

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 23 05 93- Testing, Adjusting and Balancing for HVAC

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for all equipment and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings to Consultant prior to purchase or fabrication of products.
 - .2 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .3 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes and standards.
 - .4 In addition to transmittal letter referred to in Section 01 33 00- Submittal Procedures.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00- Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
 - .1 Operation and maintenance manual shall be submitted to Prairie and Northern Wildlife Research Centre (PNWRC) O&M and Consultant prior to substantial inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.

- .7 Colour coding chart.
- .3 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93- Testing, Adjusting and Balancing for HVAC.
- .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to PNWRC O&M Representative and Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant.
 - .2 Make changes as required and re-submit as directed by PNWRC O&M Representative or Consultant.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 Consultant will provide a set of reproducible mechanical drawings. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .8 As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Perform testing, adjusting and balancing for HVAC using completed as-built drawings.
 - .4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with Section 01 78 00- Closeout Submittals.
- .2 Furnish spare parts as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One glass for each gauge glass.
- .3 Provide one set of special tools required to service equipment as recommended by manufacturers.
- .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect materials from damage.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for recycling.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic systems installation in accordance with manufacturer's written instructions.
 - .1 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PAINTING REPAIRS AND RESTORATION

- .1 Prime and touch up marred finished paintwork to match original.
- .2 Restore to new condition, finishes which have been damaged.

3.3 SYSTEM CLEANING

- .1 Clean interior and exterior of all systems including strainers.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 DEMONSTRATION

- .1 Department Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 Department Representative may video record these demonstrations for future reference.

3.6 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 01 33 00- Submittal Procedures
- .2 01 78 00- Closeout Submittals

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute/Canadian Standards Association (ANSI/CSA)
 - .1 ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters - Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.
 - .2 ANSI Z21.10.1A-2006/CSA 4.1A-2006, Addenda 1 to ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.
 - .3 ANSI Z21.10.1b-2006/CSA 4.1b-2006, Addenda 2 to ANSI Z21.10.1-2004/CSA 4.1-2004, Gas Water Heaters - Volume I, Storage Water Heaters With Input Ratings of 75,000 Btu Per Hour or Less.
 - .4 ANSI Z21.10.3A-2007/CSA 4.3-2007, Gas Water Heaters - Volume III - Storage Water Heaters, with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA B51-03(R2007), Boiler, Pressure Vessel, and Pressure Piping Code.
 - .2 CAN/CSA-B139-04, Installation Code for Oil Burning Equipment.
 - .3 CAN/CSA-B140.0-03, Oil Burning Equipment: General Requirements.
 - .4 CAN/CSA-B149.1-05, Natural Gas and Propane Installation Code.
 - .5 CAN/CSA-B149.2-05, Propane Storage and Handling Code.
 - .6 CSA B140.12-03, Oil-Burning Equipment: Service Water Heaters for Domestic Hot Water, Space Heating, and Swimming Pools.
 - .7 CAN/CSA C22.2 No.110-94(R2004), Construction and Test of Electric Storage Tank Water Heaters.
 - .8 CAN/CSA-C191-04, Performance of Electric Storage Tank Water Heaters for Household Service.
 - .9 CAN/CSA-C309-M90(R2003), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.
- .3 National Research Council Canada (NRC)
 - .1 National Plumbing Code of Canada 2015(NPC).

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 and datasheets for domestic water heater, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings to Consultant prior to purchase or fabrication of products.
 - .2 Indicate on drawings:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.
- 1.4 CLOSEOUT SUBMITTALS**
 - .1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 78 00- Closeout Submittals.
- 1.5 DELIVERY, STORAGE AND HANDLING**
 - .1 Deliver, store and handle in accordance manufacturer's written procedures.
 - .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
 - .3 Packaging Waste Management: remove for reuse and recycle.
- 1.6 WARRANTY**
 - .1 For the Work of this Section 22 30 05- Domestic Water Heaters, 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to number of years specified for each product.
 - .2 Contractor hereby warrants domestic water heaters in accordance with CCDC2, but for number of years specified for each product.
- Part 2 Products**
 - 2.1 GAS (POWER BURNER) WATER HEATER**
 - .1 To ANSI Z21.10.3/CSA 1-4.3 with a recovery rate of 681 L/hr at 56 degrees C rise
 - .2 Tank: 379 L lined steel, non CFC foam insulation, vitreous enamelled steel jacket.
 - .3 Gas burner: complete with high limit control, gas valve, gas pressure regulator, 100% safety shut-off, firepower gas burner with air distribution ring.
 - .4 Efficiency: 96% or better
 - .5 3 year warranty certificate.
 - .6 Acceptable product: Bradford White EF-100T-150E-3N(A) or approved equal
 - 2.2 TRIM AND INSTRUMENTATION**
 - .1 Drain valve: NPS ¾" with hose end.
 - .2 Thermometer: 100 mm dial type with red pointer and thermowell filled with conductive paste.

- .3 Pressure gauge: 75 mm dial type with red pointer, and shut-off cock.
- .4 Thermowell filled with conductive paste for control valve temperature sensor.
- .5 ASME rated temperature and pressure relief valve sized for full capacity of heater, having discharge terminating over floor drain and visible to operators.
- .6 Magnesium anodes adequate for 20 years of operation and located for easy replacement.

2.3 ANCHOR BOLTS AND TEMPLATES

- .1 Supply anchor bolts and templates for installation in concrete support pad as per manufacturer's written requirements.

2.4 DOMESTIC HOT WATER CIRCULATING PUMPS

- .1 Capacity: as indicated.
- .2 Construction: closed-coupled, in-line centrifugal, all stainless steel construction, stainless steel shaft, stainless steel or bronze shaft sleeve, two oil lubricated bronze sleeves or ball bearings. Design for 110 degrees C continuous service.
- .3 Motor: 110 W, drip-proof, with thermal overload protection.
- .4 Supports: provide as recommended by manufacturer.
- .5 Acceptable Product: Grundfos Magna 3 32-60 F (N)

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install in accordance with manufacturer's recommendations and SaskEnergy.
- .2 Install natural gas fired domestic water heaters in accordance with CAN/CSA-B149.1.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's factory trained, certified Engineer to start up DHW heaters.

3.4 CLEANING

- .1 Cleaning:
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION