.

2. Supply and install a new standalone VFD and field wiring for the 25 HP cold brine pump motor.

3. Provide power disconnect switch, line reactors, controls, and any other necessary electrical components for the pump motor VFD.

4. Provide across line starter bypass as the pump motor VFD backup.

5. The standalone VFD package shall be remotely installed.

6. Accepted VFD Manufacturer: ABB.

5.3.4 External Oil Pot V5

1. Size: 6” Dia x 24” OAL.

2. Design Pressure (DWP): 250 psig.

3. Oil pot shall be designed, constructed, and tested to ASME Sec VIII, Div 1, ASME B31.5, and CSA B51 Code.

4. Oil pot shall be with CRN and registered for installation and operation in B.C.

5.3.5 DDC Control System

Delta DDC system

1. Accepted hardware and programming platform manufacturer: Delta
Delta DDC system is specified for the refrigeration system DDC control installation.

2. Operator-access network ensures the control system can be accessed for offsite trouble shooting and monitoring.

3. Password protection provides multiple levels (administrator level, contractor level, and operator level) of access restriction to system operation and control. Multiple level account and password information shall be submitted to the facility after the project is completed.

4. GCL (General Control Language) shall not be locked up.

5. Control Panel

Control panel includes micro-control board, communication board, I/O board, protected control power supply, and any other necessary components.

The existing control panel is to be retained for the new application.

6. Sensors

The following is a proposed refrigeration DDC control sensor list. This list is just for reference.

It is the Contractor's responsibility to confirm the required control sensors for the requirements of the refrigeration control system and finalize the sensor list before the bidding.

New sensors include but is not necessarily limited to the following:

i. One - cold brine supply temperature sensor.
ii. One - cold brine return temperature sensor.
iii. One - ammonia suction main temperature sensor.
iv. One - ammonia discharge main temperature sensor.
v. One - ammonia suction main pressure transducer.
vi. One - ammonia discharge main pressure transducer.
vii. One - CT for the new cold brine pump motor (or to be provided by motor current analog signal from VFD).
viii. One - frequency reference signal.

All required additional plant safeties

Any other necessary sensors to complete the refrigeration plant upgrade controls for this facility.

The installation of the necessary temperature sensor wells and pressure transducer isolating valves shall be included in this project.

i. Supply and install stainless thermowells for the temperature transmitter installations.
ii. Supply and install Hansen gauge, purge, & transducer valves for the followings:
    a) Common ammonia suction main.
    b) Common ammonia discharge main.

7. New Refrigeration equipment to be controlled

New refrigeration equipment includes but is not necessarily limited to the following:

i. Plate & frame ammonia/brine brine chiller:

♋◑ One ammonia liquid level probe and one standalone liquid level controller will be installed for the chiller ammonia level control. The ammonia liquid level probe is to be wired to the standalone level controller.

♌◑ One liquid feed solenoid valve and one motorized valve will be installed to feed ammonia to the chiller. The solenoid valve and motorized valve are to be field wired to the standalone level controller.

♍◑ The liquid feed solenoid valve is to be field wired to the DDC system as well. The liquid feed shall be shut off by the DDC system when there is any emergency situation.

♎◑ One high level alarm float switch will be wired to the plant and compressor safety circuits. It needs to be wired to the DDC system as well.

ii. One cold brine circulating pump with VFD starter:

α) The cold brine pump ON/OFF and VFD starter shall be controlled by the DDC system.

8. The refrigeration plant shall be able to be controlled by the electrical-mechanical controllers with system operation when the DDC system fails.

9. Control software/graphic shall be with the following features/capabilities:

Provide control logic and interface of facility scheduled operations of the new installed refrigeration equipment and system.

i. The existing DDC control sequence and graphic of the existing refrigeration equipment such as compressor staging, compressor Lead/Lag switch over, U/S heating control, snow melt system, condenser fan/water pump control, etc. shall be retained.

ii. The control of the ammonia liquid level, liquid feed solenoid valve and motorized liquid feed valve for the ammonia/brine chiller shall be included in the standalone controller.

iii. The DDC system shall be able to turn off the ammonia liquid feed to the chiller when there is any emergency situation such as high chiller ammonia level, etc.

iv. The DDC system shall be able to turn off the relevant refrigeration equipment and system when there is any critical alarm (high ammonia liquid level, high ammonia discharge pressure, high room ammonia PPM) and any emergency situation.

The existing DDC shall be confirmed if all the critical alarm safeties have been included.

v. Graphic screen shall be upgraded to include the new refrigeration equipment into the overall configuration of the upgraded refrigeration plant and the ice rink.

a) Graphical User-Interface displays current operating conditions of all existing and new equipment & sensors using animation and color-coded on/off status and provides one-click links to set points and features.

b) Graphic screen shall display the ammonia/brine chiller operating liquid level, motorized valve opening, and liquid feed solenoid status.

c) Graphic screen will display both chiller and brine operation temperatures, ammonia suction and discharge pressures, equipment and valve operating status, motor currents, chiller liquid ammonia level, alarm set point and alarm history.

vi. Trend Logging records all system operating parameters (existing and new equipment) at a user-adjustable interval and is saved to hard-disk daily.

vii. Report Printing of Trend Log Reports with optional automatic time of day/day of week printing feature. Reports may be exported directly to Microsoft Excel.

viii. Critical alarm points include chiller high level, high discharge pressure, high discharge temperature, and compressor room ammonia concentrations, etc.

5.3.6 Ammonia Valves

1. Acceptable manufacturer: R/S, Hansen, and Danfoss.

2. Isolating valve and hand expansion valve to be seal cap.

3. Valves shall be constructed with steel body.

4. Valves shall be rated for ammonia service and factory tested for 800 psig.

5. All the new installed valves shall be supplied by the same manufacturer.

6. Isolating valves up to and including 4" will be socket weld.

7. Isolating valves 5" and larger will be butt weld.

8. Any screwed valve to be used shall be pre-approved by the Refrigeration Consultant before the installation.

9. Control valve, motorized valve, and hand expansion valve shall be sized based on required refrigeration capacity and operating conditions.

10. Solenoid valve shall be installed together with strainer. Provide blow-down valves for strainers.

11. All solenoids to have encapsulated coil with pilot light (110V).

12. Pressure relief valve shall be supplied by the same manufacturer as for the existing system.

5.3.7 Ammonia Liquid Feed Solenoid Valve & Motorized Valve

1. Acceptable manufacturer: Danfoss or Parker.

2. Unit to be suitable for ammonia application.

5.3.8 Ammonia Liquid Level Probe Transmitter and Level Controller

1. Acceptable manufacturer: Danfoss or approved equivalent.

2. Unit to be suitable for ammonia application.

3. Level probe shall be with CRN and registered for installation and operation in B.C.

4. Capacitive liquid level probe.

5. Liquid level wire probe is not acceptable.

5.3.9 Ammonia Liquid Level Sight Glass Gauge

1. Acceptable manufacturers: Penberthy, Danfoss, or approved equivalent.

2. Unit shall be with CRN and registered for installation and operation in B.C.

3. Unit housing material to be steel, ASME SA36, traceable, zinc chromatic plated.

4. Unit shall have automatically closing shut-off valves.

5. Unit to be suitable for ammonia application at design temperature.

6. Unit shall have frost shield for the low temperature application.

5.3.10 Ammonia Liquid Level Eye (Bulls Eye) Sight Glass

1. Bulls eye (Level eye) sight glass gauge is to be used for the ammonia liquid high level alarm indication.

2. Acceptable manufacturers: Parker, Phillips, or approved equivalent.

3. Unit shall be with CRN and registered for installation and operation in B.C.

4. Unit housing material to be SA36 steel construction with 1101R reflex lens.

5. Suitable for ASME Code vessels.

6. Unit to be suitable for ammonia application at design temperature.

7. Unit shall have frost shield for the low temperature application.

5.3.11 Ammonia Float Switch

1. Acceptable manufacturer:
R/S, Hansen or approved equivalent.

2. Unit to be suitable for ammonia application.

3. Unit shall be with CRN and registered for installation and operation in B.C.

5.3.12 Ammonia Liquid Drainer

1. Acceptable manufacturer: Watson McDaniel or approved equivalent.

2. Unit to be suitable for ammonia application at designed operation conditions.

3. Unit shall be with CRN and registered for installation and operation in B.C.

4. All stainless steel material.

5. Unit to be repairable.

6. Unit shall be sized based on the application capacity.

5.3.13 Brine Valves

1. Acceptable manufacturer: Grinnell, Keystone, Bray,or or approved equivalent.

2. Butterfly valve - lug style with locking handle.

3. Balance valve - Armstrong CBV valve.

4. Valve material shall be suitable for CaCl2 brine application in the design operating temperature range.

5.3.14 Brine In-line Strainer

1. Acceptable manufacturer: Colton, Bray.

2. 8” flanged Y strainer, or basket strainer.

3. Strainer material shall be suitable for CaCl2 brine application in the design operating temperature range (Cast iron or steel body with stainless steel screen is

acceptable).

4. A 1/16” mesh screen shall be used during the startup. 1/8” standard perforated screen shall be installed to replace the 1/16” mesh screen after system startup.

5.3.15 Brine Pump Suction Guide

1. Acceptable manufacturer: Armstrong.

2. Less insert.

5.3.16 Brine Filter

1. Acceptable manufacturer: Waterite Technologies.

2. HL20 large series filter housings, 1” connections, with 22” length cartridge.

5.3.17 Brine External Filtration System

1. Acceptable manufacturer: Harmsco.

2. Model HIF multi-cartridge filtration product.

5.4 Material

5.4.1. Ammonia Pipes and Fittings

1. Ammonia piping shall conform to the latest edition of ASME B31.5, CSA B51, and CSA B52 Code.

2. MTRs for all pipe and fittings shall be provided for TSBC inspection and kept for records.

3. All fitting designs shall be registered for use in B.C.

4. Pipe shall be clean, new, and free of rust, scale, oil, grease, etc.

5. Pipe up to and including 2" NPS:
   i. Pipe: Sch. 80, SA106 grade B seamless.
   ii. Fitting: Class 3000, S.W. ASTM A105 forged steel.

6. Pipe 2-1/2" NPS and larger:
   i. Pipe: Sch. 40, SA106 grade B seamless.
   ii. Fitting: Sch.40 B.W. ASTM A234B.

7. Ninety (90) degree branch pipe connection with two pipe size difference

   i. Up to 2" NPS (including 2”): Sockolets will be used.
   ii. 2-1/2" NPS and larger: Weldolets will be used.

