PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED IN THIS SECTION

.1 Contract description.

.2 Project - work covered by contract documents.

.3 Work schedule.

.4 City occupancy.

.5 Complementary Documents

.6 Precedence of documents.

1.2 RELATED DOCUMENTS

.1 Tender 36-2024

1.3 PROJECT - WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of the Contract comprises the Project, for the **North End Sewage Treatment Plant (NEWPCC) Digester Tank 9-14 Spiral Heat Exchanger Replacement.** Project Work includes provision of all required labour & materials for a fully operational heating, cooling and ventilation system. Work includes but is not limited to the following:

- .1 Receiving of the six (6) spiral heat exchangers from the procurement contractor, including generally the following work:
  - .1 Receive the spiral heat exchangers as they are offloaded from the delivery truck to the loading bay
  - .2 Transport the spiral heat exchangers from the loading bay to their assigned storage locations.
- .2 Replacement of existing spiral heat exchangers for Digester Tanks 9-14 including generally the following work:
  - .1 Asbestos abatement as required in all areas where works is to be completed.
  - .2 Demolition of existing spiral heat exchangers and all related auxiliaries and piping.
  - .3 Safe transport and removal of existing spiral heat exchangers.
  - .4 Safe transport of new spiral heat exchangers from their storage locations to their installation locations.
  - .5 Safe Work Plan to be provided for the transport of old and new spiral heat exchangers.
  - .6 Installation of new Spiral Heat Exchanger.
  - .7 System cleaning and fill.
  - .8 Commissioning of all systems.
- .3 Replacement of existing sludge isolation valves for each spiral heat exchanger, including generally the following:
  - .1 Asbestos abatement as required in all areas where works is to be completed.
  - .2 Demolition of existing sludge isolation valves.

.3 Installation of new sludge isolation valves.

.4 Repair or replacement of damaged or missing insulation. Paint or jacketing of insulation to match existing colour schemes.

.4 Replacement of existing hot water isolation valves for each spiral heat exchanger, including generally the following:

.1 Asbestos abatement as required in all areas where works is to be completed.

.2 Demolition of existing sludge isolation valves.

.3 Installation of new sludge isolation valves.

.4 Repair or replacement of damaged or missing insulation. Paint or jacketing of insulation to match existing colour schemes.

.5 Replacement of existing hot water control valves for each spiral heat exchanger, including generally the following:

.1 Asbestos abatement as required in all areas where works is to be completed.

.2 Demolition of existing sludge isolation valves.

.3 Installation of new sludge isolation valves.

.4 Repair or replacement of damaged or missing insulation. Paint or jacketing of insulation to match existing colour schemes.

.6 Provide the required bonds and liability insurance to ensure such specified assurances to the City.

.7 Coordination with equipment supplier(s) to schedule delivery, unloading and safe storage of equipment.

.8 Layout of the work for construction of complete system and associated works as noted in drawings and specifications.

.9 Protect existing foundations, superstructure, interior finishes, plant and equipment during construction.

.10 Clean-up of project and site upon completion.

.11 Repair all defects identified during the first year after completion of Work.

.2 Division of the Work among subcontractors, suppliers or vendors is solely the Contractor's responsibility. Neither the City nor Consultant assumes any responsibility to act as an arbiter to establish subcontract terms between sectors or disciplines of work.

1.4 WORK SCHEDULE

.1 Time is of the essence in this Contract. If the Contractor is not meeting the schedule, the Consultant may order the Contractor to employ additional labour and equipment, work overtime or employ any other necessary procedures at no additional expense to the City to return work back on schedule.

.2 The Contractor is expected to complete the Work within the time stated in the Bid Form.

.3 Most work is to be completed during the summer.

1.5 CITY OCCUPANCY

.1 The City will occupy the premises during the entire period of construction for the conduct of maintenance and janitorial operations.

.2 Cooperate with City to minimize conflict, and to facilitate City’s operations.

.3 Schedule the Work to accommodate City occupancy.

1.6 COMPLEMENTARY DOCUMENTS

.1 Drawings, specifications, and schedules are complementary each to the other and what is called for by one to be binding as if called for by all. Should any discrepancy appear between documents which leave doubt as to the intent or meaning, obtain direction from the Consultant.

.2 Drawings indicate general locations of equipment. Install all equipment not shown or indicated diagrammatically in schematic or riser diagrams to provide an operational assembly or system.

.3 Install components to physically conserve headroom, to minimize furring spaces, or obstructions.

.4 Locate devices with primary regard for convenience of operation and usage.

.5 Examine all discipline drawings, specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Conflicts or additional work beyond work described to be brought to attention of Consultant.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Submit to Contract Administrator submittals listed for review in accordance with the Specifications, or as requested by the Contract Administrator.

.2 Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.1 Allow 10 Working Days for review of submittals by the Contract Administrator.

.3 Do not proceed with Work affected by submittal until review is complete.

.4 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.5 Where items or information is not produced in SI Metric units converted values are acceptable.

.6 Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.7 Notify Contract Administrator, in writing at time of submission for review, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.8 Verify:

.1 Field measurements
.2 Field construction criteria
.3 Catalogue numbers and similar data
.4 Ensure affected adjacent Work is co-ordinated.

.9 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator’s review of submittals.

.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.

.11 Acceptance of Shop Drawings for a component or a subassembly does not constitute acceptance of the complete assembly of which it is a part.

.12 The Contractor shall make any corrections required by the Contract Administrator and shall resubmit the required number of corrected copies of Shop Drawings. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.

.13 After Contract Administrator's review and return of copies, distribute copies to sub-trades as appropriate.

.14 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 The Contractor shall arrange for the preparation of clearly identified Shop Drawings as specified or as the Contract Administrator may reasonably request. Shop Drawings are to clearly indicate materials, weights, dimensions, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the Work. Where articles or equipment attach or connect to other articles or equipment, clearly indicate that all such attachments and connections have been properly coordinated, regardless of the trade under which the adjacent articles or equipment will be supplied and installed. Shop Drawings are to indicate their relationship to design Drawings and Specifications. Notify the Contract Administrator in writing of any deviations in Shop Drawings from the requirements of the Contract Documents.

.3 Have Shop Drawings stamped, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba where required in the Specifications or by the Contract Administrator.

