Part 1 General

1.1 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 and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings to Departmental Representative for review and approval prior to material procurement

.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 Points of operation on performance curves.

.3 Manufacturer to certify current model production.

.4 Certification of compliance to applicable codes.

1.2 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 approved by, and final copies deposited with, Departmental Representative before final inspection.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 As specified within individual sections in Division 23.

.2 Supply and installation of power wiring, controls wiring, and conduit is the responsibility of the electrical contractor (Division 26).

.3 Supply and installation of controllers is the responsibility of the DDC contractor (Division 25). Connection of controllers to controls wiring is the responsibility of the DDC contractor (Division 25).

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 installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative 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 Departmental Representative.

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 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

3.5 DEMONSTRATION

.1 Departmental 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 Departmental Representative will record these demonstrations on video tape for future reference.

3.6 CLEANING

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

.2 Waste Management in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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 REQUIREMENTS

.1 Section 23 11 13 - Facility Fuel-Oil Piping

.2 Section 23 11 23 - Facility Natural Gas Piping

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA B139-09 (R2014), Installation Code for Oil Burning Equipment.

.2 National Research Council Canada (NRC)

.1 National Fire Code of Canada 2015 (NFC).

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 piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 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.

Part 2 Products

2.1 MATERIAL

.1 Paint: zinc-rich to CAN/CGSB-1.181.

.1 Paints, coating, and primers in accordance with manufacturer's recommendations for surface conditions.

.2 Fire Stopping: in accordance with Section 07 84 00 - Fire Stopping.

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 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer, CSA B139, and National Fire Code of Canada.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer without interrupting operation of other system, equipment, components.

3.4 AIR VENTS

.1 Install air vents in piping systems in accordance with CSA B139.

.2 Install isolating valve at each automatic air valve.

3.5 PIPEWORK INSTALLATION

.1 Install pipework to CSA B139

.2 Screwed fittings jointed with Teflon tape.

.3 Protect openings against entry of foreign material.

.4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.5 Assemble piping using fittings manufactured to ANSI standards.

.6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.7 Install concealed pipework to minimize furring space, maximize headroom, and conserve space.

.8 Install, except where indicated, to permit separate thermal insulation of each pipe.

.9 Group piping wherever possible.

.10 Ream pipes, remove scale and other foreign material before assembly.

.11 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.12 Provide for thermal expansion where necessary.

.13 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

.5 Install globe valves in bypass around control valves.

.6 Use ball valves at branch take-offs for isolating purposes except where specified.

3.6 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.

.2 Other floors: terminate 25 mm above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:

.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.

.2 Elsewhere:

.1 Provide space for firestopping.

.2 Maintain fire rating integrity.

.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.

.4 Ensure no contact between copper pipe or tube and sleeve.

3.7 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws.

.1 Chrome or nickel plated brass or type 302 stainless steel.

.3 Sizes: outside diameter to cover opening or sleeve.

.1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.8 PREPARATION FOR FIRE STOPPING

.1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with Section 07 84 00 - Fire Stopping.

.2 Uninsulated unheated pipes not subject to movement: no special preparation.

.3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging fires topping material or installation.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.9 FLUSHING OUT OF PIPING SYSTEMS

.1 Before start-up, clean interior of piping systems in accordance with requirements of Section 23 11 13 - Facility Fuel-Oil Piping and Section 23 11 23 - Facility Natural Gas Piping.

.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.10 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.

.2 Pipework: test as specified in relevant division 23 sections.

.3 Conduct tests in presence of Departmental Representative.

.4 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.

.5 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

3.11 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by Departmental Representative.

.2 Be responsible for damage to existing plant by this work.

3.12 CLEANING

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

.2 Waste Management in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This section provides requirements for gauges, meters, and sensors that will be installed or replaced as part of the project work. Note: existing gauges, meters, and sensors that are part of the control system(s) being upgraded but not identified for replacement on the drawings and found faulty during testing and commissioning shall be repaired or replaced by the Contractor as part of this contract.

1.2 RELATED REQUIREMENTS

.1 Section 25 30 02 – EMCS: Field Control Devices

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 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.

.2 Submit product data for each meter or sensor to be installed.

.2 Submittals to include:

.1 Piping configuration and sizing - straight pipe upstream and downstream, distances to first weld, protrusion, thermowell, pressure tap.

.2 Service conditions.

.3 Full details of primary element - standard of design and construction, materials, type serial number, flow rate, differential pressure, irrecoverable head loss (IHL), calculation sheets.

.4 Accuracy statements for each component at specified flow rates and other conditions.

.5 Flow and temperature ranges.

.6 Signal processor calibration data.

.7 Minimum turndown ratio.

.3 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.

.4 Closeout Submittals:

.1 Submit maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

.2 Waste Management and Disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 Submit product data sheets for all meters and sensors to be installed. Indicate device accuracy. Product data sheets shall be reviewed and approved by the Departmental Representative.

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 PREPARATION

.1 Before final calculations for orifice diameter, and before purchase of nozzle, orifice plate, or venturi measure:

.1 Internal diameter of main at the primary element to +/-0.01 mm accuracy.

.2 For concentricity of pipe.

3.3 INSTALLATION OF PRIMARY ELEMENT

.1 Follow manufacturer's instructions.

3.4 INSTALLATION OF DIFFERENTIAL PRESSURE TAPS AND PIPING

.1 Differential pressure taps horizontal and level with each other to within +/- 1.5 mm.

.2 Tubing: straight, supported throughout its length, sloped 5%-10% upward to main for drainage and venting, without air pockets, with blowdown valves at bottom.

3.5 INSTALLATION OF TRANSMITTERS NOT FORMING INTEGRAL PART OF PRIMARY ELEMENT

.1 Mount on pipe stand installed and located to ensure no damage by passing traffic.

3.6 INSTALLATION OF SIGNAL TRANSMISSION CABLE

.1 Ground shielding at one point only.

.2 Protect against RF interference.

.3 Cross electrical cables, conduits at 90 degrees leaving at least 150 mm space between.

3.7 START-UP

.1 Follow manufacturer's recommendations.

3.8 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 23 11 13 - Facility Fuel-Oil Piping

1.2 REFERENCE STANDARDS

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

.1 ANSI/ASME B1.20.1-2013, Pipe Threads, General Purpose (Inch).

.2 ASTM International

.1 ASTM A276-17, Standard Specification for Stainless Steel Bars and Shapes.

.2 ASTM B62-17, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 ASTM B505/B505M-12, Standard Specification for Copper-Base Alloy Continuous Castings.

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

.1 MSS-SP-80-2013, Bronze Gate Globe, Angle and Check Valves.

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 data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings for gas and oil trains in accordance with Section 23 11 13 - Facility Fuel-Oil Piping and Section 23 11 23 - Facility Natural Gas Piping.

1.4 CLOSEOUT SUBMITTALS

.1 Provide 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 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.

Part 2 Products

2.1 MATERIALS

.1 Valves:

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

.2 Products to have CRN registration numbers.

.2 End Connections:

.1 Connection into adjacent piping/tubing:

.1 Steel pipe systems: screwed ends to ANSI/ASME B1.20.1.

.3 Globe Valves:

.1 Requirements common to globe valves, unless specified otherwise:

.1 Standard specification: MSS SP-80.

.2 Bonnet: union with hexagonal shoulders.

.3 Connections: screwed with hexagonal shoulders.

.4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.

.5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.

.6 Handwheel: non-ferrous.

.7 Handwheel Nut: bronze to ASTM B62.

.2 NPS 2 and under, composition disc, Class 125:

.1 Body and bonnet: screwed bonnet.

.2 Disc and seat: renewable rotating PTFE disc, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.

.3 Operator: handwheel.

.3 NPS 2 and under, composition disc, Class 150:

.1 Body and bonnet: union bonnet.

.2 Disc and seat: renewable rotating PTFE disc in easily removable disc holder, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.

.3 Operator: handwheel.

.4 NPS 2 and under, plug disc, Class 150, screwed ends:

.1 Body and bonnet: union bonnet.

.2 Disc and seat ring: tapered plug type with disc stem ring of AISI S420 stainless steel to ASTM A276, loosely secured to stem.

.3 Operator: handwheel.

.5 Angle valve, NPS 2 and under, composition disc, Class 150:

.1 Body and bonnet: union bonnet.

.2 Disc and seat: renewable rotating PTFE disc in slip-on easily removable disc holder having integral guides, regrindable bronze seat, loosely secured to stem.

.3 Operator: handwheel.

.4 Ball Valves:

.1 NPS 2 and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating suitable to system installed.

.3 Connections: screwed ends to ANSI B1.20.1 and with hexagonal shoulders.

.4 Stem: tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Ball and seat: replaceable stainless steel solid ball and Teflon seats.

.7 Stem seal: TFE with external packing nut.