7. Forty five (45) degree branch pipe connection:
   i. Factory fabricated fittings with CRN.

8. Flanges:
   i. Raised face, CL300, ASTM A105.

5.4.2. Brine Pipes and Fittings

1. Pipe 2" NPS or less:
   i. ASTM A120 standard galvanized steel pipe.

2. Pipe 2-1/2" NPS or larger:
   i. ASTM A-120 Schedule 40 black steel.

5.4.3. Glycol Pipes and Fittings

1. Pipe 2" NPS or less:
   i. ASTM A120 standard galvanized steel pipe.

2. Pipe 2-1/2" NPS or larger:
   i. ASTM A-120 Schedule 40 black steel.

5.4.4. Water Pipes and Fittings

1. Pipe 2" NPS or less:
   i. Copper tube and fitting.

2. Pipe 3" NPS or larger:
   i. Schedule 40 PVC pipe or
   ii. ASTM A-120 Schedule 40 black steel.

5.4.5. Secondary Supports for Major Equipment

1. Secondary supports for the newly installed equipment can be a painted or hot dip galvanized steel frame.

2. The new chiller package shall be mounted on a customer made structural steel beam supporting frame (designed by a structural engineer).

3. A concrete housekeeping pad shall be provided for the new brine pump.

5.4.6. Pipe Stands and Hangers

1. Floor mounted pipe stands, trapeze type hangers, and Clevis hangers will be used for different applications.

2. Pipe stand and hanger material and finish shall be painted, cad plated or hot dip galvanized steel for all the steel pipes.

3. All the steel pipe hangers for copper tubes shall be cad plated and C/W rubber

sleeves.

5.4.7. Insulation

1. Insulation Material: TRYMER PIR (POLYISOCYANURATE) insulation.

2. Blue-Skin Vapor Barrier.

3. Cover vapor barrier with aluminum jacket.

4. Saddles: use hot dipped galvanized 12 gauge saddles, 12 inches long.

5. Longitudinal Joints to have Tongue & Groove or Ship Lap Joints.

6. Valves and vessels need to be insulated with pre-molded polyisocyanurate insulation to fit the contour of valve and vessel head.

7. The following table primarily shows the insulation thickness necessary to prevent condensation on the outer surface of the insulation system jacket for indoor application.

PIPE NPS (INCH)	1/2	3/4	1	1-1/2	2	2-1/2	3	4	6	8	10	12	VESSEL (U Turn Surge Drum)
INSULATION THICKNESS (INCH)	2	2	2	2	2	2	2	2	2	2	2	2-1/2	3

5.4.8. Electrical

1. Any possible new breaker, VFD, across the line starter bypass, and related heat protection for the upgraded brine pump shall be suitable for the upgrade application of existing MCC or electrical panel.

Acceptable manufacturers: Cutler Hammer.
VFD: ABB.

2. Conduit:
- Galvanized steel EMT or rigid conduit with reamed ends.
- Screw type galvanized steel coupling, connector and other fittings.

3. Junction boxes:
Galvanized pressed sheet metal steel boxes.

4. Conductors:
i: Unless otherwise specified or required by equipment manufacturer, all wires shall be soft-drawn and annealed, shall be copper of 98% conductivity with XLPE insulation.

5.4.9. Refrigerant

1. Refrigerant: Anhydrous ammonia with a minimum purity of 99.95%.

5.4.10. Secondary Refrigerant

1. Calcium chloride: Dow 97% Mini-Pellets, Anhydrous Calcium Chloride

2. Calcium chloride solution for chiller cold brine to be 21%.

5.4.11. Paint

1. Primer: Rustoleum enamel primer V769402.

2. Finish coat: Rustoleum 3600 system Grey or yellow colour multi-purpose epoxy paint.

5.4.12. Caulking and Sealants

1. Caulking and sealants shall be premium grade, weatherproof with minimum life span rating of 25 years.

2. Caulking applied to compressor room envelop penetration shall be minimum one hour fire rated. Hilti fire stop sealant is recommended.

SECTION 6: EXECUTION

6.1 System Installation

6.1.1. Equipment Installation shall satisfy the manufacturer's instructions and guidelines.

6.1.2. Provide service access and enough service space to the new installed equipment and valves according to manufacturer's requirement, Code and Regulation requirement.

6.1.3. Provide enough space in the front and the brine connection end of the new plates of the plate & frame chiller as manufacturer's instruction for future gasket replacement and necessary maintenance service.

6.1.4. Install stainless steel drip pan and tube it to the drainage for the new plate & frame chiller, cold brine pump, and any cold surfaces.

6.1.5. Take the suction branch lines to the compressors off the side of the suction header pipe.

6.1.6. The suction header and pipe shall be piped with a proper slope back to the chiller surge drum.

6.1.7. The compressor discharge branch lines shall be piped to enter the discharge header from the top.

6.1.8. All pipes shall be shipped plugged and stored inside building with plugs in place.

6.1.9. Pipes shall be cleaned up internally and exteriorly before installation.

6.1.10. Pipe ends shall be properly beveled prior to welding. All burns shall be removed.

6.1.11. Welding procedure applied for pressure pipe welds shall be registered to TSBC. All refrigeration piping welds shall be stamped by the welders.

6.1.12. Butt-welding will be used for pipe connection size 2-1/2" and up. Socket-welding will be used for pipe connection size up to 2".

6.1.13. Only factory fabricated fittings (elbows, tees, reducers, caps, etc.) are allowed to be used.

6.1.14. T pipe connections with two pipe sizes smaller than the main could be field

fabricated by using weldolets or sockolets. The related procedure shall be registered to TSBC.

6.1.15. 1/16" gap is required between the fitting shoulder and pipe end for socket weld fitting welding.

6.1.16. Only eccentric reducers will be used for horizontal pipe runs.

6.1.17. Limit the thread fittings application in ammonia piping system. Thread joint compound shall be suitable for ammonia application.

6.1.18. All pipe run changes in direction shall be made with long radius 90 degree elbows only.

6.1.19. Pipe and pipe supports shall be installed at slopes in the direction of flow approved by the Refrigeration Consultant for different application.

6.1.20. Isolating valves are to be installed in such a way with manual valve stems in the horizontal position.

6.1.21. Brine strainers shall be installed prior to the plate & frame chiller. Strainers are only allowed to be installed in horizontal runs of pipe.

6.1.22. If basket type or suction guide brine or glycol strainer is installed, it shall be installed on the suction side of related pumps.

6.1.23. Provide blow down valve on each strainer.

6.1.24. Pressure relief header and stack shall be sized based on the capacity of existing equipment, new installed equipment, and potential future upgrade equipment.

6.1.25. Pressure relief valve shall be installed above the liquid level. The safety relief valve for the oil pot shall be installed above the chiller surge drum.

6.2. Pressure Test of the New Installed Ammonia Piping and System

6.2.1. Pressure test (nitrogen) of new installed ammonia piping and system to at least 110% of the design working pressure (shall not exceed 130% of the design working pressure).

6.2.2. Nitrogen shall be used as the testing medium.

6.2.3. The testing pressure shall be continuously maintained for time period as required by the Code. It may then be reduced to design working pressure for leak test.

6.2.2. Hold the leak test pressure for 24 hours.

6.2.3. Soap suds leak tests for each joint and valve packing.

6.2.4. Replace defective materials and re-test the system if any leaks found during the test.

6.2.5. The Contractor shall coordinate with the TSBC to provide any required pressure test procedure and other document.

6.2.6. Call TSBC safety officer for pressure test witness and inspection.

6.2.7. Submit pressure test documentation to TSBC safety officer for approval.

6.2.8. After pressure test is satisfactory and approved by TSBC safety officer, blow out system pressure through drain valves.

6.2.9. After pressure test is completed, the ammonia piping and system shall be evacuated to a minimum 29" mercury by a vacuum pump and held for 12 hours without rise in pressure.

6.2.10. Owner's representative shall witness and sign off related document for the vacuum process.

6.2.11. Break the system vacuum with anhydrous ammonia.

6.3. Brine Piping System Pressure Test

6.3.1. Pressure test the new installed brine piping system to minimum 75 psig and hold for 24 hours.

6.4. Painting

6.4.1. Painting will be done after piping pressure test is completed and approved by TSBC.

6.4.2. A coat of primer and a coat of epoxy painting is required for all ferrous pipes, supports, and unfinished surfaces.

6.5. Penetrations

6.5.1. All pipe and conduit penetrations shall be sealed and finished in an approved procedure and system.

6.5.2. Tightly seal any conduit piercing fire rated walls, floor, and ceiling with certified one-hour fire rating material and system. Only CSA certified fire stop material and system are allowed to be used.

6.6. Secondary Supports

6.6.1. Install secondary supports to primary supports by bolts or in a manner

approved by the structural engineer.

6.6.2. Equipment and piping support installation needs to be approved and inspected by the structural engineer.

6.7. System Ammonia Charge

6.7.1. All safety devices are to be tested and approved by TSBC safety officer before system commissioning.

6.7.2. During the system commissioning, the amount of system ammonia charge shall be confirmed on site based on the plate and frame brine chiller operating liquid level.

6.8. CaCl2 Brine Treatment

6.8.1. The visible solids are at high PPM. An external filtering system is required to be installed in order to decrease visible solids to < 30 ppm.

1. CaCl2 brine shall be charged through an external filtering system.

2. The visible solids of the existing CaCl2 brine solution shall be decreased by circulating the solution through the external filtering system during the system commissioning.

6.8.2. Take brine sample and provide test report before the installation and after system started up.

6.8.3. Cold brine solution of whole system shall satisfy 22% density, inhibitor level, PH, and all other necessary requirements.

6.9. Insulation

6.9.1. Follow the instructions of "Installation Guideline for Trymer Insulation of ITW Insulation Systems" for the insulation installation.

6.9.2. Insulation shall not be applied until piping has been leak tested, pressure tested, and painted.

6.9.3. All insulation shall be tightly butted and free of voids and gaps.

6.9.4. Apply insulation in two layers for total thickness of 2” or more.

6.9.5. Do not insulate control valves or strainer.

6.9.6. Do not insulate plate & frame heat exchanger (chiller).

6.9.7. Do not insulate brine pumps.

6.9.8. Do not insulate the external oil pot (the chiller internal oil pot shall be insulated) .

6.9.9. Insulate isolating valves and leave valve stems, adjusting stems, and packing nut exposed.

6.9.10. Cover all insulation with a layer of Blue-Skin vapor barrier.

6.9.11. Clean up the insulation surface and get rid of any solid particles before installing of the Blue-Skin vapor barrier.

6.9.12. All insulation shall be jacketed with aluminum jacket.

6.9.13. Insulation shall be installed only by experienced insulation sub-contractor, which is familiar with industrial refrigeration piping insulation.

6.10. Identification of System

6.10.1. All refrigeration (ammonia and brine) valves will be tagged with stainless steel tags . The tags shall be attached to the valves by stainless steel cable.

Valve identification numbers are to be recorded on the as-built drawing.

The existing valve tags shall be retained and reinstalled after the replaced valves are installed.

6.10.2. All restricted used valves shall be tagged with instruction tag. The restricted used valve shall be identified on the system P & I drawing.

6.10.3. Identify major equipment by self-stick Lamacoid nameplates as specified.

6.10.4. Apply self-stick vinyl pipe marker for all the refrigeration pipes.

6.10.5. Pipe marker system shall be in compliance with IIAR guidelines for Identification of Ammonia Refrigeration Piping and System Components and the TSBC regulations.

6.11 Electrical

6.9.1. Control and power wiring to be enclosed in rigid conduit or steel EMT.

6.9.2. Control cable and power cable shall be enclosed in separate rigid conduits or steel EMT.

6.9.3. Supply and install fastening and supports for conduits and equipment.

6.9.4. Supply and install junction boxes for new wiring and components.

6.9.5. Tightly seal any conduit piercing fire rated walls, floor, and ceiling with CSA

certified one-hour fire rating material and system.

6.9.6. Conduit shall run parallel or perpendicular to building lines.

6.9.7. All wiring terminals shall be labelled. The related information shall be transferred to the wiring diagram.

6.9.8. The electrical panels and junction boxes shall be labelled.

6.9.9. Before energizing the system, thermal Imaging tests on feeders, contacts, motors, and circuits are required. Any problems discovered are to be corrected by the Contractor. The final test report shall be provided to the Refrigeration Consultant.

6.12 New Installed Equipment and DDC System

6.12.1. The Contractor shall confirm the details of the existing refrigeration system control and the existing DDC system before bidding.

6.12.2. The ammonia liquid level probe transmitter analog signal shall be inputted to the standalone liquid level controller.

6.12.3. The ammonia liquid level and motorized liquid feed valve for the new ammonia/brine chiller shall be controlled by the standalone controller.

6.12.4. Both the DDC system and standalone controller shall be programmed to stop the chiller makeup liquid feed when there is a high liquid level alarm, or system power failure, or plant emergency (fire, ammonia leak, etc.).

6.12.5. The high liquid level safety float switch shall be wired to both compressor safeties and DDC system. The high liquid level alarm shall be monitored both locally and remotely.

6.12.6. The Contractor shall submit the cold brine pump VFD control procedure to the Refrigeration Consultant for approval. The VFD could be set at 50%, 75%, and 100% for capacity control.

6.12.7. The new brine temperature transmitters shall be connected to the DDC system, tested, and calibrated on site.

6.12.8. Graphical User-Interface shall display current operating conditions of all the new controlled equipment and sensors using animation and color-coded on/off status and provides one-click links to set points and features.

6.12.9. Graphic screen will display all the temperatures, suction and discharge pressures, equipment and valve operating status, chiller ammonia level, alarm set point and history.

6.12.10. Trend Logging records all system operating parameters at a user-adjustable interval and is saved to hard-disk daily.

5.12.11. Critical alarm points includes chiller high level, high discharge pressure, and compressor room ammonia concentrations.

6.13 System Commissioning

6.13.1. Start up and adjust all new installed equipment and the existing system for proper operational conditions and procedures after installation is completed.

6.13.2. Provide a system commissioning record with control setup parameters, and motor amperage readings.

6.13.3. The Contractor shall provide a safety device (ammonia detector system and compressor room ventilation system) test and report and submit to TSBC for approval before the refrigeration system commissioning.

6.13.4. It is the Contractor's responsibility to call TSBC safety officer, and the Refrigeration Consultant for the final inspections.

6.13.5. After system commissioning is completed, take brine samples and glycol sample.

6.13.6. The lab test reports of the brine and glycol samples shall be submitted to the Refrigeration Consultant and the Owner. The samples shall be tested at certified labs.

6.14 Inspections

6.14.1 Regular Inspection: The Contractor is responsible for calling the Refrigeration Consultant for inspection at key construction phases.

6.14.2 Final inspection: The Contractor shall call the Refrigeration Consultant, TSBC safety officer, WorkSafeBC occupational hygiene officer, and the Owner for a final inspection after the work completed. The Refrigeration Consultant will issue a deficiency list after the final inspection.

The Refrigeration Consultant will do an on-site inspection to verify that all deficiencies have been corrected. The Contractor shall pay the cost of subsequent verification and reports if there are any remaining deficiencies at that time.

6.15 Substantial Completion

6.15.1. Substantial completion is defined as the installation is inspected and approved by TSBC safety officer (A plant operating permit shall be issued after the deficiency items are completed), WorkSafeBC occupational hygiene officer, Owner's inspector, and the Refrigeration Consultant.

The Contractor is responsible to correct all the deficiency items listed in the deficiency lists, which are issued by the TSBC safety officer, WorkSafeBC occupational hygiene officer, and the Refrigeration Consultant.

All the repair works listed in the deficiency lists need to be completed before the substantial completion certificate will be issued.

6.15.2. Substantial completion date: See Schedule provided by the Owner.

6.16 Training and Instrumentation

6.16.1. Provide both classroom refrigeration knowledge training and compressor room hands on training to the plant operators.

6.16.2. Refrigeration knowledge training includes refrigeration basic, system description of this upgraded refrigeration plant, major equipment controls and procedures, P & F ammonia/brine chiller, DDC system, ammonia system safety issues, emergency response procedures, and the compressor room ventilation.

6.16.3. Compressor room hands on training includes refrigeration equipment operation parameter setup, P & F ammonia/brine chiller level control panel parameter setup, DDC system parameter setup, system start-up and shut-down, equipment daily maintenance, equipment & system control procedures, oil drain procedure, manual air purging procedure, restricted use valve operating procedure, etc.

SECTION 7: SUBMITTALS

7.1 Shop Drawings

7.1.1. The Contractor shall submit shop drawings and product data to the Refrigeration Consultant for review before any work commences. Shop drawings include but are not limited to the following: ammonia/brine chiller C/W U-turn surge drum, oil pot, cold brine pump, equipment assembly with steel support frame, Liquid level indicator, liquid drainer, VFD drive, DDC system, control panel, level sensor, control valves, control procedures, compressor room new equipment layout, chiller liquid level column assembly details, secondary steel support, wall and roof penetration & seal details, electrical and control wiring diagram, etc.

7.1.2. Review of shop drawing doesn't relieve the Contractor's responsibility for correct equipment selections and installations.

7.2 Record Drawings

7.2.1. The Refrigeration Consultant will leave a set of hard copy P & I drawing on site. The Contractor is responsible for marking all the changes of the installation and recording of the valve tagging numbers. This set of drawing shall be submitted to the Refrigeration Consultant after installation is completed.

7.2.2. Provide three hard copies and one electronic copy of as-built wiring diagrams to the Refrigeration Consultant.

7.3 Manuals

7.3.1. Provide three hard copies and one electronic copy of system installation, operation and maintenance manuals to the Refrigeration Consultant for approval.

7.3.2. Each manual shall be filed in a three-ring binder.

7.3.3. Equipment maintenance instruction and procedures shall be included in the manual.

7.3.4. Shop drawings and product data shall be included in the manual.

7.3.5. A written description of the system, component, and control details shall be included in the manual.

7.3.6. System control description and operation procedures shall be included in the manual.

7.3.7. All construction documents, installation permits, TSBC inspection reports, and pressure test reports, equipment and plant operation permit shall be included in the manual.

7.3.8. All the Refrigeration Consultant's review reports, Schedule B letter of structural review, piping registration, and system design registration document shall be included in the report.

7.3.9. MDRs document of pressure vessel, chiller package equipment and oil pot shall be included in the manual.

7.3.10. CRN registration information for pressure vessel and chiller package shall be included in the manual.

7.3.11. Pressure relief pipe and header size code calculation shall be included in the manual.

7.3.12. System operation log sample form shall be included in the manual.

7.3.13. System commissioning records and system original operating set point data shall be included in the manual.

7.3.14. System start-up procedure and system shut-down procedure shall be included in the manual.

7.3.15. Oil drain procedure and system air purging procedure shall be included in the manual.

7.3.16. Restricted use valve operating procedures shall be included in the manual.

7.3.17. All shop drawings and system As Built drawing shall be included in the manual.

7.3.18. Electrical wiring diagram shall be included in the manual.

7.3.19. DDC I/O list, sensors, & shop drawing shall be included in the manual.

7.3.20. Piping and system design registration documentation shall be included in the manual.

7.3.21. Electrical thermal imaging test report shall be included in the manual.

7.3.22. Brine test report shall be included in the manual.

SECTION 8: APPENDIXES

1. Major Equipment

Ammonia / Brine Plate & Frame Chiller HE1
Performance Data Sheet Form

UL/UR 128CT2012 U-Turn Surge Drum

2. Test Report of Existing Cold Brine Solution

3. Design drawings

2945 R1 P&I IFT - 36x48
2945 R2 IFT - 24x36

Semi WeldedPlate Heat Exchanger
Technical Specification

NOTE: If the application is refrigeration, ring gasket material stated below must be checked for compatibility with compressor oil that is intended to be used.

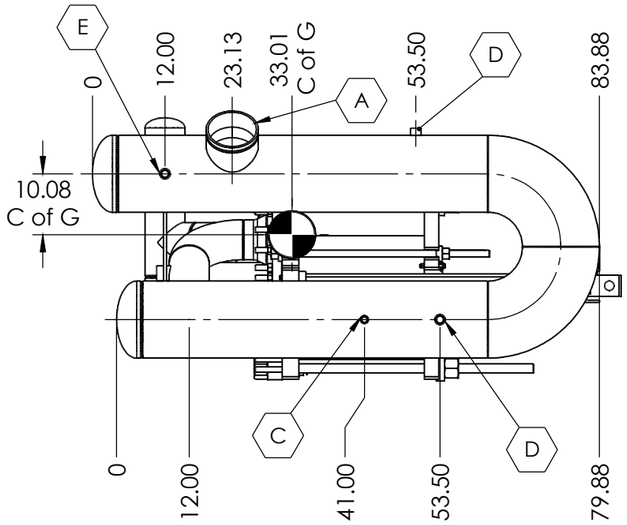
Customer: JS Refrigeration Engineering Inc.
Item: Chiller TK20BW
Model: TK20BW-FD

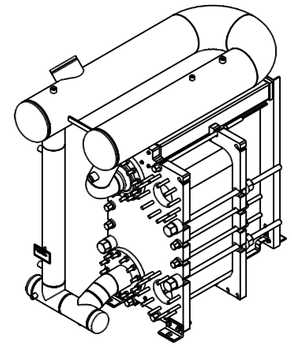
		Hot Side	Cold Side
Fluid		21.0%CaCl2	Ammonia
Mass flow rate	lb/h	607300 (1010 GPM)	3434
Fluid condensed/evaporated	lb/h		2575
Inlet temperature	°F	15.3	9.0
Outlet temperature	°F	12.0	9.0
Operating pressure (in/out)	psia		37.5/37.2
Pressure drop	psi	3.03	0.290
Velocity Connection (In/Out)	ft/s	6.65/6.65	0.0692/16.3
Heat exchanged	kBtu/h	1440	
Mean Temperature Difference	°F	4.5	
Heat transfer coefficient (clean/service)	Btu/(ft²·h·°F)	371.8/356.8	
Relative direction of fluids		Cocurrent	
Number of passes		1	1
Number of plates		202	
Extension capacity		31	
Plate material / thickness		TI / 0.60 mm	
Sealing material		NBRP ClipGrip™	Welded
Ring gasket			CR Clip-on
Connection liner material		Titanium	Titanium
Connection diameter	in	8	8
Nozzle orientation		S2 -> S1	S3 -> S4
Pressure vessel code		ASME	
Design pressure	psi	150.0	250.0
Test pressure	psi	195.0	325.0
Design temperature (max/min)	°F	200.0/-0.0	200.0/-0.0
Overall length x width x height	in	73 x 31 x 60	
Liquid volume	ft³	4.9	5.0
Net weight, empty / operating / flooded	lb	3570 / 3990 / 4150	

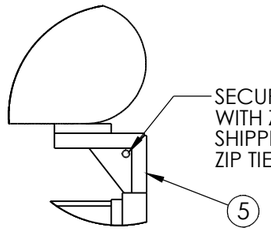
The performance of the equipment is conditioned by the process media and process parameters being consistent with the provided customer data.

ITEM NO.	QTY.	DRAWING	PART NUMBER	DESCRIPTION	MATERIAL	Size	Thickness
1	1	-	TK20-BWFD	PHE TK20-12	-	-	-
2	1	34490	SEPAR001329	SEPARATOR, U-TURN, TK20-12,LH	-	12"NOM	-
3	1	-	PIPE0000472	PIPE,x 48.50"L	SA53B, TYPE E	6"NOM	SCH40
4	1	33588	MANIF001105	MANIFOLD, LH, TK20	-	6"NOM	-
5	1	33007	HANGE113304	HANGER ASSEMBLY,UHMW	-	-	-
6	2	-	BOLT0000676	BOLT,HEX, x 1-3/4"L	SA449 TY1	1/2"-13	-
7	2	-	NUT00000085	NUT,PLAIN,HEAVY,HEX	SA194-2H	1/2"-13	-
8	2	-	COUPL000454	COUPLING,FULL,ASME B16.11	SA105	1"NPT	3000#
9	24	-	NUT00000595	NUT,PLAIN,HEAVY,HEX HEAD	SA194-2H	7/8"-9	-
10	2	33086	GASKE260601	GASKET,FLANGE,8"NOM,300#	KLINGER SEAL	12.12"OD/8.63"ID	0.125"
12	1	-	TAG00001455	TAG,ASME,(U)	SS304	3" x 6"	0.020"
13	1	36783	HANGE116015	HANGER,ASSEMBLY,NAMEPLATE,T-SHAPE	SA36	3.75"W,6.50"L	0.188"

NOTE(S):
1) U STAMP & NATIONAL BOARD REGISTERED.
   MANUFACTURED PER ASME SEC VIII, DIV 1, (LATEST EDITION).
   TAG: MAWP 300 PSI @ 200° F
   MDMT -50°F @ 300 PSI (D)
2) FOR WELDING DETAILS SEE DWG# 01483.
3) FOR CRN MASTER REFER TO DWG# U-TK20-12-LRH-ALL REV1.
4) WEIGHT AND CENTER OF MASS ARE IN REFERENCE TO THE U-TURN ONLY.
5) FLANGE NUT TORQUE TO BE: 310 FT-LBS WITH THREAD LUBRICANT
   320 FT-LBS WITHOUT THREAD LUBRICANT

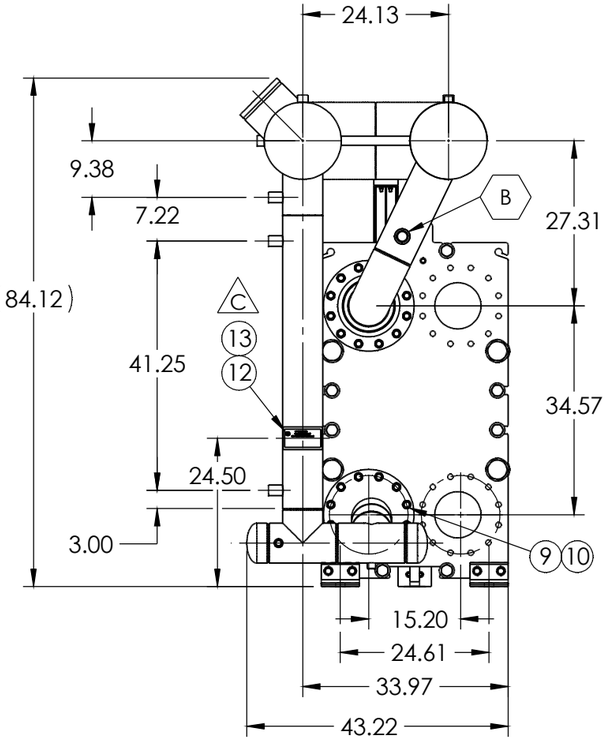


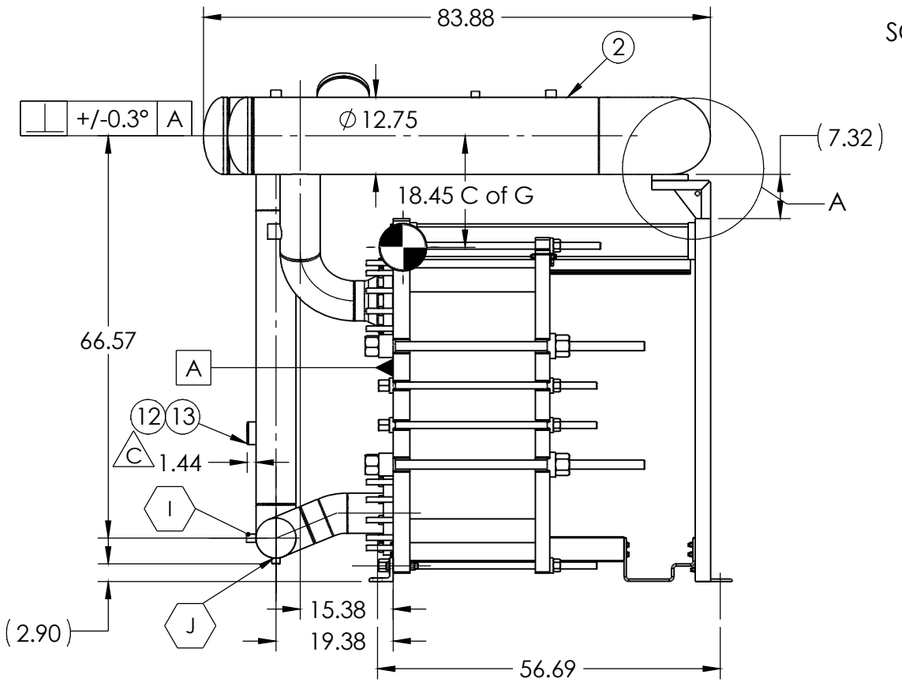


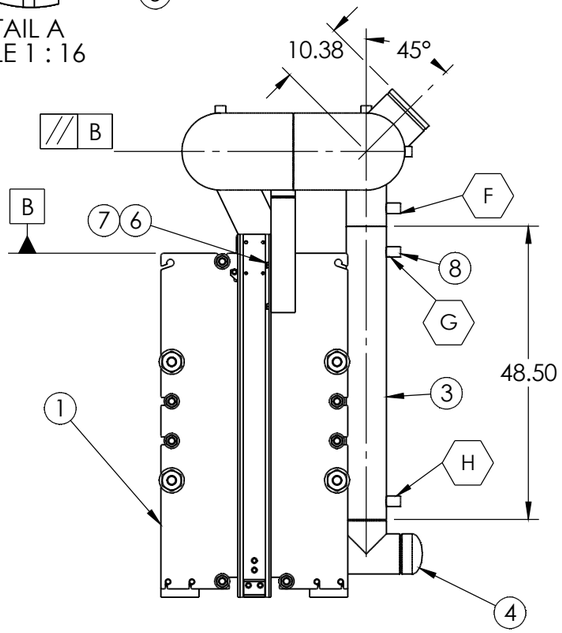


SECURE SEPARATOR TO SUPPORT HANGER WITH ZIP TIE THRU HOLE PROVIDED FOR SHIPPING ONLY.
ZIP TIE TO BE REMOVED WHEN OPERATING

DETAIL A
SCALE 1 : 16







REV.	ECN#	DESCRIPTION	DATE
D	6523	MDMT WAS -45°F	04/15/2020

NOZZLE SCHEDULE

ITEM	SIZE	SCH/THK	DESCRIPTION	SERVICE
A	8"	SCH40	PIPE,NOZZLE W/VICT. GRV	SUCTION OUTLET
B	1-1/2"	3000#	COUPLING,FULL,ASME B16.11	LIQUID FEED
C	3/4"	3000#	COUPLING,HALF,ASME B16.11	GAUGE
D	1"	3000#	COUPLING,HALF,ASME B16.11	RELIEF
E	1"	3000#	COUPLING,HALF,ASME B16.11	LIQUID LEVEL
F	1"	3000#	COUPLING,FULL,ASME B16.11	HIGH LEVEL ALARM
G	1"	3000#	COUPLING,FULL,ASME B16.11	HIGH LIQUID LEVEL CONTROL
H	1"	3000#	COUPLING,FULL,ASME B16.11	LOW LIQUID LEVEL CONTROL
I	3/4"	3000#	COUPLING,FULL,ASME B16.11	OIL DRAIN
J	3/4"	3000#	COUPLING,HALF,ASME B16.11	DRAIN

COMMENTS:

MATERIAL:

FINISH: --

	NAME	DATE
DRAWN	PC	3/14/2017
CHECKED		
ENG APPR.	ER	04/15/2020
MFG APPR.	ER	04/15/2020
Q.A.		