.4 The Contractor shall examine all Shop Drawings prior to submission to the Contract Administrator to ensure that all necessary requirements have been determined and verified and that each Shop Drawing has been checked and coordinated with the requirements of the Work and the Contract Documents.

.5 Submittals shall be in one of the following formats:

.1 Submit one electronic PDF copy.

.6 Shop Drawing reviews by the Contract Administrator is solely to ascertain conformance with the general design concept. Responsibility for approval of detail design inherent in Shop Drawings rests with the Contractor and review by the Contract Administrator shall not imply such approval.

.7 Shop Drawings will be returned to the Contractor with one of the following notations:

.1 When stamped "REVIEWED" or "NO EXCEPTIONS TAKEN", distribute additional copies as required for execution of the Work.

.2 When stamped "REVIEWED AS MODIFIED" or "MAKE NOTED CORRECTIONS", ensure that all copies for use are modified and distributed, same as specified for "REVIEWED".

.3 When stamped "REVISE AND RESUBMIT", make the necessary revisions, as indicated, consistent with the Contract Documents and submit again for review.

.4 When stamped "NOT REVIEWED" or "REJECTED", submit other Drawings, brochures, etc., for review consistent with the Contract Documents.

.5 Only Shop Drawings bearing "REVIEWED", "NO EXCEPTIONS TAKEN", "MAKE NOTED CORRECTIONS", or "REVIEWED AS MODIFIED" shall be used on the Work unless otherwise authorized by the Contract Administrator.

.8 After submittals are stamped "REVIEWED", "NO EXCEPTIONS TAKEN", "MAKE NOTED CORRECTIONS" or "REVIEWED AS MODIFIED", no further revisions are permitted unless re-submitted to the Contract Administrator for further review.

.9 Any adjustments made on Shop Drawings by the Contract Administrator are not intended to change the Contract Price. If it is deemed that such adjustments affect the Contract Price, clearly state as such in writing prior to proceeding with fabrication and installation of Work.

.10 Make changes in Shop Drawings, which the Contract Administrator may require, consistent with Contract Documents. When re-submitting, notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.

.11 Only two (2) reviews of Shop Drawings will be made by the Contract Administrator at no cost. Each additional review will be charged to the Contractor at the Contract Administrator's scheduled rates. The Contract Administrator's charges for the additional Work will be deducted from the Contractor's Progress Certificates.

.12 Show the following information in lower right hand corner of shop drawings.

.1 Project Title.
.2 Tender number or other project number assigned by the Contract Administrator.
.3 Name of the depicted item in accordance with the Specifications and Drawings.
.4 Project series number and location where the item is used if applicable.
.5 Specification section number if applicable
.6 Proposed option if applicable.
.7 Name of Contractor.

.13 Accompany submissions with transmittal letter, containing:

.1 Date.
.2 Project title and number.
.3 Contractor's name and address.
.4 Identification and quantity of each shop drawing, product data and sample.
.5 Specification Section, Title, Number, and Clause
.6 Other pertinent data.
.7 Date and revision dates.
.8 Project title and Bid Opportunity number.
.9 Name of:
.1 Contractor
.2 Subcontractor
.3 Supplier
.4 Manufacturer
.5 Separate detailer when pertinent

.10 Identification of product of material.

.11 Relation to adjacent structure or materials.

.12 Field dimensions, clearly identified as such.

.13 Specification section name, number and clause number or drawing number and detail/section number.

.14 Applicable standards, such as CSA or CGSB numbers.

.15 Contractor's stamp, initialled or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.

1.3 PROCEDURES

.1 The Contractor shall, if required by the Contract Administrator, submit for the review of the Contract Administrator method statements which describe in detail, supplement with Drawings where necessary, the methods to be adopted for executing any portion of Work.

.2 These statements shall also include details of constructional plant and labour to be employed. Acceptance by the Contract Administrator shall not relieve the Contractor of any of his responsibilities, nor shall reasonable refusal to approve entitle the Contractor to extra payment or an extension of time.

.3 Other Considerations

.1 Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.

.2 Material and equipment delivered to the site of the works will not be paid for at least until pertinent shop drawings have been submitted and reviewed.

.3 Incomplete shop drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.

.4 No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions and review of shop drawings.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSPECTION

.1 Allow Contract Administrator access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Administrator instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 The Contract Administrator will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, the City shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies may be engaged by the City for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the City. Costs of additional tests required due to defective Work shall be paid by the Contractor.

.2 All equipment required for executing inspection and testing will be provided by the respective agencies.

.3 Employment of inspection/testing agencies does not relieve or relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Contract Administrator at no cost to the City. Pay costs for retesting and re-inspection.

1.3 ACCESS TO WORK

.1 The City, the Contract Administrator, and other authorities having jurisdiction shall have access to the work.

1.4 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Contract Administrator as failing to conform to Contract Documents. Replace or re-execute in accordance with the Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of the Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the City will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Contract Administrator.

1.5 REPORTS

.1 Submit draft inspection and test reports to Contract Administrator, prior to inclusion with the O&M manuals, in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Conform to reference standards, in whole or in part as specifically requested in specifications.

.2 If there is question as to whether products or systems are in conformance with applicable standards, the Contract Administrator reserves the right to have such products or systems tested to prove or disprove conformance.

.3 Cost for such testing will be born by the City in event of conformance with Contract Documents or by the Contractor in event of non-conformance.

1.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection. Should disputes arise as to quality or fitness of products, decision rests strictly with the Contract Administrator based upon requirements of Contract Documents.

.3 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify the Contract Administrator at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Contract Administrator reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 METRIC PROJECT

.1 Unless otherwise noted, this project has been designed and is to be constructed in the International System (SI) of Units metric system of measurements.

.2 During construction, when specified metric elements are unattainable at the time they are required to meet the construction schedule, the Contractor shall notify the Contract Administrator in writing and suggest alternative substitutions. Costs due to these substitutions shall be borne by the Contractor.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber and similar products on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of the Contract Administrator.

.9 Touch-up damaged factory finished surfaces to Contract Administrator’s satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

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

1.7 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify the Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions, so that the Contract Administrator will establish the course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Contract Administrator to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.9 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.10 PROTECTION OF WORK IN PROGRESS

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 WORKMANSHIP

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the Contract Administrator if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. The Contract Administrator reserves the right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with the Contract Administrator, whose decision is final.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit written request in advance of cutting or alteration which affects:

- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of the City or separate contractor.