.8 Operator: removable lever handle.

.5 Butterfly Valves:

.1 NPS 2 1/2 through NPS 6, 2068 kPa with grooved ends.

.1 Body: cast bronze, with copper-tube dimensioned grooved ends.

.2 Disc: elastomer coated ductile iron with integrally cast stem.

.3 Operator: lever.

Part 3 Execution

3.1 INSTALLATION

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

.2 Remove internal parts before soldering.

.3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

3.2 CLEANING

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

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

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

1.2 REFERENCE STANDARDS

.1 Canadian Gas Association (CGA)

.1 CSA/CGA B149.1-05, Natural Gas and Propane Installation Code.

.2 Canadian General Standards Board (CGSB)

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

.2 CAN/CGSB-24.3-92, Identification of Piping Systems.

1.3 ACTION AND INFORMATIONAL 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.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

.2 Waste Management and Disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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.

.3 Equipment elsewhere: sizes as appropriate.

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.

2.4 PIPING SYSTEMS GOVERNED BY CODES

.1 Identification:

.1 Natural gas: to authority having jurisdiction and CSA/CGA B149.1.

2.5 IDENTIFICATION OF PIPING SYSTEMS

.1 **Natural gas:**

.1 To authority having jurisdiction and CSA/CGA B149.1.

.2 Paint Yellow

.3 Label “Gas”

.2 Propane gas:

.1 To authority having jurisdiction and CSA/CGA B149.1.

.2 Paint Yellow

.3 Label “LP”

.3 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.4 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

2.6 VALVES, CONTROLLERS

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

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.7 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.

2.8 LANGUAGE

.1 Identification in English.

.2 Use one nameplate and label.

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 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

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 PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

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

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.

.7 At beginning and end points of each run and at each piece of equipment in run.

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

.9 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 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Number valves in each system consecutively.

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 SUMMARY

.1 Fuel oil and natural gas trains for Boilers 1 and 2 shall be replaced as part of the project work. Shop drawings of fuel oil and gas trains shall be submitted by the burner manufacturer to the Departmental Representative for review and approval.

1.2 RELATED REQUIREMENTS

.1 Section 23 05 19 – Meters and Gauges for HVAC Piping.

.2 Section 23 05 53 – Mechanical Identification

1.3 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

.1 ASME-B16.3-2016, Malleable-Iron Threaded Fittings: Classes 150 and 300.

.2 ASTM International

.1 ASTM A47/A47M-99 (2014), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 CSA International

.1 CSA-B139-09 (R2014), Installation Code for Oil Burning Equipment.

.2 CSA-B140.0-03 (R2014), Oil Burning Equipment: General Requirements.

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

.1 MSS-SP-80-2013, Bronze Gate, Globe, Angle and Check Valves.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.1 Provide manufacturer’s shop drawings for No. 2 heating oil trains for Boilers 1 and 2. For each device in the train indicate:

.1 Device type,

.2 Manufacturer,

.3 Size;

.4 Certification;

.5 Set point.

.3 Product Data:

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

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

.1 Ensure piping is installed by contractor authorized by authority having jurisdiction.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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.

Part 2 Products

2.1 FILL VENT AND CARRIER PIPE

.1 Materials as per CSA-B139.

.2 Steel: to ASTM A53/A53M, Schedule 40, continuous weld or electric resistance welded, screwed.

2.2 STEEL PIPE COATING

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

.2 Paints, Primers, Coating: in accordance with manufacturer's recommendations for surface conditions. LOW VOC.

2.3 JOINTING MATERIAL

.1 Screwed fittings: Teflon tape.

2.4 FITTINGS

.1 Steel:

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

.2 Unions: malleable iron, brass to iron, ground seat, screwed, to ASTM A47/A47M.

.3 Nipples: Schedule 40, to ASTM A53/A53M.

2.5 GATE VALVES

.1 NPS 2 and under, screwed bonnet: rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, solid wedge disc as specified under Section 23 05 23 - Valves - Bronze.

2.6 GLOBE VALVES

.1 NPS 2 and under, screwed: to MSS-SP-80, Class 125, 860 kPa, bronze body, screwed over bonnet, renewable bronze disc as specified under Section 23 05 23 - Valves - Bronze.

2.7 OIL FILTER

.1 Replaceable cartridge type as recommended by oil burner manufacturer.

.2 Furnish spare filter cartridge.

2.8 OIL METERS

.1 Accuracy: tested and certified by manufacturer for accuracy within plus or minus 0.2% between 20% and 100% rated capacity.