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± 1° BEND ± 1°
TWO PLACE DECIMAL ± .13
THREE PLACE DECIMAL ± .003

DO NOT SCALE DRAWING

Richmond, Virginia

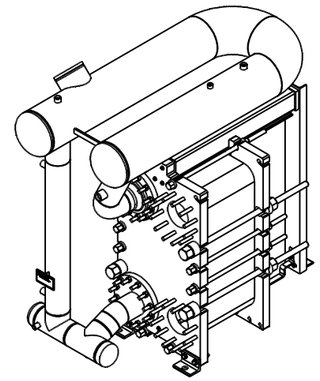
UL128CT2012

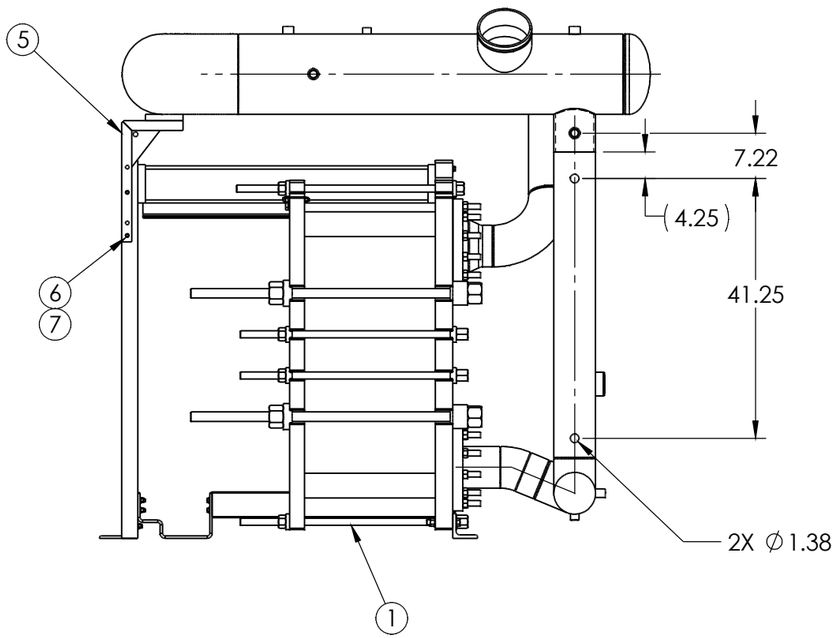
SIZE B | DWG. NO. 34489 | REV. D

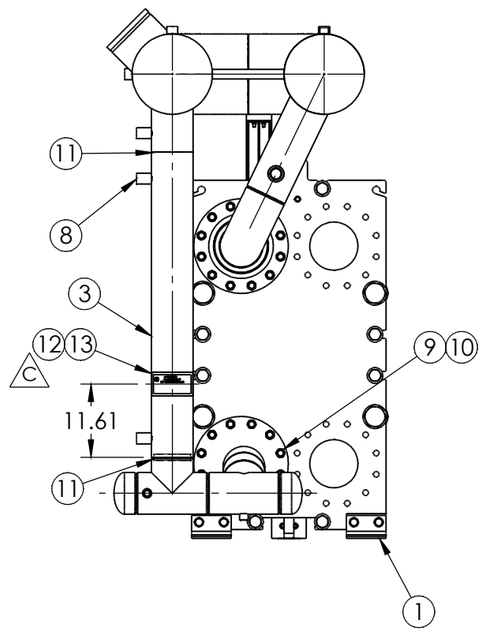
SCALE:1:32 | WEIGHT: 926.7 | SHEET 1 OF 2

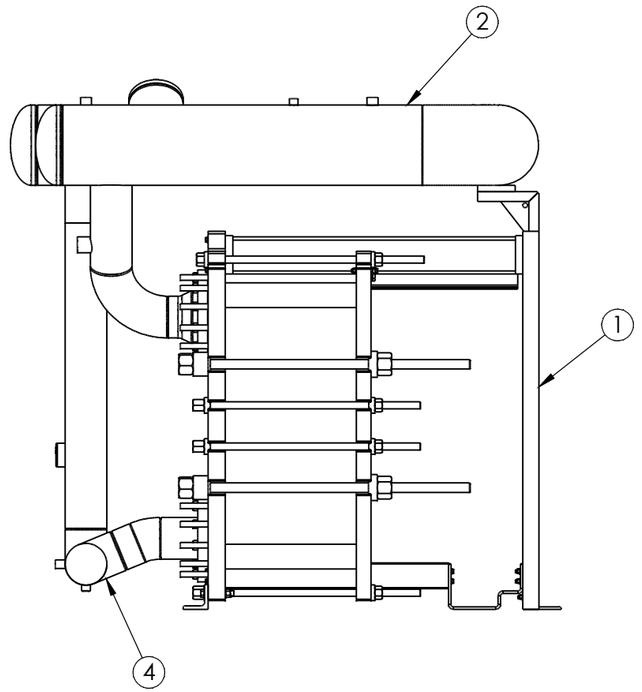
ITEM NO.	QTY.	DRAWING	PART NUMBER	DESCRIPTION	MATERIAL	Size	Thickness
1	1	-	TK20-BWFD	PHE TK20-12	-	-	-
2	1	34490	SEPAR001329	SEPARATOR, U-TURN, TK20-12,LH	-	12"NOM	-
3	1	-	PIPE0000472	PIPE,x 48.50"L	SA53B, TYPE E	6"NOM	SCH40
4	1	33588	MANIF001105	MANIFOLD, LH, TK20	-	6"NOM	-
5	1	33007	HANGE113304	HANGER ASSEMBLY,UHMW	-	-	-
6	2	-	BOLT0000676	BOLT,HEX, x 1-3/4"L	SA449 TY1	1/2"-13	-
7	2	-	NUT00000085	NUT,PLAIN,HEAVY,HEX	SA194-2H	1/2"-13	-
8	2	-	COUPL000454	COUPLING,FULL,ASME B16.11	SA105	1"NPT	3000#
9	24	-	NUT00000595	NUT,PLAIN,HEAVY,HEX HEAD	SA194-2H	7/8"-9	-
10	2	33086	GASKE260601	GASKET,FLANGE,8"NOM,300#	KLINGER SEAL	12.12"OD/8.63"ID	0.125"
11	2	-	TUBE0000166	TUBE, X 1"LG	SA135 GR B	6" OD	0.134"
12	1	-	TAG00001455	TAG,ASME,(U)	SS304	3" x 6"	0.020"
13	1	36783	HANGE116015	HANGER,ASSEMBLY,NAMEPLATE,T-SHAPE	SA36	3.75"W,6.50"L	0.188"

REV.	ECN#	DESCRIPTION	DATE
D	6523	MDMT WAS -45°F	04/15/2020









COMMENTS:		NAME	DATE
	DRAWN	PC	3/14/2017
	CHECKED		
MATERIAL:	ENG APPR.	ER	04/15/2020
FINISH: –	MFG APPR.	ER	04/15/2020
	Q.A.		

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± 1° BEND ±1°
TWO PLACE DECIMAL ±.13
THREE PLACE DECIMAL ±.003

DO NOT SCALE DRAWING

Richmond, Virginia

UL128CT2012

SIZE	DWG. NO.	REV.
B	34489	D

SCALE:1:24	WEIGHT:	SHEET 2 OF 2

Zeotec Limited
9643 62 Avenue
Edmonton, AB
T6E 0E1
780.434.5810
www.zeotec.com

REPORT OF CALCIUM CHLORIDE BRINE ANALYSIS

Customer Name:	Sunshine Coast and	**Date:**	October 6, 2023
Address:	Regional District	**Attention:**	Hugh Cottrell
	1975 Field Road	**cc:**	
	Sechelt, B.C.	**E-mail:**	Hugh.Cottrell@scrd.ca
	V0N 3A1	**Reference:**	**GACC V6 CF & V4 HF**
Phone:	604-885-6800	**P.O.:**	**N/A**

CONSTITUENT	V6 C.F.	V4 H.F.	Control Range
Sample Date	**September 12, 2023**	**September 12, 2023**	
Appearance	Clean/Clear	Clean/Clear	Clean/Clear
Visible Solids	< 30 ppm	< 30 ppm	< 30 ppm
Specific Gravity	1.20	1.20	1.20 Min.
% Calcium Chloride	21.5	21.5	21.5% Min
Freezing Point (°C)	-21.00	-21.00	-5.0 °F or -20.5 °C Min
Visible iron	< 30 ppm	< 30 ppm	< 30 ppm
Complex Phosphate Inhibitor (cPO_4)	25 ppm	22 ppm	20/30ppm cPO_4 at 0.12% Z-5750 HC 10X
pH	10.16	9.44	8.50 to 9.50
Dissolved iron	< 10 ppm	< 10 ppm	< 10 ppm
Ammonia	0 ppm	0 ppm	0 ppm ($SM4500\text{-}NH_3$)

