PART 1 GENERAL

1.1 Related Sections

1.2 References

.1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME-B16.3- 1985, Malleable-Iron Threaded Fittings, Classes 150 and 300.

.2 ANSI/ASME-B16.9- 1986, Factory-Made Wrought Steel Buttwelding Fittings.

.2 Canadian Standards Association (CSA)

.1 CAN/CSA-B139- M91, Installation Code for Oil Burning Equipment.

.3 Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)

.1 MSS-SP-80- 1987, Bronze Gate, Globe, Angle and Check Valves.

1.3 Product Data

.1 Submit product data in accordance with Section 01330 - Submittal Procedures.

PART 2 PRODUCTS

2.1 Fill Vent and Carrier Pipe

.1 Steel: to ASTM A 53, Schedule 40, continuous weld or electric resistance welded, screwed.

2.2 Steel Pipe Coating

.1 Bituminous paint: in accordance with manufacturer's recommendations.

2.3 Jointing Material

.1 Screwed fittings: pulverized lead paste .

2.4 Fittings

.1 Steel:

.1 Malleable iron: screwed, banded, Class 150 to ANSI/ASME-B16.3.

.2 Unions: malleable iron, brass to iron, ground seat, screwed, to ASTM A 47M.

.3 Nipples: Schedule 40, to ASTM A 53.

2.5 Gate Valves

.1 NPS 2 and under, screwed bonnet:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, solid wedge disc.

.2 Acceptable material: Red – White Fig. 293.

PART 3 EXECUTION

3.1 Piping

.1 Install oil piping system in accordance with CAN/CSA-B139 and CAN/CSA-B140.0.

.2 Assemble piping using fittings manufactured to ANSI standards.

.3 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.4 Slope piping down in direction of storage tank unless otherwise indicated.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage.

.6 Provide clearance for access and maintenance of equipment, valves and fittings.

.7 Ream pipes, clean scale and dirt, inside and out.

.8 Fill, vent, and return outside building:

.1 Steel piping welded throughout except at tanks where use electrically isolating fittings.

.2 Grading: slope all piping at 1% minimum back to tanks.

.9 Piping at tanks:

.1 Suction: terminate 150 mm from bottom of tank.

.2 Vent: extend into tank and terminate less than 25 mm from top. Terminate open end [3600] mm above grade with return bend and removable 10 mesh copper screen.

.10 Interconnections between tanks:

.1 Interconnect fill, vent, to ensure equal level in tanks.

.2 Valve to permit isolation of any tank without interfering with use of any other tank.

3.2 Valves

.1 Install valves with stems upright or horizontal unless approved otherwise by Engineer.

.2 Install gate valves at all branch take-offs, to isolate each piece of equipment and as indicated.

3.3 Field Quality Control

.1 Test system in accordance with CAN/CSA-B139 and CAN/CSA-B140.0 and authorities having jurisdiction.

.2 Isolate tanks from piping pressure tests.

.3 Maintain test pressure during backfilling.

3.4 Flushing and Cleaning

.1 Flush after pressure test with number 1 or number 2 fuel oil for a minimum of 2 hours. Clean strainers and filters.

.2 Dispose of fuel oil used for flushing out in accordance with requirements of authority having jurisdiction.

END OF SECTION

PART 1 GENERAL

1.1 References

.1 ASTMA126- 84(1991), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTMB62- 93, Specification for Composition Bronze or Ounce Metal Castings.

.3 ANSI/AWWAC700- 90, Cold Water Meters-Displacement Type.

.4 ANSI/AWWAC701- 88, Cold Water Meters-Turbine Type for Customer Service.

.5 ANSI/AWWAC702- 86 , Cold Water Meters-Compound Type.

.6 CAN/CSA-B64 Series- M88, Backflow Preventers and Vacuum Breakers.

.7 CAN3-B79- M79, Floor Drains and Trench Drains.

.8 CSA-B356- M1979, Water Pressure Reducing Valves for Domestic Water Supply Systems.

.9 PDI-G101- 81, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.

.10 PDI-WH201- 77, Water Hammer Arrestors.

1.2 Submittals

.1 Submit shop drawings and product data in accordance with Section 01340 - Shop Drawings, Samples and Mock-Ups.

.2 For shop drawings, indicate dimensions, construction details and materials for all fixtures and accessorie s.

.3 For product data, indicate dimensions, construction details and materials for all items specified herein.