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 PIPING

.1 Install piping in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified.

.2 Install oil piping system in accordance with CSA-B140.0, CSA-B139, and NFC.

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

.4 Above ground piping to be protected from physical impact due to impact.

.5 Piping inside building:

.1 Use approved fitting to CSA-B139 for steel piping.

.2 Install filter, gate valve, and fire valve at burners.

.6 Clearly label piping runs in legible form indicating;

.1 Piping product content.

.2 Direction of flow.

3.3 VALVES

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

.2 Install ball/gate valves at branch take-offs, to isolate pieces of equipment and as indicated.

.3 Install globe valves for balancing and in by-pass around control valves.

3.4 OIL FILTERS

.1 Install ULC approved oil filters in supply line branches to each burner according to manufacturers' recommendations.

3.5 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Test system to CSA-B139 and CSA-B140.0 and authorities having jurisdiction.

.2 Isolate tanks from piping pressure tests.

3.6 CLEANING

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

.2 Waste Management in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Fuel oil and natural gas trains for Boilers 1 and 2 shall be replaced as part of the project work. Shop drawings of fuel oil and gas trains shall be submitted by the burner manufacturer to the Departmental Representative for review and approval.

1.2 RELATED REQUIREMENTS

.1 Section 23 05 19 – Meters and Gauges for HVAC Piping.

.2 Section 23 05 53 – Mechanical Identification

1.3 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.5-13, Pipe Flanges and Flanged Fittings.

.2 ASME B18.2.1-12, Square and Hex Bolts and Screws Inch Series.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A47/A47M-99(2014), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 ASTM B837-10, Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems.

.3 Canadian Standards Association (CSA International)

.1 ANSI Z21.21-2015/CSA 6.5-2015 - Automatic valves for gas appliances

.4 Canadian Standards Association (CSA)/Canadian Gas Association (CGA)

.1 CAN/CSA B149.1HB-00, Natural Gas and Propane Installation Code Handbook.

.2 CAN/CSA B149.2-10 (R2015), Propane Storage and Handling Code.

.3 CAN/CSA B149.3-15, Field Approval of Fuel-Related Components on Appliances and Equipment.

1.4 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 for piping, fittings and equipment.

.3 Closeout Submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

.1 NOT USED.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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.

Part 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Schedule 40, seamless as follows:

.1 NPS 1/2 to 2, screwed.

.2 NPS2 1/2 and over, plain end.

2.2 JOINTING MATERIAL

.1 Screwed fittings: pulverized lead paste.

.2 Welded fittings: to CSA W47.1.

.3 Flange gaskets: non-metallic flat.

.4 Brazing: to ASTM B837.

2.3 FITTINGS

.1 Steel pipe fittings, screwed, flanged or welded:

.1 Malleable iron: screwed, banded, Class 150.

.2 Steel pipe flanges and flanged fittings: to ASME B16.5.

.3 Welding: butt-welding fittings.

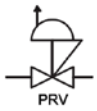
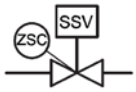
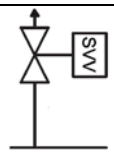
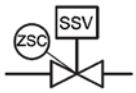
.4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47/A47M.

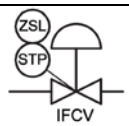
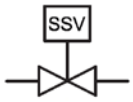
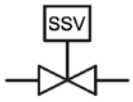
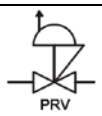
.5 Bolts and nuts: to ASME B18.2.1.

.6 Nipples: schedule 40, to ASTM A53/A53M.

2.4 DEVICES

.1 Gas train devices must comply with the following:

GAS DEVICE SPECIFICATIONS			
DEVICE ID	ITEM	SYMBOL	REQUIREMENTS
100	GAS METER		
101	PRESSURE REGULATOR		CSA B149.3-15: 5.2, 7.6, 13.8.1.1, 13.8.2.2, 13.8.2.15
102	OVERPRESSURE PROTECTION DEVICE		CSA B149.3-15: 5.7
103	LOW GAS PRESSURE SAFETY DEVICE (CUT-OFF)		CSA B149.3-15: 9.5.2, 9.5.3, 9.5.4, 13.1.1.2, 13.8.2.3, 13.8.2.16
104	LOW GAS PRESSURE SAFETY DEVICE (ALARM)		
105	SAFETY SHUT-OFF VALVE WITH PROOF OF CLOSURE SWITCH		Certified to ANSI Z21.21/CSA 6.5 and marked C/I, or to CGA 3.9 CSA B149.3-15: 5.3.3, 5.3.5, 5.3.6, 5.3.7, 5.3.8, 5.3.9, 5.3.10
106	SAFETY VENT VALVE		Safety vent valve certified to ANSI Z21.21/CSA 6.5 CSA B149.3-15: 5.3.12(b), 5.3.13, 7.6
107	SAFETY SHUT-OFF VALVE WITH PROOF OF CLOSURE SWITCH		Certified to ANSI Z21.21/CSA 6.5 and marked C/I, or to CGA 3.9 CSA B149.3-15: 5.3.3, 5.3.5, 5.3.6, 5.3.7, 5.3.8, 5.3.9, 5.3.10
108	HIGH GAS PRESSURE SAFETY DEVICE (CUT-OFF)		CSA B149.3-15: 9.5.1, 13.8.1.5, 13.8.2.6, 13.8.2.19
109	HIGH GAS PRESSURE SAFETY DEVICE (ALARM)		

110	TEST FIRING VALVE		CSA B149.3-15: 5.5
111	INPUT FLOW CONTROL VALVE WITH MECHANICAL STOP AND LOW FIRE START SWITCH		CSA B149.3-15: 5.4, 9.3 (Integrated in burner)
200	MANUAL SHUT-OFF VALVE (PILOT)		CSA B149.3-15: 4.2
201	PRESSURE REGULATOR (PILOT)		CSA B149.3-15: 4.3
202	OVERPRESSURE PROTECTION DEVICE (PILOT)		CSA B149.3-15: 4.4
203	LOW GAS PRESSURE SAFETY DEVICE (CUT-OFF)		CSA B149.3-15: 9.5.2, 9.5.3, 9.5.4, 13.1.1.2, 13.8.2.3, 13.8.2.16
204	LOW GAS PRESSURE SAFETY DEVICE (ALARM)		
205	SAFETY SHUT-OFF VALVE (PILOT)		Certified to ANSI Z21.21/CSA 6.5 CSA B149.3-15: 4.5
206	SAFETY SHUT-OFF VALVE (PILOT)		Certified to ANSI Z21.21/CSA 6.5 CSA B149.3-15: 4.5
207	TEST FIRING VALVE (PILOT)		CSA B149.3-15: 4.4
300	PRESSURE REGULATOR (PILOT)		CSA B149.3-15: 4.3

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 PIPING

.1 Install in accordance with Section 23 05 05 - Installation of Pipework, applicable Provincial/Territorial Codes, CAN/CSA B149.1, CAN/CSA B149.2, supplemented as specified.

.2 Install drip points:

.1 At low points in piping system.

.2 At connections to equipment.

3.3 VALVES

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

.2 Install valves at branch take-offs to isolate pieces of equipment, and as indicated.

3.4 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Test system in accordance with CAN/CSA B149.1, CAN/CSA B149.2, and requirements of authorities having jurisdiction.

3.5 ADJUSTING

.1 Purging: purge after pressure test in accordance with CAN/CSA B149.1 and CAN/CSA B149.2.

.2 Pre-Start-Up Inspections:

.1 Check vents from regulators, control valves, terminate outside building in approved location, protected against blockage, damage.

.2 Check gas trains, entire installation is approved by authority having jurisdiction.

3.6 CLEANING

.1 Cleaning: in accordance with Section 01 74 11 – Cleaning.

END OF SECTION

Part 1 General

This section provides specifications for the new burners for existing Boilers 1 and 2. No new boilers are installed in this project.

1.1 RELATED REQUIREMENTS

.1 25 30 01 - EMCS: Building Controllers Family of Controllers

1.2 REFERENCE STANDARDS

.1 CSA Group

- .1 CSA B139-09 (R2014), Installation Code for Oil Burning Equipment.
- .2 CSA B149.1-15, Natural Gas and Propane Installation Code.

.2 Electrical and Electronic Manufacturers Association of Canada (EEMAC)

1.3 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 burners and boiler control panels and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

- .1 Submit shop drawings for:
  - .1 Burner mounting plates
  - .2 Modifications to boiler front wall refractory
- .2 Indicate on drawings:
  - .1 General configuration
  - .2 Installation methods
  - .3 Dimensioned details
  - .4 Material specifications
  - .5 Certifications and approvals

.4 Submit product data and shop drawings to Departmental Representative for review and approval prior to material procurement. Submit burner product data and shop drawings for burner and mounting plates 1 week after award of Contract as per Section 01 32 16 Construction Progress Schedule.