FINDINGS & RECOMMENDATIONS

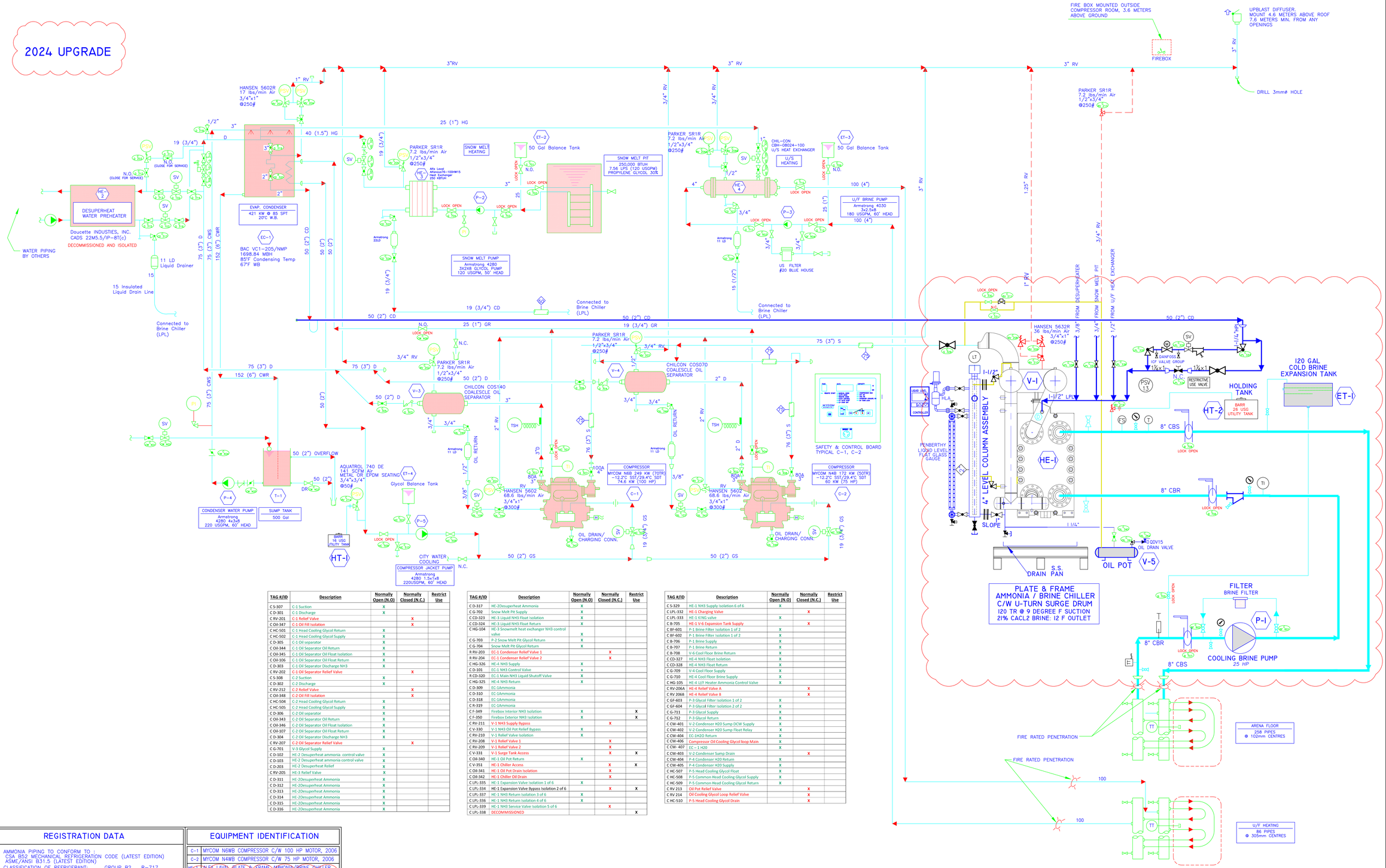
Cooling Floor:
V6
pH is high at 10.16.
Visible solids are good at < 30 ppm.
cPO_4 is good at 25 ppm.

Heating Floor:
V4
pH is good at 9.44.
Visible solids are good at < 30 ppm.
cPO_4 is good at 22 ppm.

1977 to 2023 - 46 Years of Service

Kristofer Bacon, Chemical Technologist

2024 UPGRADE



TAG #/ID	Description	Normally Open (N.O)	Normally Closed (N.C.)	Restrict Use
C S-307	C-1 Suction	X		
C D-301	C-1 Discharge	X		
C RV-201	C-1 Relief Valve		X	
C OI-347	C-1 Oil Fill Isolation		X	
C HC-501	C-1 Head Cooling Glycol Return	X		
C HC-502	C-1 Head Cooling Glycol Supply	X		
C D-305	C-1 Oil separator	X		
C OI-344	C-1 Oil Separator Oil Return	X		
C OI-345	C-1 Oil Separator Oil Float Isolation	X		
C OI-106	C-1 Oil Separator Oil Float Return	X		
C D-303	C-1 Oil Separator Discharge NH3	X		
C RV-202	C-1 Oil Separator Relief Valve		X	
C S-308	C-2 Suction	X		
C D-302	C-2 Discharge	X		
C RV-212	C-2 Relief Valve		X	
C OI-348	C-2 Oil Fill Isolation		X	
C HC-504	C-2 Head Cooling Glycol Return	X		
C HC-505	C-2 Head Cooling Glycol Supply	X		
C D-306	C-2 Oil separator	X		
C OI-343	C-2 Oil Separator Oil Return	X		
C OI-346	C-2 Oil Separator Oil Float Isolation	X		
C OI-107	C-2 Oil Separator Oil Float Return	X		
C D-304	C-2 Oil Separator Discharge NH3	X		
C RV-207	C-2 Oil Separator Relief Valve		X	
C G-701	V-3 Glycol Supply	X		
C D-102	HE-2 Desuperheat ammonia control valve	X		
C D-103	HE-2 Desuperheat ammonia control valve	X		
C D-203	HE-2 Desuperheat Relief	X		
C RV-205	HE-3 Relief Valve	X		
C D-311	HE-2Desuperheat Ammonia	X		
C D-312	HE-2Desuperheat Ammonia	X		
C D-313	HE-2Desuperheat Ammonia	X		
C D-314	HE-2Desuperheat Ammonia	X		
C D-315	HE-2Desuperheat Ammonia	X		
C D-316	HE-2Desuperheat Ammonia	X		

TAG #/ID	Description	Normally Open (N.O)	Normally Closed (N.C.)	Restrict Use
C D-317	HE-2Desuperheat Ammonia	X		
C G-702	Snow Melt Pit Supply	X		
C CD-323	HE-3 Liquid NH3 Float Isolation	X		
C CD-324	HE-3 Liquid NH3 Float Return	X		
C HG-104	HE-3 Snowmelt heat exchanger NH3 control valve	X		
C G-703	P-2 Snow Melt Pit Glycol Return	X		
C G-704	Snow Melt Pit Glycol Return	X		
R RV-203	EC-1 Condenser Relief Valve 1		X	
R RV-204	EC-1 Condenser Relief Valve 2		X	
C HG-326	HE-4 NH3 Supply	X		
C D-101	EC-1 NH3 Control Valve	X		
R CD-320	EC-1 Main NH3 Liquid Shutoff Valve	X		
C HG-325	HE-4 NH3 Return	X		
C D-309	EC-1Ammonia			
C D-310	EC-1Ammonia			
C D-318	EC-1Ammonia			
C R-319	EC-1Ammonia			
C F-349	Firebox Interior NH3 Isolation	X		X
C F-350	Firebox Exterior NH3 Isolation	X		X
C RV-211	V-1 NH3 Supply Bypass		X	
C V-330	V-1 NH3 Oil Pot Relief Bypass	X		
C RV-210	V-1 Relief Valve Isolation	X		
C RV-208	V-1 Relief Valve 1		X	
C RV-209	V-1 Relief Valve 2		X	
C V-331	V-1 Surge Tank Access		X	X
C OI-340	HE-1 Oil Pot Return	X		
C V-351	HE-1 Chiller Access		X	X
C OI-341	HE-1 Oil Pot Drain Isolation		X	
C OI-342	HE-1 Chiller Oil Drain		X	
C LPL-335	HE-1 Expansion Valve Isolation 1 of 6	X		
C LPL-334	HE-1 Expansion Valve Bypass Isolation 2 of 6		X	X
C LPL-337	HE-1 NH3 Return Isolation 3 of 6	X		
C LPL-336	HE-1 NH3 Return Isolation 4 of 6	X		
C LPL-339	HE-1 NH3 Service Valve Isolation 5 of 6		X	
C LPL-338	DECOMMISSIONED			X

TAG #/ID	Description	Normally Open (N.O)	Normally Closed (N.C.)	Restrict Use
C S-329	HE-1 NH3 Supply Isolation 6 of 6	X		
C LPL-332	HE-1 Charging Valve		X	
C LPL-333	HE-1 K/NG valve	X		
C B-705	HE-1 V-6 Expansion Tank Supply		X	
C BF-601	P-1 Brine Filter Isolation 1 of 2	X		
C BF-602	P-1 Brine Filter Isolation 1 of 2	X		
C B-706	P-1 Brine Supply	X		
C B-707	P-1 Brine Return	X		
C B-708	V-6 Cool Floor Brine Return	X		
C CD-327	HE-4 NH3 Float Isolation	X		
C CD-328	HE-4 NH3 Float Return	X		
C G-709	V-4 Cool Floor Supply	X		
C G-710	HE-4 Cool Floor Brine Supply	X		
C HG-105	HE-4 U/F Heater Ammonia Control Valve	X		
C RV-206A	HE-4 Relief Valve A		X	
C RV 206B	HE-4 Relief Valve B		X	
C GF-603	P-3 Glycol Filter Isolation 1 of 2	X		
C GF-604	P-3 Glycol Filter Isolation 2 of 2	X		
C G-711	P-3 Glycol Supply	X		
C G-712	P-3 Glycol Return	X		
C CW-401	V-2 Condenser H20 Sump DCW Supply	X		
C CW-402	V-2 Condenser H20 Sump Float Relay	X		
C CW-404	EC-1H2O Return	X		
C CW-406	Compressor Oil Cooling Glycol loop Main	X		
C CW- 407	EC – 1 H20	X		
C CW-403	V-2 Condenser Sump Drain		X	
C CW-404	P-4 Condenser H20 Return	X		
C CW-405	P-4 Condenser H20 Supply	X		
C HC-507	P-5 Head Cooling Glycol Float	X		
C HC-508	P-5 Common Head Cooling Glycol Supply	X		
C HC-509	P-5 Common Head Cooling Glycol Return	X		
C RV 213	Oil Pot Relief Valve		X	
C RV 214	Oil Cooling Glycol Loop Relief Valve		X	
C HC-510	P-5 Head Cooling Glycol Drain		X	

REGISTRATION DATA

1. AMMONIA PIPING TO CONFORM TO : CSA B52 MECHANICAL REFRIGERATION CODE (LATEST EDITION) ASME/ANSI B31.5 (LATEST EDITION)
2. CLASSIFICATION OF REFRIGERANT: GROUP B2 R-717
3. WEIGHT OF REFRIGERANT CHARGE IN SYSTEM : 250 LBS.
4. CLASSIFICATION OF REFRIGERATION SYSTEM BY TYPE: INDIRECT
5. CLASSIFICATION OF OCCUPANCY: MIXED PUBLIC (ARENA), INDUSTRIAL (COMPR. ROOM)
6. REFRIGERATION CAPACITY: 120 TR
7. SYSTEM OPERATING TEMPERATURES:
   SUCTION = +9 Deg. F
   CONDENSING = +85 Deg. F
8. TESTING PRESSURE/MEDIUM: 275 PSIG/NITROGEN GAS
9. SYSTEM PRESSURE: DESIGN OPERATING TEST
   HIGH SIDE: 250 PSIG 151.7 PSIG 275 PSIG
   LOW SIDE: 250 PSIG 22.9 PSIG 275 PSIG
10. MACHINERY ROOM CLASSIFICATION: CLASS T
11. MACHINERY ROOM VENTILATION: MINIMUM/EMERGENCY 400/1,850 CFM

PIPING SPECIFICATION

PIPING: SHALL BEAR THE MILL TEST CERTIFICATE AND HEAT #. NOTE: COPY OF THE MILL TEST CERTIFICATES TO BE FORWARDED TO THE OWNER & INCLUDED IN THE INSTRUCTION MANUAL

2 1/2" IPS & OVER: SCH. 40 A106 GR. B SEAMLESS OR SCH. 40 A53 ERW GRADE B

UP TO 2" IPS: SCH. 80 A106 GR. B SEAMLESS

FITTINGS SHALL BEAR THE MANUFACTURER'S IDENTIFICATION. ONLY REGISTERED FITTINGS TO BE USED.

2" IPS & OVER:

CARBON STEEL BUTT WELD ASTM A234B COMPATIBLE WITH THE WALL THICKNESS OF THE PIPE.

UP TO 1 1/2" IPS:

FORGED STEEL SOCKET WELD ASTM A105 GR. 2, 3000# WOG.

THREADED CONNECTIONS WITH SAME SPECIFICATIONS ONLY IF LOCATION APPROVED BY THE REFRIGERATION CONSULTANT.

FLANGES: ANSI RAISED FACE, ASTM A105 GR. 1,

TUBING: STAINLESS STEEL, 0.035" THK. WALL IN 1/4" O.D. AND 3/8" O.D. SIZES.

EQUIPMENT IDENTIFICATION

C-1	MYCOM N6WB COMPRESSOR C/W 100 HP MOTOR, 2006
C-2	MYCOM N4WB COMPRESSOR C/W 75 HP MOTOR, 2006
HE-1	ALFA LAVAL PLATE & FRAME AMMONIA/BRINE CHILLER 120 TR, 9 F SUCTION, 2024
HE-2	DOUCETTE INDUSTRIES CADS 22M5.5/IP-8T(c), 2006 DECOMMISSIONED AND ISOLATED
HE-3	ALFANOVA 76-100HW15 SNOW MELT HEAT EXCHANGER
HE-4	CHIL-CON CBH-08024-100 U/S HEAT EXCHANGER
V-1	ALFA LAVAL CHILLER U-TURN SURGE DRUM, 2024
V-3	CHIL-CON COS140 OIL SEPARATOR, 2006
V-4	CHIL-CON COS070 OIL SEPARATOR, 2006
V-5	EXTERNAL OIL POT, 2024
ET-1	COLD BRINE EXPANSION TANK, 120GAL, 2024
ET-2	SNOW MELT GLYCOL EXPANSION TANK, 2006
ET-3	U/S WARM BRINE EXPANSION TANK, 2006
ET-4	COMPRESSOR GLYCOL EXPANSION TANK, 2006
T-1	CONDENSER REMOTE WATER SUMP, 500 USGAL, 2006
P-1	ARMSTRONG COLD BRINE PUMP, 25 HP, 2024
P-2	SNOW MELT GLYCOL PUMP, 2006
P-3	ARMSTRONG U/S WARM BRINE PUMP, 2006
P-4	CONDENSER REMOTE WATER PUMP, 2006
P-5	COMPRESSOR OIL COOLING GLYCOL PUMP, 2006
EC-1	BAC VC1-205 EVAP. CONDENSER, 2006

SYMBOL	LEGEND
PSV	PRESSURE SAFETY VALVE
PCV	PRESSURE CONTROL VALVE
M	MOTOR
LSH	LEVEL SWITCH – HIGH
SV	SOLENOID VALVE
PI	PRESSURE INDICATOR
TI	TEMPERATURE INDICATOR
TT	TEMPERATURE TRANSMITTER
PT	PRESSURE TRANSMITTER
LI	LEVEL INDICATOR
	GATE VALVE
	NEEDLE VALVE
	GLOBE VALVE
	ATMOSPHERIC RELIEF VALVE

SYMBOL	LEGEND
	SOLENOID VALVE
	BUTTERFLY VALVE
	CONTROL VALVE
	CHECKVALVE
	CHECKVALVE WITH MANUAL LIFT STEM
	PUMP
	STRAINER
	END CAP
	SCREWED CAP
	DEADMAN VALVE
	PLUGGED VALVE
	BALL VALVE
	CORROSION COUPON

ABBV.	LEGEND
BB	BRINE BALANCE
BP	BY-PASS
CBR	COLD BRINE RETURN
CBS	COLD BRINE SUPPLY
CD	CONDENSER DRAIN
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
D	DISCHARGE
DR	DRAIN
E	EQUALIZING
F	FIRE
GR	GLYCOL RETURN
GS	GLYCOL SUPPLY
HLA	HIGH/LOW ALARM

ABBV.	LEGEND
HPL	HIGH PRESS. LIQUID
LPL	LOW PRESS. LIQUID
OIL	OIL RETURN
OF	OVERFLOW
PSH	PRESS. SWITCH (HIGH)
PSL	PRESS. SWITCH (LOW)
RV	RELIEF VENT
S	SUCTION
TSH	TEMP. SWITCH (HIGH)
V	VENT
WS	WATER SUPPLY
WR	WATER RETURN
75	INSULATION THICKNESS

Valve Tag Key

VALVE TAG KEY

C D - 101

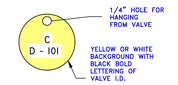
PIPE LEGEND ABBREVIATION | VALVE TYPE | VALVE NUMBER | VALVE LOCATION

Valve Location & Type

ABBREVIATIONS LEGEND	
C	COMPRESSOR ROOM
R	ROOFTOP
100	CONTROL VALVE
200	RELIEF VALVE
300	ISOLATE VALVE

Valve Tag Sample Specification

MATERIAL: PVC PLATE
YELLOW OR WHITE FACE WITH BLACK IN BEHIND
SIZE: 2" DIAMETER
LETTERING: APPROX. 0.25" HIGH, BOLD BLACK



NOTES:

1) PLANT OPERATION & MAINTENANCE MUST FOLLOW PROCEDURES & SOPs.
2) ONLY CERTIFIED PEOPLE ARE ALLOWED TO DO PLANT OPERATION & MAINTENANCE.
3) THE RESTRICT USE VALVES MUST BE OPERATED IN PROCEDURES & SOPS AND BY CERTIFIED PEOPLE ONLY.
4) PROVIDE BLOW-DOWN VALVES FOR STRAINERS.
5) ALL SOLENOIDS TO HAVE ENCAPSULATED PILOT LIGHTS.
6) CONTRACTOR TO SIZE RV VALVE, LINE AND RELIEF HEADER SIZE AFTER EQUIPMENT ARE SELECTED.
7) CONTRACTOR TO SIZE CONTROL VALVE SIZE BASED ON REQUIRED CAPACITY AND OPERATING CONDITIONS.

No.	DATE	DESCRIPTION
2	05FEB2024	IFT
1	08DEC2023	FIRST REVISION FOR REVIEW

ISSUES AND REVISIONS

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION

2024 CHILLER REPLACEMENT UPGRADE
REFRIGERATION CONSULTANTS
JS REFRIGERATION ENGINEERING INC.
PERMIT TO PRACTICE #1004255
VANCOUVER, B.C.
tel: (604) 437-3333 cel: (778) 317-9633
www.jsre.co

2021 TSBC SO UPGRADE CONTRACTOR
TEMP-PRO REFRIGERATION LTD.
2258 Cowichan Road
Cowichan Bay, B.C., V0R 1N1

2021 TSBC SO COMPLIANCE UPGRADE
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JS REFRIGERATION ENGINEERING INC.
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2006 INSTALLATION REFRIGERATION CONTRACTOR
PACE INDUSTRIAL INC.
7584 RUSSELL AVENUE
BURNABY B.C. V5J 4R8
Phone: 604.451.2448 Fax: 604.451.1070
Web: www.paceindustrial.com

2006 INSTALLATION REFRIGERATION CONSULTANTS
R. H. Strong & Associates Inc.
260 – 8208 Swenson Way, Delta, B.C. V4G 1J6
tel: (604) 951-0717 fax: (604) 951-0734
email: rhstrong@uniserve.com

PROJECT LOCATION

GIBSONS AREA COMMUNITY CENTER
SUNSHINE COAST, B.C.

PROJECT: GIBSONS AREA COMMUNITY CENTER ICE PLANT REFRIGERATION 2024 UPGRADES

DRAWING TITLE: REFRIGERATION P & I DIAGRAM

DATE PLOTTED

SCALE N T S

DRAWN GH

REVIEWED JS

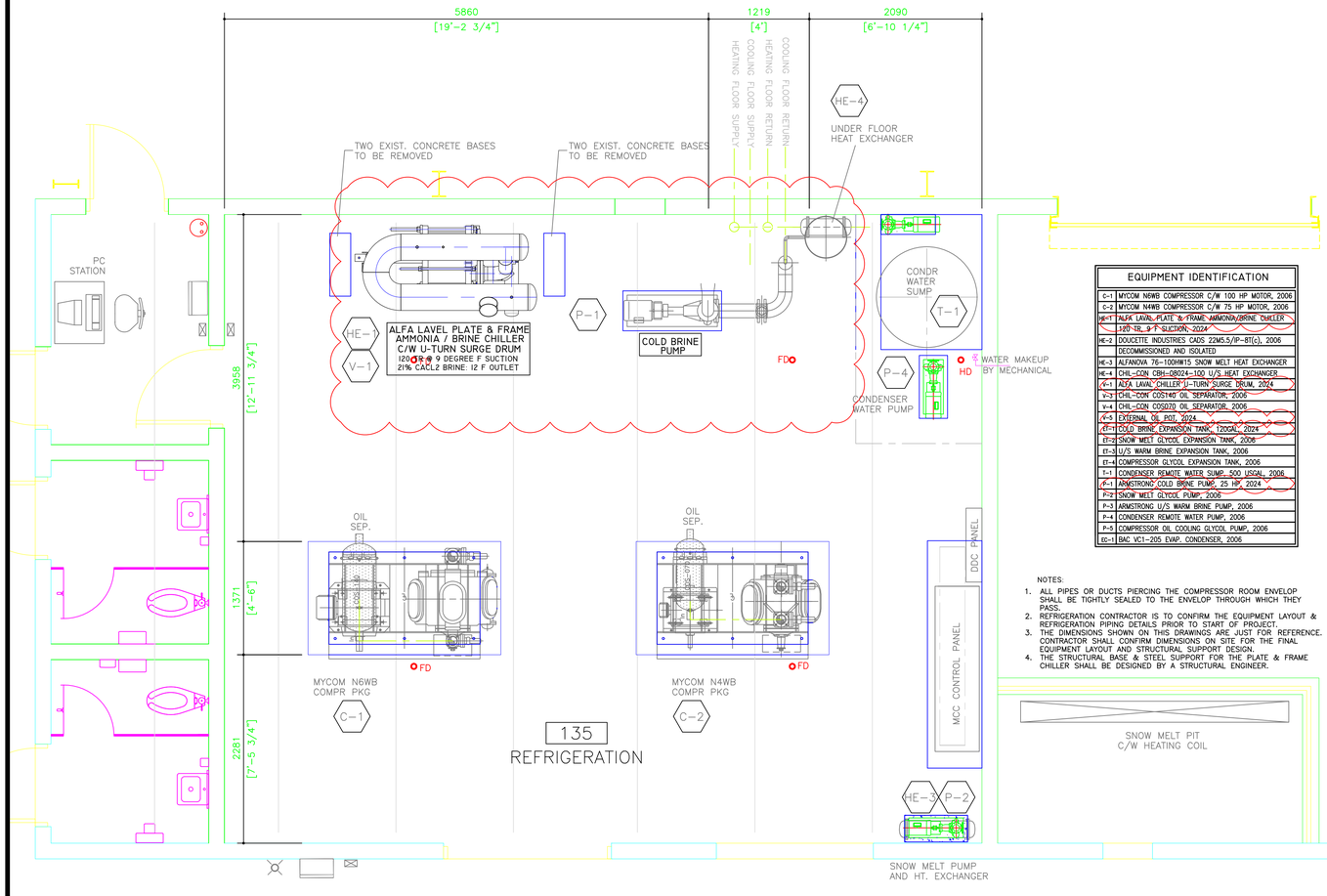
PROJECT No: 2945

REV No. 2

DWG No. 2945-R1

2024 UPGRADE

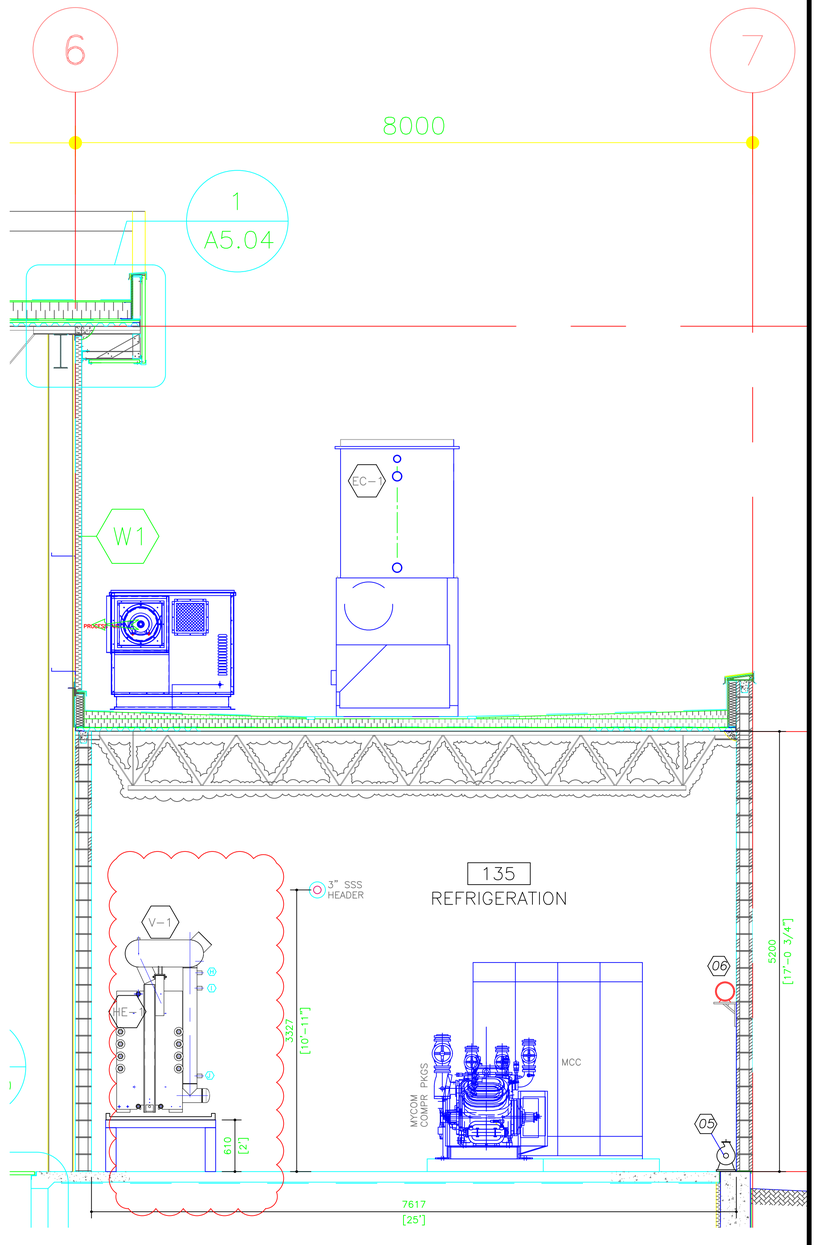
PRELIMINARY DESIGN
NOT FOR CONSTRUCTION



EQUIPMENT IDENTIFICATION	
C-1	MYCOM N6WB COMPRESSOR C/W 100 HP MOTOR, 2006
C-2	MYCOM N4WB COMPRESSOR C/W 75 HP MOTOR, 2006
HE-1	ALFA LAVAL PLATE & FRAME AMMONIA/BRINE CHILLER
	12Ø-18, 9° SUCTION, 2024
HE-2	DOUCETTE INDUSTRIES CADS 22M5.5/IP-8T(c), 2006
	DECOMMISSIONED AND ISOLATED
HE-3	ALFANOVA 76-100HW15 SNOW MELT HEAT EXCHANGER
HE-4	CHIL-CON CBH-08024-100 U/S HEAT EXCHANGER
V-1	ALFA LAVAL CHILLER U-TURN SURGE DRUM, 2024
V-3	CHIL-CON COS140 OIL SEPARATOR, 2006
V-4	CHIL-CON COS070 OIL SEPARATOR, 2006
V-5	EXTERNAL OIL POT, 2024
ET-1	COLD BRINE EXPANSION TANK, 120GAL, 2024
ET-2	SNOW MELT GLYCOL EXPANSION TANK, 2006
ET-3	U/S WARM BRINE EXPANSION TANK, 2006
ET-4	COMPRESSOR GLYCOL EXPANSION TANK, 2006
T-1	CONDENSER REMOTE WATER SUMP, 500 USGAL, 2006
P-1	ARMSTRONG COLD BRINE PUMP, 25 HP, 2024
P-2	SNOW MELT GLYCOL PUMP, 2006
P-3	ARMSTRONG U/S WARM BRINE PUMP, 2006
P-4	CONDENSER REMOTE WATER PUMP, 2006
P-5	COMPRESSOR OIL COOLING GLYCOL PUMP, 2006
EC-1	BAC VC1-205 EVAP. CONDENSER, 2006

NOTES:
1. ALL PIPES OR DUCTS PIERCING THE COMPRESSOR ROOM ENVELOP SHALL BE TIGHTLY SEALED TO THE ENVELOP THROUGH WHICH THEY PASS.
2. REFRIGERATION CONTRACTOR IS TO CONFIRM THE EQUIPMENT LAYOUT & REFRIGERATION PIPING DETAILS PRIOR TO START OF PROJECT.
3. THE DIMENSIONS SHOWN ON THIS DRAWINGS ARE JUST FOR REFERENCE. CONTRACTOR SHALL CONFIRM DIMENSIONS ON SITE FOR THE FINAL EQUIPMENT LAYOUT AND STRUCTURAL SUPPORT DESIGN.
4. THE STRUCTURAL BASE & STEEL SUPPORT FOR THE PLATE & FRAME CHILLER SHALL BE DESIGNED BY A STRUCTURAL ENGINEER.

PLAN VIEW



ELEVATION VIEW

No.	DATE	DESCRIPTION
2	05FEB2024	IFT
1	08DEC2023	FIRST REVISION FOR REVIEW

ISSUES AND REVISIONS

2024 CHILLER REPLACEMENT UPGRADE
REFRIGERATION CONSULTANTS
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email: rhstrong@uniserve.com

PROJECT LOCATION

GIBSONS AREA
COMMUNITY CENTER
SUNSHINE COAST, B.C.

PROJECT: GIBSONS AREA COMMUNITY CENTER
ICE PLANT REFRIGERATION
2024 UPGRADES

DRAWING TITLE: COMPRESSOR ROOM
REFRIGERATION EQUIPMENT LAYOUT

DATE PLOTTED	
SCALE	N T S
DRAWN	GH
REVIEWED	JS
PROJECT No:	2945
REV No.	2
DWG No.	2945-R2