1.3 Closeout Submittals

.1 Provide maintenance data for incorporation into manual specified in Section 01730 - Operation and Maintenance Manual

.2 Data to include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

PART 2 PRODUCTS

2.1 Floor Drains

.1 Floor drains and trench drains: to CAN3-B79.

.2 Type1: general duty; cast iron body round, adjustable head, nickel bronze strainer, integral seepage pan, and clamping collar.

.3 Type2: combination funnel floor drain; cast iron body with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral funnel.

2.2 Cleanouts

.1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Access covers:

.1 Wall access: face or wall type, polished nickel bronze or stainless steel square and or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.2 Floor access: rectangular round cast iron body and frame with adjustable secured nickel bronze top cast box with anchor lugs and:

.1 Plugs: bolted bronze with neoprene gasket.

.2 Cover for unfinished concrete floors: cast iron nickel bronze round or square, gasket, vandal-proof screws.

2.3 Water Hammer Arrestors

.1 Stainless steel or Copper construction, bellows piston type: to PDI-WH201.

2.4 Hose Bibbs and Sediment Faucets

.1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.

2.5 Trap Seal Primers

.1 All brass, with integral vacuum breaker, NPS1/2 solder ends, NPS1/2 drip line connection.

2.6 Strainers

.1 860 kPa, Ytype with 20mesh, monel, bronze or stainless steel removable screen.

.2 NPS 2 and under, bronze body, screwed ends, with brass cap.

.3 NPS21/2 and over, cast iron body, flanged ends, with bolted cap.

PART 3 EXECUTION

3.1 Installation

.1 Install in accordance with Canadian Plumbing Code, provincial codes, and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.2 Cleanouts

.1 In addition to those required by code, and as indicated, install at base of all soil and waste stacks, and rainwater leaders.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4

3.3 Back Flow Preventors

.1 Install in accordance with CAN/CSA-B64 Series, where indicated and elsewhere as required by code.

.1 At connection to each piece of mechanical equipment including make-up packages, pot feeders, etc.

.2 Pipe discharge to terminate over nearest drain.

3.4 Hose Bibbs and Sediment Faucets

.1 Install at bottom of all risers, at low points to drain systems, and as indicated.

3.5 Trap Seal Primers

.1 Install for all floor drains and elsewhere, as indicated.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Consultant.

.3 Install soft copper or plastic tubing to floor drain.

3.6 Strainers

.1 Install with sufficient room to remove basket.

3.7 Start-up

.1 Floor drains:

.1 Prime, using trap primer.

.2 Clean out baskets.

.2 Rectify start-up deficiencies.

3.8 Commissioning

.1 In context of this paragraph, "verify" to include "demonstrate" to Consultant.

.2 Timing: commission only after start-up deficiencies rectified.

.3 Access doors: verify size and location relative to items to be services.

.4 Adjust to suit site conditions, including, but not necessarily limited to, following:

.1 Floor drains:

.1 Verify proper operation of trap primer, flushing features.

.2 Verify security and removability of strainers.

.2 Cleanouts:

.1 Verify covers are gastight, secure and easily removable.

.2 Verify that cleanout rods can probe as far as next cleanout.

.3 Pressure regulators:

.1 Adjust settings to suit installed locations, required flow rates.

.4 Hose bibbs, sediment faucets:

.1 Verify operation.

.5 Trap seal primers:

.1 Verify operation.

.2 Adjust flow rate to suit site conditions.

.5 Commissioning reports:

.1 Record all results on approved report forms.

.2 Include signature of tester and supervisor.

.3 To be countersigned by Consultant.

.6 Verification:

.1 Notify Consultant 5 days before commencing tests.

.2 All tests and procedures to be witnessed by Consultant.

.3 All reported results subject to verification by Commissioning Manager .

.7 Training:

.1 Train O&M personnel in start-up, operation, monitoring, servicing, maintenance and shut-down procedures. Training to be hands-on.]

.8 Demonstrations:

.1 Demonstrate full compliance with Design Criteria.

.2 Demonstrations also to show completeness of O&M personnel training.

.9 END OF SECTION

.10

PART 1 GENERAL

1.1 References

.1 Canadian Standards Association (CSA).

- .1 CSAB51- [M1991] , Boiler, Pressure Vessel, and Pressure Piping Code.
- .2 CAN/CSA-B139- [M91] , Installation Code for Oil Burning Equipment.
- .3 CSA B140.7.2- [1967(R1991)] , Oil-Fired Steam and Hot Water Boilers for Commercial and Industrial Use.

.2 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).

- .1 ANSI/ASME Boiler and Pressure Vessel Code, SectionIV, [1992] .

1.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01340 - Shop Drawings, Samples and Mark-Ups.

.2 Indicate the following:

- .1 General arrangement showing terminal points, instrumentation test connections.
- .2 Clearances for operation, maintenance, servicing, tube cleaning, tube replacement.
- .3 Foundations with loadings, anchor bolt arrangements.
- .4 Piping hook-ups.
- .5 Equipment electrical drawings.
- .6 Burners and controls.
- .7 All miscellaneous equipment.
- .8 Flame safety control system.
- .9 Breeching and stack configuration.
- .10 Stack emission continuous monitoring system to measure C0, 0, N0x, S0, stack temperature and smoke density of flue gases.

.3 Engineering data to include:

- .1 Boiler efficiency at 25%, 50%, 75%, 100%, and 110% of design capacity.
- .2 Radiant heat loss at 100% design capacity.

1.3 Closeout Submittals

.1 Submit operation and maintenance data for incorporation into manual specified in Section 01730 – Operations and Maintenance Manual

1.4 Maintenance Materials, Special Tools and Spare Parts

.1 Maintenance materials to include:

.1 Special tools for burners, manholes, handholes and Operation and Maintenance.

.2 Spare parts for 1 year of operation.

.3 Spare gaskets.

.4 Spare gauge glass inserts.

.5 Probes and sealants for electronic indication.

.6 Spare burner tips.

.7 Spare burner gun.

.8 Safety valve test gauge.

PART 2 PRODUCTS

2.1 General

.1 Packaged boiler:

.1 Complete with burner and necessary accessories and controls.

.2 Laboratory or Factory tested at rated capacity to, and bearing seal or nameplate certifying compliance with, CSAB140.7.2 CAN1-3.1, witnessed and certified by Consultant.

.3 Ready for attachment to piping, electrical power, controls, flue gases exhaust.

.4 Designed and constructed to ANSI/ASME Boiler and Pressure vessel Code.

.5 CRN (Canadian Registration Number), to CSAB51.

.6 Boiler/burner package to bear ULC CGA label.

.2 Performance:

.1 In accordance with American Boiler Manufacturers Association (ABMA) testing procedures.

.2 Hot water: 57.5 kW (196 MBH) gross output. 82 °C (180 °F) supply. 71 °C (160 °F) return. Maximum operating pressure as per manufacturer's specification.

.3 Firing rate: #2 oil as specified in schedule.

.4 Boiler efficiency: 80% minimum at 30% to 100% firing rates.

.5 Flue gas temperature leaving boiler:

.1 Not to exceed 260°C.

.2 Above dewpoint conditions at minimum firing rate.

.3 Electrical:

.1 Power: 208 V, 3 phase, 60Hz.

.2 Controls: 120 V, 1 phase, 60Hz.

.3 Electrical components: CSA approved.

.4 Controls: factory wired. Enclosed in Electrical and Electronic Manufacturers' Association of Canada (EEMAC) 1 steel cabinet.

.5 Thermal insulation:

.1 50 mm thick mineral fibre. Seal insulation at all handholes, manholes, mudholes, piping connections with insulating cement or asphaltic paint. Finish with heat resisting paint.

.6 Jackets: heavy gauge metal, finished with heat resisting paint.

.7 Mounting:

.1 Structural steel base, lifting lugs.

.8 Anchor bolts and templates:

.1 Supply for installation by other Divisions.

.2 Anchor bolts to be sized to satisfy specified vibration isolation measures.

.9 Start-up, instruction, on-site performance tests: 3 days per boiler.

.10 Trial usage:

.1 Consultant or Owner may use boilers for test purposes prior to acceptance and commencement of warranty period.

.2 Supply labour, materials and instruments required for tests.

.11 Temporary use by contractor:

.1 Contractor may use boilers only after written approval from Engineer.

.2 Monitor and record performance continuously. Keep log of maintenance activities carried out.

.3 Refurbish to as-new condition before final inspection and acceptance.

.12

2.2 Auxiliaries

.1 Provide for each boiler and to meet ANSI/ASME requirements.

.2 Hot water boilers:

.1 Relief valves : ANSI/ASME rated, set at kPa, to release entire boiler capacity.

.2 Pressure gauge: 90mm diameter complete with shut-off cock.

.3 Thermometer: 115mm diameter range 10 to 150 °C.

.4 Low water cut-off: with visual and audible alarms.

.5 Auxiliary low water cut-off: with separate cold water connection to boiler.

.6 Isolating gate valves: on supply and return connections.

.7 Drain valve: NPS 2 .

.8 Stack thermometer: Range 65 to 400 °C.

.9 Outdoor controller: to reset operating temperature controller.

.10 One 1 set of cleaning tools.

2.3 Oil Burners

.1 General:

.1 Pressure-mechanical atomizing forced draft with:

.1 Built-in blower to supply combustion air, complete with motor, silencer and damper.

.2 Single stage oil pump driven by blower motor and complete with integral relief valve.

.3 Oil filter.

.4 Pressure gauge.

.5 High voltage ignition transformer.

.6 Flame observation port.

.7 Easy access to nozzles and electrodes.

.8 Oil and air metering controls for maximum burner efficiency throughout operating range.

.2 Electric oil heater: to heat fuel oil from pre-heat temperature to combustion temperature, even with voltage reduced by 20%, complete with 63mm diameter thermometer on inlet and outlet.

.2 Turndown ratio: at least 3:1

.3 Controls:

.1 Electronic combustion control relay with scanner for combustion control and flame supervision.

.2 Control to shut off fuel within 5 seconds upon flame failure or upon signal of safety interlock and to ensure, when restarted, in sequence, ignition and resumption of supervision of burner operation.

.3 Burner operation to include:

.1 Pre-purge.

.2 Pilot ignition and supervision.

.3 Burner operation.

.4 Post-purge upon burner shut-down.

.4 Immersion controllers:

.1 Operating: to start and stop burner, and operating between adjustable setpoints.

.2 High-low: to shift burner operation to high or low fire.

.5 Visual and audible alarms: to indicate burner shutdown due to flame failure, low water level, high pressure , low air pressure, low fuel pressure.

.6 Selector switch: to permit manual and automatic firing at any rate between low and high fire.

.7 Pilot lights: to indicate: Normal burner operation

.8 Boiler high temperature alarm to signal back to major alarm panel

2.4 **Emission Control**

.1 Rate of discharge of air contaminants from boiler not to exceed:

.1 For nitrogen oxides expressed as nitrogen dioxide:

.1 150 ng/J of heat input when fired with solid fossil fuel.

.2 110 ng/J of heat input when fired with oil specified as type 4, 5, or 6, according to CGSB classification.

.3 43 ng/J of heat input when fired with oil specified as type 1 or 2, according to CGSB classification.

.4 22 ng/J of heat input when fired with gaseous fuel.

.2 For sulphur dioxide:

.1 500 ng/J of heat input when fired with solid fossil fuel.

.2 500 ng/J of heat input when fired with oil specified as type 4, 5,or 6, according to CGSB classification.

.3 25 ng/J of heat input when fired with oil specified as type 1 or 2, according to CGSB classification.

.3 For particulate matter measured undiluted, 160 mg/m 3, when fired with solid fossil fuel; and

.4 For carbon monoxide, 125 ng/J of heat input.

PART 3 EXECUTION

3.1 **Installation**

.1 Install in accordance with ANSI/ASME Boiler and Pressure Vessels Code SectionIV, regulations of Province or Territory having jurisdiction, except where specified otherwise, and manufacturers recommendations.

.2 Make all required piping connections to all inlets and outlets recommended by boiler manufacturer.

.3 Maintain clearances as indicated or if not indicated, as recommended by manufacturer for operation, servicing and maintenance without disruption of operation of any other equipment/system.

.4 Mount unit level using specified vibration isolation.

.5 Pipe hot water relief valves full size to nearest drain.

.6 Pipe blowdown/drain to blowdown tank/floor drain.

.7 Oil fired installations - in accordance with CAN/CSA-B139.

3.2 **Mountings and Accessories**

.1 Safety valves and relief valves:

.1 Run separate discharge from each valve.

.2 Terminate discharge pipe as indicated.

.3 Run drain pipe from each valve outlet and drip pan elbow to above nearest drain.

.2 Blowdown valves:

.1 Run discharge to terminate as indicated.

3.3 **Commissioning**

.1 Manufacturer to:

.1 Certify installation.

.2 Start up and commission installation.

.3 Carry out on-site performance verification tests.

.4 Demonstrate operation and maintenance.

.2 Provide Engineer at least 5 days written notice prior to inspections, tests, and demonstrations. Submit written report of inspections and test results.

END OF SECTION

.....1996-06-30

PART 1 GENERAL

1.1 Product Data

.1 Submit product data in accordance with Section 01340 - Shop Drawings, Samples, and Mock-Ups.

1.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01340 - Shop Drawings, Samples, and Mock-Ups.

.2 Clearly indicate following:

- .1 Methods of sealing sections.
- .2 Methods of expansion.
- .3 Details of thimbles.
- .4 Bases/Foundations.
- .5 Supports.
- .6 Guy details.
- .7 Rain caps.

1.3 Closeout Submittals

.1 Submit operation and maintenance data for incorporation into manual specified in Section [01730 - Operations and Maintenance.

1.4 Certifications

.1 Catalogued or published ratings shall be those obtained from tests carried out by independent testing agency or manufacturer signifying adherence to codes and standards.

PART 2 PRODUCTS

2.1 Breechings

.1 Shop fabricated 3.5mm thick mild steel, stainless steel galvanized steel welded, with sweep bends from boiler outlet to thimble or chimney as indicated.

2.2 All Fuels Pressure Chimney and Breeching

.1 ULC labelled, 760°C rated, all fuels.

.2 Sectional, prefabricated, double wall with air space mineral wool insulation with mated fittings and couplings.

- .1 Liner: mm thick, type 316 stainless steel.
- .2 Shell: mm thick, type 316 stainless steel aluminized steel.
- .3 Outer seals between sections: to suit application.

.4 Inner seals between sections: to suit application.

2.3 Steel Chimney Refractory Lined

.1 Material:

.1 Prefabricated sections with 90mm thick high temperature impervious insulating refractory lining, centrifugally spun into 3.5mm thick circular casing.

.2 Construction:

.1 Prefabricated sections, welded on site or at factory. Use high temperature insulating cement at joints in refractory lining.

.3 Welding:

.1 To full thickness. All welds ground smooth.

.4 Supports:

.1 Welded gussets, cleats and bolts for installation on concrete base.

.2 Chimney to be self supporting or Laterally and Vertically braced, as indicated.

.3 Concrete base by Section 03300- Cast-in-Place Concrete.

.5 Breeching entry:

.1 Tee section with 150mm minimum refractory lined projection.

.6 Access door: in bottom section.

.7 Drain connection: at base of stack.

.8 Dimensions: as indicated.

2.4 Accessories

.1 Cleanouts: bolted, gasketted type, full size of breeching, as indicated.

.2 Barometric dampers: single or double acting, 70% of full size of breeching area.

.3 Hangers and supports: in accordance with recommendations of Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) as indicated.

.4 Rain cap.

.5 Expansion sleeves with heat resistant caulking, held in place as indicated.

PART 3 EXECUTION

3.1 Installation - General

.1 Follow manufacturer's and SMACNA installation recommendations for shop fabricated components.

.2 Suspend breeching at 1.5m centres and at each joint.

.3 Support chimneys at bottom, roof and intermediate levels as indicated.

.4 Install thimbles where penetrating roof, floor, ceiling and where breeching enters masonry chimney. Pack annular space with heat resistant caulking.

.5 Install flashings on chimneys penetrating roofs, as indicated.

.6 Install rain caps and cleanouts, as indicated.

3.2 **Installation - Refractory Lined Steel Chimney**

.1 Grind all welds smooth to form appearance of single tube.

.2 Seal insulating refractory at top of stack.

.3 Pack annular space around breeching at entry tee with heat resistant caulking.

.4 Run drain line from drain connection to .

.5 On completion, paint one coat of rust inhibitive primer and two coats of heat resisting paint of colour, make and quality as approved by Consultant.

END OF SECTION

1.0 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 01340 - Shop Drawings, Samples and Mock-Ups.

2.0 Products

2.1 PIPE TRACING

.1 Intake Pump Line - Two (2) cables for each intake: Type D, Power-limiting heating cable.

.1 The power-limiting heater shall consist of two (2) 12 AWG tinned-copper bus wires embedded in parallel which will exhibit a resistance increase as the temperature increases, the heater shall be allowed to be crossed over itself without overheating, to be used directly on plastic pipe, and to be cut to length in the field. To provide a good ground path where none exists and to enhance mechanical protection and provide a bond to ground the heater shall be protected by a dense metal braid. The heater shall have a primary FEP jacket and an overjacket of FEP fluoropolymer resin.

.2 The heater shall operate on line voltages of 208 volts without the use of transformers and shall operate at 6W per foot at 208V.

.3 There shall be two (2) heat trace lines installed on each intake line. Refer to the drawings for installation.

2.2 CONTROLS

.1 Control Panel: Microprocessor based, designed to operate, control and monitor two separate heating circuits from a single location. The control module shall be user programmed with all outputs and alarm values for each of the two heat tracing circuits. Double heat sinks shall allow each tracer to operate at a full 30 amps and still maintain a T4 rating. The control panel shall have a set of common alarm contacts which will send trouble or alram signals to the building alarm panel.

.2 Temperature Sensors: RTD, platinum, 3 wire 100 ohm at 0 deg. C. Two (2) RTD sensors and mounting kits shall be supplied with each control panel. (2)

.3 Standard of Acceptance: Accutron TS-201 Controller c/w northern alarm.

3.0 Execution

3.1 INSTALLATION

.1 Notify Engineer five (5) days prior to installation of heating cables.

.2 Install heating cables as indicated and in accordance with manufacturer's instructions. Ground shield to building ground. Co-ordinate cable installation with insulation application.

.2 Make power and control connections.

3.2 TESTING

.1 Perform tests in accordance with Section 16010 - Electrical - General Provisions and in accordance with manufacturer's recommendation.

.2 Use 2500 V megger to test cables for continuity and insulation value and record readings before, during and after installation.

.3 Where resistance of 50 megohms or less is measured, stop work and advise Engineer.

.4 Test ground fault trip and alarm by simulating ground fault condition.

END OF SECTION

February 2003

PART 1 GENERAL

1.1 Shop Drawings

.1 Submit shop drawings in accordance with Section 01340 - Shop Drawings, Samples, and Mock-Ups.

.2 Indicate:

.1 Equipment, capacity, piping, and connections.

.2 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, sizes and location of mounting bolt holes.

.3 Special enclosures.

1.2 Closeout Submittals

.1 Provide maintenance data for incorporation into manual specified in Section 01730 – Operations and Maintenance Manual

1.3 Samples

.1 Submit samples in accordance with Section [01330 - Submittal Procedures].

.2 Submit 1200mm length sample enclosure showing method of securing to structure and connecting to adjacent length of enclosure.

PART 2 PRODUCTS

2.1 Capacity

.1 As indicated, based on 77°C (170°F) average water temperature, 11°C (20°F) temperature drop and 18°C (65°F) E.A.T.

2.2 Finned Tube Radiation

.1 Heating elements: NPS 1 1/4 seamless copper tubing, 1.2 mm minimum wall thickness, mechanically expanded into flanged collars of evenly spaced aluminum fins, 102 x 102mm nominal, 164 fins per metre suitable for sweat fittings.

.2 Element hangers: ball bearings plastic lined cradle type providing unrestricted longitudinal movement on enclosure brackets. Space brackets 900mm centres maximum.

.3 Standard enclosures: 1.2mm thick steel complete with components for wall-to-wall or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as indicated. Provide full length channel and sealer strip at top of wall edge. Height as indicated. Joints and filler pieces to be flush with cabinet. Support rigidly top and bottom, on wall mounted brackets. Joints and filler pieces to be clear of grilles located to provide easy access to valves and vents. Provide access doors for valves vents traps. Finish cabinet with factory applied baked primer coat.

.4 Special enclosures: as indicated.

.5 Dimensions for enclosures: measure site conditions. Do not scale from drawing.

.6 Provide for noiseless expansion of all components.

.7 Expansion compensators: to be provided.

.8 Acceptable material: Engineered Air.

PART 3 EXECUTION

3.1 Installation

.1 Install in accordance with manufacturer's instructions.

.2 Install in accordance with piping layout and approved reviewed shop drawings.

.3 Provide for pipe movement during normal operation.

.4 Maintain sufficient clearance to permit performance of service maintenance.

.5 Check final location with Engineer if different from that indicated prior to installation. Should deviations beyond allowable clearances arise, request and follow Engineer's directive.

.6 Valves

.1 Install valves with stems upright or horizontal unless approved otherwise.

.2 Install isolating gate valves on inlet and lockshield globe balancing valves on outlet of each unit.

.7 Venting:

.1 Install screwdriver vent on cabinet convector, terminating flush with surface of cabinet.

.2 Install automatic air vent standard air vent with cock on continuous finned tube radiation.

.8 Clean finned tubes and comb straight.

.9 Install flexible expansion compensators as indicated.

END OF SECTION