.3 Include in request:

- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of the City or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Remove and replace defective and non-conforming Work.

.2 Provide openings in non-structural elements of Work for penetrations of electrical Work.

.3 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.4 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.5 Restore work with new products in accordance with requirements of Contract Documents.

.6 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.7 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with approved fire stopping material, full thickness of the construction element.

.8 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

.1 Maintain work in tidy condition, free from accumulation of waste products and debris, other than that caused by the City or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Contract Administrator. Do not burn waste materials on site.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Dispose of waste materials and debris off site.

.7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Copy will be returned after final inspection, with Contract Administrator's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Furnish evidence, if requested, for type, source and quality of products provided.

.5 Pay costs of transportation.

1.2 OPERATING AND MAINTENANCE MANUALS

.1 Formatting of O&M Manual as per Tender Document 36-2024 Section E13

.2 Prepare using personnel experienced in maintenance and operation of described products.

.3 Operation and maintenance instructions and technical data to be sufficiently detailed with respect to design elements, construction features, component function, correct installation procedure and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation. Technical data to be in form of approved shop drawings, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists.

.4 One (1) advance copy of the manual shall be submitted prior to Total Performance of the Work for review and comments. After review, five (5) hard copies and one electronic (PDF) copy of the final manuals shall be submitted.

.5 For the guidance of the City's operating and maintenance personnel, the Contractor shall prepare O&M Manuals for the Work, describing in detail the construction of each part of the Work and the recommended procedure for operation, servicing and maintenance.

.6 All instructions in these manuals shall be in simple language to guide the City in the proper operating and maintenance of this installation.

.7 In addition to information called for in the Specifications, include the following:

- .1 Overall Title sheet, labelled "Operation and Maintenance Instructions", and containing project name and date, facility's covered in the manual, City's Contract number, the name and address of the Contractor, and the issue date.
- .2 Overall list of contents, indicating the facilities upgraded by the project.
- .3 Title sheet for each section, labelled "Operation and Maintenance Instructions", the applicable facility, and containing project name and date.
- .4 List of contents for each section.
- .5 Include:
  - .1 Brochures/catalogue excerpts of all components of the Work.
  - .2 Documentation of all test results.
  - .3 Complete set of equipment and assembly drawings

.4 Installation, start-up, O&M Manuals

.5 Any specific requirements from the Specifications

.6 Clean Shop Drawings and cutsheets of all equipment and materials,

.1 Do not utilize the submittals as these may have markups on them and would therefore contain inaccurate information.

.7 Include sections for the record drawings of all installations. Drafted record drawings of size 432x279mm (11 x 17") will be inserted by the Contract Administrator, based on the record drawings marked up by the Contractor.

.8 Names, addresses, and telephone numbers of all major sub-contractors and suppliers.

.8 Modify and supplement the manual as required by the Contract Administrator.

.9 Format to be as follows:

.1 Binders: vinyl, hard covered, 3 'D' ring, with spine and face pockets.

.2 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.

.3 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.3 AS-BUILT DRAWINGS

.1 After award of Contract, the Contract Administrator will provide a complete set of Drawings for the purpose of maintaining Project As-Built Drawings. Accurately record deviations from Contract Documents caused by Site conditions and changes ordered by the Contract Administrator. Update daily.

.2 Identify Drawings as "Project Record Copy". Maintain in good condition and make available for inspection on-site by Contract Administrator at all times.

.3 On completion of each facility, submit As-Built Drawings to Contract Administrator for review.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Procedures for demonstration and instruction of Products, equipment and systems to City's personnel.

.2 Seminars and demonstrations.

1.2 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 DESCRIPTION

.1 Demonstrate operation and maintenance of equipment and systems to City's personnel two (2) weeks prior to date of final inspection.

.2 City will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.4 COMPONENT DEMONSTRATION

.1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems as indicated in various sections.

.2 Instruct City's personnel, and provide written report that demonstration and instructions have been completed.

1.5 SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system two (2) weeks prior to designated dates, for Consultant's approval.

.2 Submit reports within one (1) week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.3 Give time and date of each demonstration, with list of persons present.

1.6 CONDITIONS FOR DEMONSTRATIONS

.1 Demonstrations required for the following Equipment. Ensure equipment has been inspected and put into operation in accordance with manufacturer's instructions and various sections:

.1 Heat Exchanger: Section 23 57 00

.2 Valves: Sections 23 05 23

.2 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 PREPARATION

.1 Verify that suitable conditions for demonstration and instructions are available.

.2 Verify that designated personnel are present.

.3 Prepare agendas and outlines.

.4 Establish seminar organization.

.5 Explain component design and operational philosophy and strategy.

.6 Develop equipment presentations.

.7 Present system demonstrations.

.8 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2 PREPARATION OF AGENDAS AND OUTLINES

.1 Prepare agendas and outlines including the following:

.1 Equipment and systems to be included in seminar presentations.

.2 Name of companies and representatives presenting at seminars.

.3 Outline of each seminar's content.

.4 Time and date allocated to each system and item of equipment.

.5 Provide separate agenda for each system

3.3 SEMINAR ORGANIZATION

.1 Coordinate content and presentations for seminars.

.2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

.3 Arrange for presentation leaders familiar with the design, operation, maintenance and troubleshooting of the equipment and systems. Where a single person is not familiar with all aspects of the equipment or system, arrange for specialists familiar with each aspect.

.4 Coordinate proposed dates for seminars with City and select mutually agreeable dates.

3.4 EXPLANATION OF DESIGN STRATEGY

.1 Explain design philosophy of each system. Include following information:

.1 An overview of how system is intended to operate.

.2 Description of design parameters, constraints and operational requirements.

.3 Description of system operation strategies.

.4 Information to help in identifying and troubleshooting system problems.

3.5 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.

.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

.3 Instruct personnel on control and maintenance of sensory equipment and operational equipment associated with maintaining energy efficiency and longevity of service.

.4 Review contents of manual in detail to explain all aspects of operation and maintenance.

.5 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

3.6 TIME ALLOCATED FOR INSTRUCTION

.1 Provide sufficient amount of time required to instruct maintenance staff on the proper operation of all equipment.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Alteration project procedures.

.2 Regulatory Requirements.

.3 Scheduling

.4 Project Conditions.

.5 Preparation .

.6 Demolition.

1.2 RELATED SECTIONS

.1 Section 01 10 00 - Summary:

.2 Section 01 73 00 - Execution Requirements

1.3 ALTERATION PROJECT PROCEDURES

.1 Materials: As specified in Product sections; match existing Products and work for patching and extending work.

.2 Employ skilled and experienced installer to perform alteration work.

.3 Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

.4 Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring Products and finishes to original condition.

.5 Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with a neat transition to adjacent finishes.

.6 Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

.7 When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Consultant for review.

.8 Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition to Consultant for review.

.9 Patch or replace portions of existing surfaces which are damaged, lifted, discoloured, or showing other imperfections.

.10 Finish surfaces as specified in individual Product sections.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Perform noisy, malodorous, or dusty work after normal occupancy and in accordance with school division policy.

1.5 REGULATORY REQUIREMENTS

.1 Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection, and gas service disconnection and re-connection.

.1 The National Building Code of Canada, current edition ratified for use by authorities.

.2 The Worker's Compensation Act, Safety Regulations Governing Building, Construction and Demolition.

.3 Occupational Health & Safety Act, (most recent edition).

.2 Obtain required permits from authorities.

.3 Do not close or obstruct egress width to any building or site exit.

.4 Do not disable or disrupt building fire or life safety systems **without 3 days prior written notice** to City.

.5 Conform to procedures applicable when hazardous or contaminated materials are discovered.

1.6 PROJECT CONDITIONS

.1 Conduct demolition to minimize interference with adjacent and occupied building areas.

.2 Cease operations immediately if structure appears to be in danger and notify Consultant. Do not resume operations until directed.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 PREPARATION

.1 Provide, erect, and maintain temporary barriers, partitions, insulated partitions at locations indicated.

.2 Erect and maintain weatherproof closures for exterior openings.

.3 Erect and maintain temporary partitions to prevent spread of dust, odours, and noise to permit continued City occupancy.

.4 Protect existing materials which are not to be demolished.

.5 Prevent movement of structure; provide bracing and shoring. Contractor is responsible for the safety and support of such work.

.6 Notify affected utility companies before starting work and comply with their requirements.

.7 Arrange and pay for disconnecting, capping and plugging of gas, water, sewer, electrical telephone and other services not required in the new work.

.8 Mark location and termination of utilities.

.9 Provide appropriate temporary signage including signage for exit or building egress.

3.2 DEMOLITION

.1 Disconnect remove, cap, and identify designated utilities within demolition areas.

.2 Demolish in an orderly and careful manner.

.3 Protect existing supporting structural members.

.4 Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

.5 Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

.6 Remove temporary Work.

3.3 ASBESTOS REMOVAL

.1 Asbestos containing products have been removed during spiral exchanger and valve replacement project in 2008.Contractor may request additional asbestos testing for any suspicious materials.

.2 Identified asbestos removal shall be part of the contractor’s scope of work and will be considered additional work under the cash allowance.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), c. 33

.2 Environmental Protection Agency (EPA)

.1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Master Painters Institute (MPI)

.1 MPI Architectural Painting Specifications Manual.

.5 National Fire Code of Canada

.6 Society for Protective Coatings (SSPC)

.1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

.7 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act (TDGA), c. 34 .

1.2 SCOPE OF WORK

.1 The scope of work includes, but is not limited to:

.1 Paint all new interior walls

.2 All interior piping shall be painted in accordance with this specification.

.3 Any new metal surfaces, not already factory finished, shall be painted in accordance with this specification. Touch up any equipment factory painted, including equipment supplied by the City.

.4 Existing structural steel shall be painted in accordance with this specification as indicated in the drawings

.5 All concrete repairs, patching and new concrete shall be painted in accordance with this specification.

.6 Paint all existing concrete walls and surfaces as shown in the Specifications and Drawings.

1.3 SUBMITTALS

.1 Product Data:

.1 Submit product data and instructions for each paint and coating product to be used.

.2 Provide color samples to the Contract Administrator for approval before application.

.3 Submit product data for the use and application of paint thinner.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions:

.1 Submit manufacturer's installation and application instructions.

.6 Extra Materials:

.1 Submit one 4-litre can of each type and colour of primer and finish coating. Identify colour and paint type in relation to established colour schedule and finish formula.

.2 Deliver to the City of Winnipeg and store where directed.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Pack, ship, handle and unload materials in accordance with manufacturer's written instructions.

.2 Acceptance at Site:

.1 Identify products and materials with labels indicating:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store materials and supplies away from heat generating devices.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly.

.7 Remove paint materials from storage only in quantities required for same day use.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.2 Ventilation: ventilate area of work by use of approved portable supply and exhaust fans.

.3 Provide temporary heating where permanent facilities are not available to maintain minimum recommended temperatures.

.4 Apply paint finish only in areas where dust is no longer being generated by related construction operations such that airborne particles will not affect the quality of the finished surface.

.5 Apply paint only when surface to be painted is dry, properly cured, and adequately prepared.

Part 2 Products

2.1 MATERIALS

.1 Only paint materials listed in the MPI Approved Products List (APL) are acceptable for use on the project, except where other products are specified.

.2 Paint materials for each coating formula to be products of a single manufacturer.

.3 Colour schedule will be determined by the Contract Administrator. Selection of colours will be from manufacturer's full range of colours.

.4 Paint Finishes: Except for Formula 1 (epoxy) use Master Painters Institute (MPI) finishing formulae as specified below:

.1 Formula 1: for wood to receive paint finish: MPI EXT 6.4B - Alkyd GR (semi-gloss) finish premium grade.

.2 Formula 2: for shop primed and unprimed ferrous metal surfaces (Alkyd):

.1 MPI EXT 5.1D Alkyd G5 (semi-gloss) finish premium grade.

.2 Touch-up shop primer (if used) with primer provided by the manufacturer.

.3 One coat marine alykd metal primer CGSB-1-GP-48M.

.4 Two coats semi-gloss enamel CAN/CGSB-1.57.

.5 Acceptable products: Pratt and Lambert, Benjamin Moore, Glidden, Cloverdale or Northern Paint.

.6 Provide color samples to the Contract Administrator for approval before application.

.7 Paint and primer shall be from the same manufacturer.

.3 Formula 3: for galvanized and zinc-coated metal: MPI EXT 5.3B - Alkyd G5 (semi-gloss) finish premium grade.

.4 Formula 4: for concrete, walls and ceilings apply: MPI EXT 3.1A - Latex G5 (semi-gloss) finish premium grade.

.1 One coat latex primer-sealer CAN/CGSB-1.119.

.2 Two coats semi-gloss enamel CAN/CGSB-1.57.

.3 Acceptable products: Pratt and Lambert, Benjamin Moore, Glidden, Cloverdale or Northern Paint.

.4 Paint and primer shall be from the same manufacturer.

.5 Formula 5: for concrete floors apply: MPI EXT 3.2D – Alkyd floor enamel #59 low gloss finish premium grade. Sprinkle with clean silica sand to provide slip-resistant surface acceptable to Contract Administrator.

2.2 EXTRA MATERIALS

.1 Submit one 4-litre can of each type and colour of primer and finish coating. Identify colour and paint type in relation to established colour schedule and finish formula.

.2 Deliver to City and store as directed.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to the Contract Administrator.

.2 Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.4 PREPARATION

.1 Protection:

.1 Cover or mask floors, walls, and equipment adjacent to areas being painted to prevent damage and to protect from paint drops and splatters. Use non-staining coverings.

.2 Protect items that are permanently attached such as Fire Labels on doors, frames, and name plates on equipment.

.2 Surface Preparation: Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.

.2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Allow surfaces to drain completely and allow to dry thoroughly.

.3 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.

.4 Where possible, prime surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.

.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.5 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted.

.6 Touch up of shop primers with primer as specified in applicable section. Major touch-up including cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas, shall be by supplier of fabricated material.

3.5 APPLICATION

.1 Apply paint in accordance with manufacturer's application instructions unless specified otherwise.

.2 Apply each coat of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.4 Sand and dust between each coat to remove visible defects.

.5 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.6 Do not paint over galvanized metal, aluminium, stainless steel, brass or bronze, rubber, plated surfaces, machined surfaces, hangers and nameplates.

.7 Ventilate area of work by use of approved portable supply and exhaust fans.

.8 Provide temporary heating where permanent facilities are not available to maintain minimum recommended temperatures.

.9 Apply paint finish only in areas where dust is no longer being generated by related construction operations such that airborne particles will not affect the quality of the finished surface.

.10 Apply paint only when surface to be painted is dry, properly cured, and adequately prepared.

.11 Apply each coat of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.12 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.13 Sand and dust between each coat to remove visible defects.

.14 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.15 Paint both sides and edges of backboards for electrical equipment before installation. Leave equipment in original finish except for touch-up as required.

3.6 CLEANUP

.1 Clean and reinstall all hardware items that were removed before undertaken coating operations.

.2 Remove over-spray, paint splatter and spills from exposed surfaces that were not intended for painting. Remove smears and spatter immediately as operations progress, using appropriate methods as per manufacturer's instructions.

3.7 PUMPS

.1 Do not apply primer or paint to pumps.

3.8 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Do not paint exposed conduit, ductwork and hangers, unless otherwise indicated.

.2 Paint exposed piping. Colour and texture to match adjacent surfaces, except as noted otherwise.

.3 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.4 Do not paint over nameplates, brass or bronze surfaces or machined surfaces.

.5 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashes on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of the Contract Administrator. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by the Contract Administrator.

3.10 STANDARDS OF ACCEPTANCE

.1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface when viewed using final lighting source.

.2 Ceilings: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Piping, valves and pumping equipment: No visible defects from a distance of 1000 millimetres at 90 degrees to surface when viewed using final lighting source.

.4 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Tender 36-2024

.1 Section E6

1.2 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.1-[05], Cast Iron Pipe Flanges and Flanged Fittings.

.2 ASTM International (ASTM).

.1 ASTM A 49-[01(2006)], Standard Specification for Heat-Treated Carbon Steel Joint Bars.

.2 ASTM A 126-[04], Standard Specification for Grey Iron Castings for Valves, Flanges, and Pipe Fittings.

.3 ASTM A 536-[84(2004)e1], Standard Specification for Ductile Iron Castings.

.4 ASTM B 61-[08], Standard Specification for Steam or Valve Bronze Castings.

.5 ASTM B 62-[02], Standard Specification for Composition Bronze or Ounce Metal Castings.

.6 ASTM B 85/B 85M-[08], Standard Specification for Aluminum-Alloy Die Castings.

.7 ASTM B 209-[07], Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.3 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).

.2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)

.1 MSS SP-61, Pressure Testing of Steel Valves.

.2 MSS SP-70, Grey Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS SP-71, Grey Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS SP-82, Valve Pressure Testing Methods.

.5 MSS SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets for valves and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials/Spare Parts: Furnish additional isolation valves as per E9.

Part 2 Products

2.1 MATERIAL

.1 Valves:

.1 Except for specialty valves, to be of single manufacturer.

.2 Requirements common to valves, unless specified otherwise:

.1 Body, bonnet: cast iron to ASTM B 209 Class B
.2 Connections: flanged ends to ANSI B16.1
.3 Inspection and pressure testing: to MSS SP-82
.4 Bonnet gasket: non-asbestos.
.5 Stem: to have precision-machined Acme or 60 degrees V threads, top screwed for handwheel nut.
.6 Stuffing box: non-galling two-piece ball-jointed packing gland, gland bolts and nuts.
.7 Gland packing: non-asbestos.
.8 Handwheel: die-cast aluminum alloy to ASTM B 85/B 85M or malleable iron to ASTM A 49. Nut of bronze to ASTM B 62
.9 Identification tag: with catalogue number, size, other pertinent data.

.3 All products to have CRN registration numbers.

2.2 BALL VALVES

.1 Rating: 150 psi

.2 Size: 6 inch

.3 Type: PFA-Fused Cast Iron Ball Valve

.4 End Connection: F1-Flanged Drilling, ASME Class 125/500

.5 Seats: PTFE

.6 Stem: Stainless Steel

.7 Port: Full, double drilled and tapped for venting or drain.

.8 Operator: Handwheel w/chain or lever as specified.

2.3 VALVE OPERATORS

.1 Install valve operators as follows:

.1 Handwheel: on valves except as specified.

.2 Handwheel with chain operators: on valves installed more than 1800 mm above floor

Part 3 Execution

3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

3.2 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.2 Clean installed products in accordance to manufacturer's recommendation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and requirements for the identification of duct work, actuators, and controllers, including the installation and location of identification systems.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.

1.3 SUBMITTALS

.1 Product Data:

.2 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.3 Product data to include paint colour chips, other products specified in this section.

.4 Samples:

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.4 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: use size # 5.

.2 Equipment in Mechanical Rooms: use size # 9.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Contract Administrator.

2.4 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.

.2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.5 CONTROLLERS

.1 Brass tags with 12 mm stamped identification data filled with black paint.

2.6 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

2.7 LANGUAGE

.1 Identification in English.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 TIMING

.1 Provide identification only after painting specified Section 09 91 23 - Painting has been completed.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.4 LOCATION OF IDENTIFICATION ON DUCTWORK SYSTEMS

.1 On both sides of visual obstruction or where run is difficult to follow.

.2 At point immediately upstream of major manually operated or automatically controlled dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.

.3 Identification easily and accurately readable from usual operating areas and from access points.

.1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 CONTROLLERS

.1 Controllers: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one copy of flow diagrams and equipment schedule mounted in frame behind non-glare glass where directed by Contract Administrator. Provide one copy (reduced in size if required) in each operating and maintenance manual.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as specified.

.2 TIAC ss:

.1 CRF: Code Rectangular Finish.

.2 CPF: Code Piping Finish.

1.2 REFERENCE STANDARDS

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).

.2 ASTM International (ASTM)

.1 ASTM C335-2017, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.2 ASTM C411-2017, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.3 ASTM C449/C449M-2000, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.4 ASTM C533-2017, Calcium Silicate Block and Pipe Thermal Insulation.

.5 ASTM C547-2017, Mineral Fiber Pipe Insulation.

.6 ASTM C795-2018, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.7 ASTM C921-2015, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-1989, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.2 CAN/CGSB-51.53-1995, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (SDS).

.5 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-2010, Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-2011, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S702-2014, Thermal Insulation, Mineral Fibre, for Buildings

.4 CAN/ULC-S702.2-2003, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.3 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.4 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: specialist in performing work of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Storage and Protection:

.1 Protect from weather, construction traffic.

.2 Protect against damage.

.3 Store at temperatures and conditions required by manufacturer.

PART 2 PRODUCTS

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102

.1 Maximum flame spread rating: [25].

.2 Maximum smoke developed rating: [50].

2.2 INSULATION

.1 Mineral fibre specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702 .

.2 Maximum "k" factor: to CAN/ULC-S702.

.4 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).

.1 Mineral fibre: to CAN/ULC-S702.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5 mm diameter stainless steel.

.5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Air drying on mineral wool, to ASTM C449/C449M.

2.5 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: white, or to match existing piping colour scheme.

.3 Minimum service temperatures: -20 degrees C.

.4 Maximum service temperature: 65 degrees C.

.5 Moisture vapour transmission: 0.02 perm.

.6 Thickness: 15 mil.

.7 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Install hangers, supports outside vapour retarder jacket.

.5 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: at valves, flanges and unions at equipment.

.2 Design: to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: PVC.

3.5 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.6 PIPING INSULATION

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.

.1 Seals: lap seal adhesive, lagging adhesive.

.2 Installation: TIAC Code 1501-H.

.3 TIAC Code: C-2 with vapour retarder jacket.

.1 Seals: lap seal adhesive, lagging adhesive.

.2 Installation: TIAC Code: [1501-C].

.4 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000 mm long.

.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)				
			Runout	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6
Hot Water Heating	60 - 94	A-1	25	38	38	38	38
Domestic HWS with vapour retarder		A-1	25	25	25	38	38
Digester Sludge Heating	60 - 94	A-1	25	38	38	38	38

.5 Finishes:

.1 Exposed indoors: PVC jacket.

.2 Exposed in mechanical rooms: canvas jacket.

.3 Concealed, indoors: canvas on valves, fittings. No further finish.

.4 Finish attachments: SS bands, at 150 mm on centre. Seals: closed.

.5 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 GENERAL CONDITIONS

.1 Common Work Results - Mechanical Section 23 05 00.

1.2 WORK INCLUDED

.1 Work under this section to include, but not necessarily be limited to installation covering the following:

.1 Supply all labour, materials, equipment and services necessary for the installation of the digester spiral heat exchangers.

.1 The six (6) Spiral Heat Exchangers to be installed are supplied by the City of Winnipeg.

.2 Supply all labour, materials, equipment and services necessary to assist in the Systems start-up.

1.3 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME Boiler and Pressure Vessel Code, 2010.

.2 CSA Group (CSA)

.1 CSA B51-09, Boiler, Pressure Vessel, and Pressure Piping Code.

1.4 RELATED SECTIONS

.1 Tender 36-2024

.1 Section E5

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for heat exchangers and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.6 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for heat exchangers for incorporation into manual.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: Receive heat exchangers from procurement contractor, transport and store in designated areas.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect heat exchangers from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 SPIRAL HEAT EXCHANGER:

.1 Applicable Codes and Standards

.1 As supplemented by this specification, the following codes, standards and regulations shall apply:

.1 ASME Boiler and Pressure Vessel Code, section VIII, Division 1, latest revision, its addenda, and all other documents referenced therein. (Referred herein after as the Code.) Heat exchangers shall be designed and stamped in accordance with this Code and;

.2 ASTM A516/A516M pressure vessel plates, carbon steel, for moderate and lower temperature service.

.2 In addition, the following codes, standards and regulations in force on the date of the Purchase Order shall apply to the extent specified herein:

.1 National Building Code of Canada and;

.2 Requirements of the Province of Manitoba in which the heat exchanger will be installed

.2 Design Conditions

.1 The equipment shall be designed and constructed to meet the following minimum performance parameters:

.1	Thermal Capacity:	806 kW
.2	Sludge Flow:	180 m^3/hr
.3	Hot Water Flow:	125 m^3/hr
.4	Sludge Temperature In:	33°C
.5	Sludge Temperature Out:	38°C
.6	Water Temperature In:	68°C
.7	Water Temperature Out:	63°C
.8	Pressure Drop – Sludge Side:	4.9 m
.9	Pressure Drop – Water Side:	3.4 m
.10	Max Operating Pressure:	210 kPa

.3 Equipment Size and Arrangement

.1 The heat exchanger shall be generally as shown on the drawing(s). Deviations from the connection points and nozzle shown will not be considered and;

.2 Exchangers must fit in existing location and be compatible with existing infrastructure.

.4 Thermal Design

.1 The Heat Exchanger shall be guaranteed to deliver the performance called for under E3.2.

.5 Design Pressure

.1 Notwithstanding the design pressure stated in the heat exchanger specification sheet, the minimum design pressure for either side of the exchanger channel shall be not less than 205 kPa;

.1 The exchanger shall be stamped for the true Maximum Allowable Working Pressure (MAWP) if it is greater than the design pressure and;

.2 The design of exchanger internal pressure parts for a differential pressure less than the shell and/or channel design pressure shall not be allowed unless specifically shown on the heat exchanger specification sheet. When such a differential pressure design is permitted, a special nameplate or warning tag shall be attached to the exchanger so as to make this condition known.

.6 Corrosion Allowance

.1 Corrosion allowances shall be as shown in the specifications and;

.2 No corrosion allowance shall be added to non ferrous materials, stainless steel, or other high alloy parts unless indicated on the heat exchanger specification sheet.

.7 Shell

.1 Shell heads shall be one side fixed, one side removable (hinged and bolted, minimum of twenty ¾” inch zinc-plated hook bolts and clamps). The removable head shall provide access to the outer (cold side) channel to allow sludge cleaning.

.8 Channels

.1 Spiral construction shall be as given below:

.1 External spiral type with two concentric spiral channels for counter current circulation of sludge and hot water. Tube-in-tube, plate and boiler/heat exchanger types are unacceptable;

.2 Sludge channel provided with lage inlet compartment offering tangential entry and a 4-inch cleanout for sludge pocket;

.3 Sludge channels shall be a minimum of 1 inch high and free of any sharp bends, support pins or any other obstructions;

.4 Carbon steel 6mm (1/4") thick, 22mm (7/8”) inner channel (hot side) width and 25mm (1”) outer channel (cold side) width;

.5 The inner (hot side) channel shall be welded to the fixed head and;.

.6 Spacer studs shall be provided on the inner channel (hot side). The outer (cold side) channel shall be open to the removable head side.

.9 Gaskets

.1 Full-face non-asbestos fiber sheet minimum 6mm (1/4”) thick;

.2 Furnish the gaskets for the removable shell head;

.3 Provide one extra set of all gaskets and;

.4 Provide six cover hook bolts.

.10 Nozzles and Connections;

.1 ANSI B16.5, Class 150 flange, for all connections 3 inch and larger;

.2 Half coupling drain connections with plugs shall be provided on the hot side of the exchanger. Sufficient connections shall be provided to insure complete draining of all spiral compartments;

.3 Flanged nozzles through 50mm (2") size inclusive shall be raised face 150# ANSI;

.4 Nozzles over 50mm (2") size may be built up using forged steel raised face 150# ANSI type flanges, with rolled plate (min. 12mm) or pipe necks (minimum SCH. 80). Paragraph UG 37 of the Code shall be used to ascertain the necessity for reinforcement.;

.5 Nozzles shall be long enough to permit the removal of a standard length stud bolt from the back side of the flange to clear the exchanger body and insulation. If not specified elsewhere, the minimum distance from external surface of shell to nozzle flange face shall be as follows:

.1 Nozzles up to and including 300mm(12"): 200mm (8")

.2 Nozzles over 300mm (12"): 250mm (10")

.6 A 50mm (2”) half coupling backwash nozzles shall be provided on the cold side inlet nozzle and the cold side discharge nozzle;

.1 With extension to full port ball valve, accessible from front hatch face of the spiral heat exchanger.

.7 A 100mm (4”) diameter cleanout shall be provided on the cold side inlet pocket and;

.8 All nozzles shall be ground flush and smooth with the inside of the exchanger. The periphery of any nozzles opening shall be ground to 6mm (1/4”) minimum radius.

.11 Shell Supports

.1 Each exchanger shall be provided with at least two steel supports with saddles for distributing the dead load and;

.2 The bolt holes in the saddle on one end of each exchanger shall be slotted if required for expansion under the operating temperature.

.12 Lifting Lugs

.1 Suitable lifting lugs, rings, or eyebolts shall be provided on the shell in order to facilitate handling.

.13 Identification Plate;

.1 16-gauge stainless steel with ¼-inch die stamped equipment tag number securely mounted in a readily visible location.

.14 Materials

.1 Where carbon steel construction is provided, the following materials will be preferred:

.1 Plate: SA516 70 (shell, head, channel, reinforcing pad, etc.);

.2 Forgings: SA105N;

.3 Pipes: SA106B or SA53B Seamless;

.4 Bolting: A193 Gr B7 for bolts and SA 194 Gr 2H for nuts and;

.5 Structural: SA36 - or approved equivalent.

.2 When stainless steel material is provided, L grade materials shall be used and;

.3 Factory Finishing

.1 Sandblast in accordance to SSPC-SP-6. External carbon surfaces, except machined surfaces, or flanges painted with International Interlac 789 (single component modified alkyd primer/finish). 4.0 mil minimum finish coat.

.15 Fabrication

.1 Forming and Assembly;

.1 The preparation of plate edges for welding shall be done by shearing, machining, grinding, or thermal cutting. Carbon steel plate thickness greater than 25mm (1") and all ferrous alloy steel plates shall be preheated prior to thermal cutting, and the bevelled edges magnetic particle examined for linear discontinuities. Defects shall not exceed limits outlined in ASME SA 20, Table A1.14;

.2 Plate edge laminations, revealed by visual or magnetic particle examination and which are not acceptable shall be completely removed and area(s) repaired;

.3 The maximum thickness of non bevelled plate shall not exceed 8mm (5/16");

.4 Shearing shall not be used for thickness of 6mm (¼") and over;

.5 Nozzles and their reinforcement pads shall not be located within 50mm (2") of any weld unless welds meet the radiographic requirements in paragraph UW 51 of Division 1 and;

.6 All internal and external non pressure welded attachments shall be fully seal welded. All seal welded pads shall be vented through a 6mm (¼") NPT tell tale hole.

.2 Welding

.1 All pressure retaining welds shall be full penetration welds;

.2 Where access does not permit back welding, the root pass shall be made by the GTAW process;

.3 On the shell, welding procedures qualified to SA 516 70 are also acceptable for SA 106 B. The same brands of welding consumables as those used for qualification shall be used for production and;

.4 Welders and welding procedures shall be qualified in accordance with the ASME Code, Section IX.

.3 Post Weld Heat Treatment

.1 When specified or when required by the ASME Code, post weld heat treatment of the heat exchangers shall be performed in accordance with the requirements of the Code and;

.2 Properly identified heat treatment charts are required for all heat treatment operations. The temperature charts shall identify each of the thermocouples used to record the exchanger temperature.

.16 Inspection

.1 The responsibility for inspection rests with the Contractor in accordance with paragraph UG 90 of the Code; however, the Contract Administrator reserves the right for its authorized representative to inspect exchangers at any time during their fabrication to assure that such equipment, materials and workmanship are in accordance with this Specification, and the Code;

.2 All non destructive examinations shall be performed only by personnel certified in accordance with CGSB Standards (Canadian General Standards Board);

.3 All pressure vessels shall be registered by the Contractor with the Government Jurisdiction in which the heat exchanger will be installed. All required certificates shall be obtained by the Contractor and forwarded to the Contract Administrator for record;

.4 The Contractor shall notify the Contract Administrator, or its authorized representative, when fabrication is started and when the exchanger is completed and ready for final inspection and tests. Intermediate inspections shall be arranged as necessary, between the Contractor and the Contract Administrator or his authorized representative;

.5 For non magnetic materials, a liquid penetrant examination in accordance with Appendix 8 of the Code, shall be used in place of any required magnetic particle examination;

.6 Welds utilizing stainless steel or high nickel electrodes shall be liquid penetrant examined upon their completion;

.7 Radiographic examination of weld joints shall be performed when required by the Code;

.8 All nozzle to shell and channel attachment welds shall be magnetic particle examined (MT);

.9 All radiographs taken during fabrication shall be available for examination by the Contract Administrator or his agent and;

.10 All non destructive examinations shall be conducted and results evaluated in accordance with ASME Section V.

.17 Testing

.1 Hydrostatic testing shall be in accordance with ASME Section VIII, Division 1, and as follows;

.2 Factory Acceptance Test (FAT) report shall be provided for each spiral heat exchanger;

.1 Report shall state design specifications, acceptable tolerances and as found values.

.3 All welded attachments provided with tell tale holes shall be pneumatically and soap tested at 20 psig prior to heat treatment and/or hydrostatic test. Tell tale holes shall not be plugged during the final hydrostatic test of the vessel;

.4 Heat exchangers shall be subjected to a hydrostatic test pressure which, at every point in the exchanger, is not less than that required by the Code. There shall be no water leakage from nozzle blinds during hydrostatic test;

.1 Test shall be performed after completion of all external and internal welding;

.2 Prior to final inspection and hydrostatic test, the inside and outside of the vessel shall be cleaned and shall be free from all slag, scale, dirt, grit, weld spatter and pieces of metal, paint, oil, etc;

.3 The use of shellac, compounds, lead, etc., on gaskets is not permitted;

.4 Service gaskets and bolting that are to be supplied with the exchanger may be used when pressure testing the equipment. A spare set of gaskets for all but ANSI flanges shall be supplied with the exchanger. All gaskets shall be new;

.5 All hydrostatic tests shall be held for at least one hour and shall be made in the presence of an authorized inspector and with his approval;

.6 Following the hydrotest, the exchanger shall be completely drained so that no liquid remains;

.7 The release of an exchanger by an authorized inspector shall not relieve the Contractor of his responsibility and does not alter the conditions of the guarantee and;

.8 No welding (pressure or non pressure) on a pressure envelope is permitted after final hydrotesting.

.18 Repairs

.1 Any major repairs resulting from the material defects or manufacturing errors must be reviewed with the Contract Administrator prior to taking any corrective action and;.

.2 Welding repairs carried out after heat treatment shall be re heat treated, or after testing shall be re-tested, or after radiography shall be re radiographed, or after examination by magnetic particle or liquid penetrant method, shall be re examined in accordance with the requirements of this specification. The Contract Administrator shall be notified of any such repairs.

.19 Preparation For Shipment

.1 All flange faces and other machined surfaces shall be coated with a rust preventative and protected with covers;

.2 All tell tale and vent holes shall be packed with grease to prevent water infiltration. Plugs are not permitted;

.3 Bolts and nuts shall be coated with a suitable thread lubricant to prevent galling;

.4 All bolting and other parts shall be suitably packaged and identified to avoid loss or damage during shipment and;

.5 Exchanger shall not be released for shipment without the approval of the Contract Administrator’s authorized representative.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for heat exchanger installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate .

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 General: install level and firmly anchored to supports in accordance with manufacturer's recommendations.

.3 Appurtenances:

.1 Install with safety relief valve piped to drain.

3.3 SITE QUALITY CONTROL

.1 Site Tests and Inspections:

.1 Perform tests as directed by Consultant and Manufacturer's instructions to ensure heat exchangers are functional.

.2 Obtain reports within 3 days of review and submit immediately to Consultant.

.2 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.

3.4 SYSTEM START-UP

.1 Check heater for cleanliness on primary and secondary sides.

.2 Check water treatment system is complete, operational and correct treatment is being applied.

.3 Check installation, settings, operation of relief valves and safety valves.

.4 Check installation, location, settings and operation of operating, limit and safety controls.

.5 Check supports.

.6 Timing: only after of hydronic systems have been successfully completed.

.7 Primary side:

.1 Measure flow rate, pressure drop, and water temperature at heater inlet and outlet.

.2 Control valve: verify proper operation without binding, slack in components.

.3 Secondary side:

.1 Measure flow rate, pressure drop and temperature at heater inlet and outlet.

.2 Verify installation and operation of air elimination devices.

.4 Calculate heat transfer from primary and secondary sides.

.5 Verify settings, operation, safe discharge from safety valves and relief valves.

.6 Verify settings, operation of operating, limit and safety controls and alarms.

3.5 CLEANING

.1 Progress Cleaning: leave work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by heat exchanger installation.

END OF SECTION