

Part 1 General

1.01 SUMMARY

- .1 Division 01 - General Requirements.
- .2 Section 21 05 01 - Common Work Results for Mechanical.
- .3 Related Sections:
 - .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.02 REFERENCES

- .1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME):
 - .1 ANSI/ASME B31.1, Power Piping.
 - .2 ANSI/ASME B31.3 Process Piping Addenda A.
 - .3 ANSI/ASME B31.3 Process Piping Addenda B.
 - .4 ANSI/ASME Boiler and Pressure Vessel Code latest edition:
 - .1 Section I: Power Boilers.
 - .2 Section V: Non-destructive Examination.
 - .3 Section IX: Welding and Brazing Qualifications.
- .2 American National Standards Institute/American Water Works Association (ANSI/AWWA):
 - .1 ANSI/AWWA C206 Field Welding of Steel Water Pipe.
- .3 American Welding Society (AWS):
 - .1 AWS C1.1, Recommended Practices for Resistance Welding.
 - .2 AWS Z49.1, Safety Welding, Cutting and Allied Process.
 - .3 AWS W1, Welding Inspection Handbook..
- .4 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-48.2, Spot Radiography of Welded Butt Joints in Ferrous Materials.
- .5 Canadian Standards Association (CSA International):
 - .1 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.
 - .2 CSA W48 series-01, Filler Metals and Allied Materials for Metal Arc Welding.
 - .3 CSA B51, Boiler, Pressure Vessel and Pressure Piping Code.
 - .4 CSA-W117.2, Safety in Welding, Cutting and Allied Processes.
 - .5 CSA W178.1, Certification of Welding Inspection Organizations.
 - .6 CSA W178.2, Certification of Welding Inspectors.

1.03 QUALIFICATIONS

- .1 Welders:
 - .1 Welding qualifications in accordance with CSA B51.

- .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
 - .3 Furnish welder's qualifications to Departmental Representative.
 - .4 Each welder to possess identification symbol issued by authority having jurisdiction.
 - .5 Certification of companies for fusion welding of aluminum in accordance with CSA W47.2.
- .2 Inspectors:
- .1 Inspectors qualified to CSA W178.2.

1.04 QUALITY ASSURANCE

- .1 Registration of welding procedures in accordance with CSA B51.
- .2 Copy of welding procedures available for inspection.
- .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

Part 2 Products

2.01 ELECTRODES

- .1 Electrodes: in accordance with CSA W48 Series.

Part 3 Execution

3.01 WORKMANSHIP

- .1 Welding: in accordance with ANSI/ASME B31.1, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B3.0, AWS C1.1.

3.02 INSTALLATION REQUIREMENTS

- .1 Identify each weld with welder's identification symbol.
- .2 Backing rings:
 - .1 Where used, fit to minimize gaps between ring and pipe bore.
 - .2 Do not install at orifice flanges.
- .3 Fittings:
 - .1 NPS 2 and smaller: install welding type sockets.
 - .2 Branch connections: install welding tees or forged branch outlet fittings.

3.03 INSPECTION AND TESTS - GENERAL REQUIREMENTS

- .1 Review weld quality requirements and defect limits of applicable codes and standards with Provincial Authority before work is started.

- .2 Formulate "Inspection and Test Plan" in co-operation with Governmental Authorities.
- .3 Do not conceal welds until they have been inspected, tested and approved by inspector.
- .4 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

3.04 SPECIALIST EXAMINATIONS AND TESTS

- .1 General:
 - .1 Perform examinations and tests by specialist qualified in accordance with CSA W178.1 and CSA W178.2 and approved by Provincial Authority.
 - .2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.
 - .3 Inspect and test 10% of welds in accordance with "Inspection and Test Plan" by non-destructive visual examination and magnetic particle (hereinafter referred to as "particle") tests.
- .2 Visual examinations: include entire circumference of weld externally and wherever possible internally.
- .3 Failure of visual examinations:
 - .1 Upon failure of welds by visual examination, perform additional testing as directed by Governmental Authorities of up to 10% of welds, selected at random.

3.05 DEFECTS CAUSING REJECTION

- .1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.

3.06 REPAIR OF WELDS WHICH FAILED TESTS

- .1 Re-inspect and re-test repaired or re-worked welds.

END OF SECTION

Part 1 General

1.01 GENERAL REQUIREMENTS

- .1 The Contractor shall be responsible to carry out all the Work set out or referred to in this Section.

1.02 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.
 - .2 Sustainable requirements for construction and verification.

1.03 REFERENCES

- .1 Canadian Gas Association (CGA):
 - .1 CSA/CGA B149.1, Natural Gas and Propane Installation Code.
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .3 National Fire Protection Association (NFPA):
 - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.

1.04 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures
- .2 Product data to include paint colour chips, other products specified in this section.
- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.05 QUALITY ASSURANCE

- .1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Health and Safety:
 - .1 Construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.06 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.
- .2 Waste Management and Disposal:
 - .1 Construction Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Dispose of unused paint, coating material at official hazardous material collections site approved by Departmental Representative.
 - .3 Do not dispose of unused paint, coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.01 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer. Metal plates shall be provided for all for equipment operating over 140°F.
- .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.

2.02 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	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.

2.03 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 Departmental Representative.

2.04 PIPING SYSTEMS GOVERNED BY CODES

- .1 Identification:
 - .1 Sprinklers: in accordance with NFPA 13.

2.05 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
 - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
- .3 Legend:
 - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
 - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
 - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
 - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
 - .1 To full circumference of pipe or insulation.
 - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 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°C and intermittent temperature of 200°C.

- .7 Colours and Legends:
 - .1 Where not listed, obtain direction from Departmental Representative.
 - .2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE
 - .3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
Fire protection water	Red	FIRE PROT. WTR

2.06 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.

2.07 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.

2.08 LANGUAGE

- .1 Identification in English and French.
- .2 Use one nameplate and label for each language.

Part 3 Execution

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC and/or CSA registration plates as required by respective agency.
- .3 Identify systems, equipment to conform to Correction Services Canada Technical Standards.

3.03 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.

3.04 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.

3.05 VALVES, CONTROLLERS

- .1 Valves and operating controllers: Secure tags with non-ferrous chains or closed "S" hooks.

3.06 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

1.01 GENERAL REQUIREMENTS

- .1 The Contractor shall be responsible to carry out all the Work set out or referred to in this Section.

1.02 SUMMARY

- .1 Section Includes:
 - .1 Thermal insulation for piping and piping accessories in commercial type applications.

1.03 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineer (ASHRAE):
 - .1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 American Society for Testing and Materials International (ASTM):
 - .1 ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
 - .2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - .3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C533, Calcium Silicate Block and Pipe Thermal Insulation.
 - .6 ASTM C547, Mineral Fiber Pipe Insulation.
 - .7 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB):
 - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .2 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Material Safety Data Sheets (MSDS).
- .5 Manufacturer's Trade Associations:
 - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (latest edition).

- .6 Underwriters' Laboratories of Canada (ULC):
 - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .3 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings
 - .4 CAN/ULC-S702.2, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.04 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.

1.05 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.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
- .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.

1.06 QUALITY ASSURANCE

- .1 Subcontractor responsible for installation shall be a specialist in performing work of this Section, have at least 3 years successful experience in this size and type of project, and be a member of TIAC.
- .2 Health and Safety:
 - .1 Construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.07 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.
- .3 Waste management and disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Place excess or unused insulation and insulation accessory materials in designated containers.
 - .3 Divert unused metal materials from landfill to approved metal recycling facility.
 - .4 Dispose of unused adhesive material at official approved hazardous material collections site.

Part 2 Products

2.01 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.02 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-2: Rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.
 - .1 Insulation: to ASTM C533.
 - .2 Maximum "k" factor: to 0.075 W/m °C @ 500°C.
 - .3 Design to permit periodic removal and re-installation.

2.03 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.

2.04 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Hydraulic setting on mineral wool, to ASTM C449/C449M.

2.05 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

2.06 INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

2.07 ALUMINUM JACKETS

- .1 Aluminum:
 - .1 In accordance with ASTM B209.
 - .2 Thickness: 0.50 mm sheet.
 - .3 Finish: Smooth.
 - .4 Joining: Longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

Part 3 Execution

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 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.

3.03 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.

3.04 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-2.
 - .1 Insulation securements: 18 ga SS wire or 12 mm x 0.51 mm SS bands at 300 mm oc.
 - .2 Seals: lap seal adhesive, lagging adhesive.
 - .3 Installation: TIAC Code: 1501-H.
- .3 TIAC Code: C-2 with vapour retarder jacket:
 - .1 Insulation securements: ss. wire, 300 mm on centre
 - .2 Seals: lap seal adhesive, lagging adhesive.
 - .3 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 run outs to plumbing fixtures, chrome plated piping, valves and fittings.

Application	Temp ° C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Diesel Engine Exhaust		A-2	38	65	65	75	90	90

- .5 Finishes:
 - .1 Exposed indoors: PVC.
 - .2 Exposed in mechanical rooms: PVC.

- .3 Concealed, indoors: canvas on valves, fittings. No further finish.
- .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
- .5 Finish attachments: SS bands at 150 mm on centre.
- .6 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.05 FIELD QUALITY CONTROL

- .1 Verification requirements in accordance with Section 01 45 00 - Quality Control: Construction shall include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Certified wood.
 - .8 Low-emitting materials.

3.06 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

1.01 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for light fuel oil piping to boiler.
- .2 Related Sections:
 - .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 01 35 29.06 - Health and Safety Requirements.
 - .3 Section 01 45 00 - Quality Control.
 - .4 Section 01 78 00 - Closeout Submittals.

1.02 REFERENCES

- .1 American Society of Mechanical Engineers (ASME):
 - .1 ASME-B16.3, Malleable-Iron Threaded Fittings.
 - .2 ASME-B16.9, Factory-Made Wrought Steel Buttwelding Fittings.
- .2 American Society for Testing and Materials International (ASTM):
 - .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
 - .3 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.
 - .4 ASTM B75M, Standard Specification for Seamless Copper Tube.
- .3 Canadian Standards Association (CSA International):
 - .1 CSA-B139, Installation Code for Oil Burning Equipment.
 - .2 CSA-B140.0, Oil Burning Equipment: General Requirements.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Material Safety Data Sheets (MSDS).
- .5 Manufacturers Standardization Society of the Valve and Fitting Industry (MSS):
 - .1 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .6 Do all work in accordance with the New Brunswick Department of Public Safety and local authority having jurisdiction and the following standards.
- .7 American National Standards Institute (ANSI):
 - .1 ANSI/API650, Welded Steel Tanks for Oil Storage.
- .8 American Petroleum Institute.
- .9 Canadian Council of Ministers of the Environment (CCME):
 - .1 CCME EPC-LST-71E, Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products.

- .2 CCME-EPC/87E, Guideline for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks.
- .10 Canadian Environmental Protection Act (CEPA):
 - .1 CEPA S53 AST Guidelines.
- .11 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.140-M89, Oil-Alkyd Type Red Lead, Iron Oxide Primer.
- .12 Canadian Standards Association (CSA):
 - .1 CAN/CSA-B139-M91, Installation Code for Oil Burning Equipment.
- .13 National Research Council:
 - .1 NRCC 30621, National Fire Code of Canada (NFC).
- .14 Underwriters' Laboratories of Canada (ULC):
 - .1 ULC/ORD-C58.9, Secondary Containment Liners for Underground and Aboveground Flammable and Combustible Liquids.
 - .2 ULC/ORD-C58.15, Overfill Protection Devices for Flammable Liquid Storage Tanks.
 - .3 ULC-S601, Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.
 - .4 CAN/ULC-S602, Aboveground Steel Tanks for Fuel Oil and Lubricating Oil.

1.03 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.
 - .1 Indicate on manufacturer's catalogue literature the following: valves, pipe and fittings.
- .3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

Part 2 Products

2.01 FILL VENT AND CARRIER PIPE

- .1 Steel: to ASTM A53/A53M, Schedule 40, continuous weld or electric resistance welded, socket welded.

2.02 JOINTING MATERIAL

- .1 Welded.

2.03 FITTINGS

- .1 Steel:
 - .1 Malleable iron: socket weld, banded, Class 150 to ASME-B16.3.
 - .2 Unions: malleable iron, brass to iron, ground seat, socket weld, to ASTM A47/A47M.
 - .3 Nipples: Schedule 40, to ASTM A53/A53M.
 - .4 Socket weld fittings (all).

2.04 GATE VALVES

- .1 Approved for fuel oil application.
- .2 Forged steel body, socket weld ends.
- .3 Carbon steel Class 800.
- .4 API 602-ASME B16.34 - BS 5352.
- .5 O S & Y.
- .6 Full port.
- .7 Approved Product: Bonney Forge and Velan.

2.05 CHECK VALVES

- .1 Approved for fuel oil application.
- .2 Forged steel body, socket weld ends.
- .3 Carbon steel Class 800.
- .4 ASME B16.34 - BS 5352, ASME B16.11.
- .5 Bolted Bonnet.
- .6 Swing-type.
- .7 Approved Product: Bonney Forge, Velan.

Part 3 Execution

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 PIPING

- .1 Install piping in accordance with Section 23 11 00 - Diesel Fuel Piping, supplemented as specified.
- .2 Install oil piping system in accordance with CSA-B139 and CSA-B140.0.
- .3 Slope piping down in direction of storage tank unless otherwise indicated.

3.03 VALVES

- .1 Install valves with stems upright or horizontal unless approved otherwise by Departmental Representative.
- .2 Install gate valves at branch take-offs, to isolate pieces of equipment and as indicated.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 Do the work in accordance with section 23 05 17 - Pipe Welding and local authority having jurisdiction except where specified otherwise.
- .2 Section 23 07 19 - Thermal Insulation for Piping.

1.2 PRODUCT DATA

- .1 Submit product drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate dimensions, construction details and materials.

Part 2 Products

2.1 DIESEL EXHAUST SYSTEM

- .1 Provide exhaust system for new diesel engine in accordance with NFPA 37. Exhaust systems shall be complete with all fittings and accessories as required for a complete installation.
- .2 Maximum back pressure of the silencer, exhaust flex and piping not to exceed the diesel manufacturer's recommendations.
- .3 Exhaust piping shall be schedule 80 steel ASTM A53 or A106 c/w butt welded fittings.
- .4 Insulated ventilated wall thimble in accordance with NFPA 110, constructed to NFPA 37. Thimble shall be c/w one fixed welded wall mounting plate and one adjustable mounting plate. Thimble to be manufactured from heavy gauge carbon steel. Thimble shall be c/w two wall plates and rain guard. Thimble shall extend a minimum 230mm (9") on each side of wall and shall maintain a minimum 230mm (9") between exhaust pipe and combustible construction. Rated for maximum operating temperature of 760°C (1400°F).

Part 3 Execution

3.1 INSTALLATION

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

3.2 DIESEL EXHAUST SYSTEMS

- .1 Installation to be in accordance with manufacturer's recommendations.
- .2 Coordinate exhaust pipe sizes and connection to diesels with Electrical Division.
- .3 Insulate pipe and muffler with type A-2 insulation.

- .4 Supply and install insulated wall thimble through wall at existing penetration. Exhaust pipe must not make contact with thimble and shall be centred in sleeve opening. Do not plug gap between exhaust and thimble. Do not plug gap between rain shroud and thimble. High temperature sealer required between exhaust tube and rain shroud. Thimble shall extend a minimum 230mm (9") on each side of wall and shall maintain a minimum 230mm (9") between exhaust pipe and combustible construction.
- .5 Provide spring-loaded exhaust pipe cover.
- .6 Maintain continuity of existing brick and wall rain screen.

3.3 COMMISSIONING

- .1 After start-up, test and adjust to suit site conditions.

END OF SECTION