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

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for burners for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: work to be performed in compliance with applicable Provincial and Federal regulations.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra materials:

.1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.1 Special tools for burners, access opening, 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.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Expedite procurement and delivery of all equipment and supplies to within 6 weeks of award of contract as per Section 01 32 16 Construction Progress Schedule. Delivery of burners is identified as critical to the project schedule. Expedite delivery of burners to site within 6 weeks of award of contract.

.3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.4 Storage and Handling Requirements:

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

.2 Store and protect burner, control panel, and associated equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL

Weishaupt equipment shall be provided for this project in order to match existing equipment. Equals will not be accepted.

2.2 COMBINATION GAS-OIL BURNERS

.1 Burner

.1 High Efficiency Natural Gas and No.2 Oil Burner
.2 Weishaupt WM-GL30/3-A, ZM-R-3LM
.3 Multi-flame (3LN) burner head for low NOx levels
.4 4 stepping motors
.5 QRA73 self-check UV scanner
.6 modulating operation
.7 light weight cast aluminum monobloc construction
.8 powder-coated
.9 corrosion resistant housing
.10 hinged flange stainless steel alloy combustion head
.11 integral gas butterfly valve
.12 flame viewing port
.13 insulated air intake for quiet operation
.14 TEFC high efficiency motor
.15 air pressure switch
.16 burner mounted high pressure oil pump
.17 magnetic clutch
.18 mechanical atomization
.19 burner mounted oil valve train
.20 stainless steel braided flex hoses for oil supply and return
.21 W-FM 200 linkage-less control system
.22 Main control module mounted on the burner
.23 programming and display unit (ABE)
.24 VFD Motor, 20 hp, 575V, 3 ph, 60 Hz

.2 Control Panel

.1 Weishaupt WM-GL30/3
.2 Control panel enclosure with textured, powder coat finish, gasketed gland plate, door with foamed in place gasket and cam-lock latches.
.3 Includes fused control circuit transformer, DIN rail with terminal strip and alpha-numeric coded wiring laid in covered ducts.

.4 Include electronic, star/delta motor starter with overload protection. Include switch for Burner On/Off, LED-type lights for Power On, Burner On, Gas On, Oil On, Pilot On (if pilot is included) and Fault.

.5 Pressure transducer

.6 Lights for HWCO, LWCO, AUX LWCO, steam pressure, etc.

.7 Alarm horn with silencing

.3 Gas pilot:

.1 To building code and provincial regulations including solenoid gas valve, pressure regulator, pressure gauge, manual shut-off valve.

.4 Main gas train:

.1 To building code and provincial regulations including main shut-off valve, pressure regulator, motorized electric shut-off valve, downstream block-test valve with test connection and pressure gauge.

.5 Oil:

.1 Multi stage oil burner pump, integrated in burner.

.2 Provide oil supply and return piping as indicated on drawings.

2.3 EMISSION CONTROL

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

.1 For nitrogen oxides expressed as nitrogen dioxide:

.1 43 ng/J of heat input when fired with oil specified as type1 or 2, according to CGSB classification.

.2 22 ng/J of heat input when fired with gaseous fuel.

.2 For sulphur dioxide:

.1 25 ng/J of heat input when fired with oil specified as type1 or 2, according to CGSB classification.

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

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 heating boiler installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative 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 Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

.1 Work shall be staged in order to keep a minimum of two boilers operational at all times during construction. Refer to Section 01 11 00 for details.

.2 Install in accordance with regulations of Province having jurisdiction and manufacturers recommendations.

.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 Natural gas fired installations: in accordance with CSA B149.1.

.5 LP gas installations - in accordance with CSA B149.1.

.6 Oil fired installations - in accordance with CSA B139.

3.4 WORK HOURS

.1 Burner installation is critical to the project schedule. Carry out Work to replace the boiler burners Monday to Friday from 08:00 to 16:00 hours. Complete Work to replace one burner and to return the associated boiler to service within 14 consecutive work days. Complete Work to replace burners on Boilers 1 and 2 and return boilers to service within 28 consecutive working days. Return all three boilers to service no later than November 15, 2018.

3.5 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.

3.6 FIELD QUALITY CONTROL

.1 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 Departmental Representative at least 24 hours notice prior to inspections, tests, and demonstrations. Submit written report of inspections and test results.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management in accordance with 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION