1. GENERAL

1.1 Scope

.1 Expansion tanks.

.2 Fuel oil day tank (inside).

.3 Fuel oil storage tank (outside).

.4 Glycol storage tank.

.5 Accessories and connection to piping system.

.6 Saddles and structural supports.

.7 Provide shop drawings for all scheduled tanks.

1.2 Standards

.1 Construct pressure tanks to current ASME Code for Unfired Pressure Vessels.

.2 Comply with current Government Regulations.

.3 Above ground fuel storage tanks shall comply with latest edition of CAN4-S602.

1.3 Submittals

.1 Submit shop drawings for all equipment in this section.

1.4 Inspections

.1 Obtain inspection certificates for pressure vessels from Authorities.

2. PRODUCTS

2.1 Expansion Tanks

.1 Welded steel, rated for working pressure, supplied with steel support structure.

.2 Precharged air chamber, heavy duty butyl diaphragm bonded with polypropylene liner to steel separating air chamber from water.

.3 Provide with air side charge connection, and water side inlet connection precharged as scheduled.

2.2 Fuel Oil Day Tank.

.1 Atmospheric, welded steel construction.

.2 Red zinc rich primer, coating inside and out.

.3 Provide steel saddle supports.

.4 Provide maximum 600 mm long gauge glass sections extending from top of tank to bottom, brass compression stops and guards.

.5 Provide vent, overflow, return, inlet, outlet, level control, gauge glass, tappings and drain. Levelometer to be complete with electronic output for DDC system, including low level alarm contact for DDC system connection.

2.3 Above Ground Fuel Storage Tank (Outside)

.1 Above ground 10,000 L self contained double wall.

.2 Construction: to CAN/ULC-S2602 and S652-95.

.3 Primary tank to be enclosed in a leak tight reinforced steel containment casing having a capacity of 100% of the primary tank's capacity.

.4 Tank shall have interstitial monitoring port for leak detection of primary tank and be of sufficient size to enable product removal.

.5 Tank shall be equipped with a lockable track fill spillbox with release device to drain accumulated spillage into tank.

.6 Tank shall be equipped with level indicator mounted directly on the tank in plain view of fill point.

.7 100 diameter fill complete with removable drop tube, trackfill adaptor, and 95% fill limiting valve. Fill limiting valve: Rayanik Manufacturing OFV-2. Contact 1-800-697-5109.

.8 1 – 25 diameter bottom draw off with ULC approved repad construction.

.9 2 – 50 diameter spare couplings.

.10 100 diameter interstitial vent c/w vent pipe and cap.

.11 100 diameter primary vent c/w 3660 long 100 diameter vent pipe, vent cap and whistle.

.12 500 diameter lockable combination spill box and manhole 20 manual drain connection.

.13 50 diameter interstitial monitoring inspection port.

.14 50 diameter tank mounted level indicator port.

.15 Tank assembly to be complete with lifting lugs, grounding, lug and formed plate skid.

.16 Exterior: one coat of red oxide primer painted to CAN/CGB-1.1401 coat of white marine enamel, corrosion resistant, polyurethane 1.5 mil, factory applied.

.17 Provide 50 mm black block lettering indicating tank contents.

.18 Tank gauging stick and chart to manufacturer's standard.

.19 Grounding and Banding to Section 16450.

.20 Standard of acceptance: Durex VAGST-F 10,000.

2.4 Atmospheric Glycol Storage Tank

.1 Provide polypropylene tank, complete with removable lid, suitable for storage of heating system glycol solution. Lid to contain hinged access hatch for piping.

.2 Unit to be of 170 L storage capacity.

3. EXECUTION

3.1 Installation

.1 Support tanks inside building from building structure as indicated on drawings. Provide 100 mm high housekeeping bases on floor mounted tanks.

.2 Flush and clean fuel tanks prior to delivery to site and keep sealed during construction.

.3 Provide fuel for testing of tanks, and provide full fuel fill prior to turning over to owner, after all testing and commissioning is complete.

3.2 Performance

.1 Provide tanks of dimensions and capacities as indicated on the drawings and/or tank schedule.

END OF SECTION

DIESEL FUEL SYSTEM

1. GENERAL

1.1 Scope

.1 Provide diesel fuel systems consisting of outdoor double walled storage tank, day tank, fuel transfer pumps, piping, valves, strainers and controls. For boiler plant and standby gen-set.

.2 Co-ordinate with Division 16 Electrical for field wiring of ancillary control devices. Division 15900 controls to provide monitoring/status as specified, all other control wiring and interlocks shall be provided by Division 16 Electrical.

1.2 Submittals

.1 Submit shop drawings for tanks, valves, piping, pumps and control switches showing in detail pipe tappings, dimensions, construction materials detailed, and pump curves.

1.3 Quality Assurance

.1 Tanks to be suitable for diesel fuel and to carry ULC labels.

.2 Pumps, valves, piping and fittings to be suitable for diesel fuel.

.3 Pump controls to carry ULC and CSA labels.

.4 Installation shall meet all governing codes including the current edition of CSA Standard B139, NFPA and API Standards, and requirements set out by local fire department.

2. PRODUCTS

2.1 Tanks

.1 Refer to Section 15130.

2.2 Above Ground Piping And Fittings

.1 Refer to Section 15100.

.2 Provide all necessary isolation valves, check valves, unions and strainers as required for complete installation.

2.3 Pumps

.1 Refer to Section 15300.

2.4 Pump Controllers

.1 For fuel system day tank provide four level switches equal to McDonnel Miller liquid level controllers. Cut-in level switch shall be mounted at 3/4 point of tank. Cut-out level switch shall be mounted at 1/3 point of tank. Low level controller shall be mounted at 1/4 point of tank, and high level switch at 7/8 point of tank.

2.5 Fusible Head Fire Valves

.1 Fusible head fire valves 15 mm – bronze body 15 mm NPT x 15 mm NPT.

2.6 Fuel Filters

.1 Basket filter with removable bucket, replaceable filter, and 20 mm NPT threaded inlet and outlet.

.2 Standard of acceptance: General Oil Filter 2A-700A.

2.7 Remote Fuel Indicator

.1 Provide remote fuel level indicator for outside storage tank. Locate indicator in the generator room.

.2 The fuel indicator shall be hydraulically powered float type. Use Clemmer Model 6755.

3. EXECUTION

3.1 Installation

.1 Install vent at least 3660 mm above grade with 180° turn down and insect screen.

.2 Securely cap all pipes and plug all tank openings which are temporarily not connected during construction. Clean all dirt and foreign matter in pipe prior to final hook-up. Flush all piping with kerosene or diesel fuel.

.3 Soap test in the presence of Engineer all lines prior to completion. Any leaks are to be repaired and system retested. Isolate lines for tank during test.

.4 Provide all necessary isolation valves, check valves, unions, and strainers to properly complete the system. Test complete system in the presence of the Engineer to ensure the system operates satisfactorily. Division 16 – Electrical shall provide 190V power source for controls.

.5 Provide plugged tees at low points of oil system to allow drainage of system of condensate and sludge.

.6 Provide a deflection plate at the bottom of fibreglass fuel tank to prevent damage to the tank from the use of dip-stick.

.7 Use flexible pipe to allow for relative movement due to expansion or heaving. Swing joints in piping are not permitted.

3.2 Testing

.1 Testing shall be conducted as per the requirements of the local fire department.

.2 Notify local fire department, prior to any testing or backfilling to witness the tests.

.3 Test pressure shall be not less than 1-1/2 times the maximum working pressure and not less than 340 kPa at the highest point of the system. Test shall be maintained for at least 10 hours. Underground tank to be air tested. Refer to the current edition of CSA Standard B-139, and the Provincial Fire Code. Air test tanks at maximum 35 kPa for a minimum of 2 hours.

END OF SECTION

1. GENERAL

1.1 Scope

.1 Piping insulation.

.2 Engine exhaust pipe insulation.

.3 Adhesives, tie wires, tapes.

.4 Recovering.

1.2 Quality Assurance

.1 Insulation shall be installed by skilled workmen regularly engaged in this type of work.

.2 Materials shall meet or exceed fire and smoke hazard ratings as stated in this section and defined in applicable building codes.

1.3 Submittals

.1 Submit shop drawings which indicate complete material data, "K" value temperature rating, density, finish, recovery jacket of materials proposed for this project and indicate thickness of material for individual services.

1.4 Job Conditions

.1 Deliver material to job site in original non-broken factory packaging, labelled with manufacturer's density and thickness.

.2 Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer. Make good separation of joints or cracking of insulation due to thermal movement or poor workmanship.

1.5 Alternatives

.1 Alternative insulations are subject to review and acceptance by the Engineer. Alternatives shall provide the same or better thermal resistance at normal conditions as material specified.

2. PRODUCTS

2.1 General

.1 Insulation Materials, Recovery Jackets, Vapour Barrier Facings, Tapes and Adhesives: Composite fire and smoke hazard ratings shall not exceed 25 for flame spread and 50 for smoke developed.

.2 All insulation materials shall meet current Building Code Standards, and packages or containers of such materials shall be appropriately labelled.

.3 Insulate fittings and valve bodies with preformed removable insulated fittings.

2.2 Materials

.1 Cold Piping: Formed fine fibrous glass or formed mineral fibre pipe insulation, with factory applied vapour barrier jacket, factory moulded to conform with piping, "K" value at 24°C maximum 0.035 W/m.°C. Service temperature -14°C to 100°C.

.2 Hot Piping: Formed fine fibrous glass or mineral fibre pipe insulation, with factory applied general purpose jacket, factory moulded to conform to piping, "K" value maximum 0.035 W/m.°C at 24°C. Service temperature up to 150°C.

.3 Roof Drains, Vents and Radiant Panels: Flexible fibrous glass or mineral fibre insulation, "K" value maximum 0.035 W/m.°C at 24°C with factory applied reinforced aluminum foil vapour barrier. Service temperature -14°C to 50°C.

.4 Recovery Jackets:

- ULC labelled thermo-canvas flamespread less than 25 smoke developed less than 50.
- 0.4 mm embossed aluminum sheet for piping.

3. EXECUTION

3.1 Preparation

.1 Do not install covering before piping and equipment has been tested and approved.

.2 Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application. Finish with systems at operating conditions.

3.2 Installation

.1 Ensure insulation is continuous through inside walls. Pack around pipes with fire proof self-supporting insulation material, properly sealed.

.2 Insulate piping, fittings and valves. Do not insulate unions, flanges (except on flanged valves), strainers, flexible connections and expansion joints. Terminate insulation neatly with plastic material trowelled on a bevel.

.3 Finish insulation neatly on hangers, supports and other protrusions.

.4 Locate insulation or cover seams in least visible locations. Locate seams on piping in ceiling spaces on the underside of the pipe.

.5 Provide recovering jackets on exposed insulation throughout, including equipment rooms. Insulation located in crawlspaces, pipe shafts and suspended ceiling spaces is not considered exposed. Make smooth uneven insulated surfaces before recovering.

.6 Cover insulation exposed to outdoors with aluminum jacket secured with aluminum bands on 200 mm centres or screws on 150 mm centres. Lap joints 75 mm minimum and seal with compatible waterproof lap cement.

.7 Cold Piping: Seal lap joints with 100% coverage of vapour barrier adhesive. Seal butt joints with 50 mm wide strips of vapour barrier sealed with vapour barrier adhesive. For fittings and valves, apply hydraulic insulating cement; or apply factory fabricated insulation half shells, seal all laps and joints.

.8 Flare out staples may be used to secure jacket laps on hot systems. Staples are to be applied on 100 mm centres.

.9 Hot Piping: For fittings and valves, apply hydraulic insulating cement; or apply factory fabricated insulation half shells.

.10 Roof Drains and Vents: Adhere flexible insulation with adhesive applied to all laps. Provide annealed tie wire at 400 mm centres for securing insulation. Butt insulation and seal joints and breaks with 50 mm of foil adhered over joint.

3.3 Insulation Installation Thickness Schedule

Piping or Equipment		Pipe Sizes mm	Insulation Thickness (fibreglass) mm	Insulation Thickness (closed cell phenolic) mm	Recovery Jacket
1.	Domestic Cold Water Piping	15 to 20 25 & over	12 25	12 12	Canvas
2.	Domestic Hot Water Supply and Recirculation Piping	15 to 50 Over 50	25 40	12 25	Canvas
3.	Glycol Heating Piping	All sizes	40	25	Canvas

PIPING INSULATION

Piping or Equipment		Pipe Sizes mm	Insulation Thickness (fibreglass) mm	Insulation Thickness (closed cell phenolic) mm	Recovery Jacket
4.	Vents within 3 m of Roof Outlet, as measured along pipe	All sizes	25	12	Canvas
5.	Air Separators		25	N/A	Canvas

END OF SECTION

DUCT INSULATION

1. GENERAL

1.1 Scope

.1 Duct thermal insulation.

.2 Duct acoustic insulation.

.3 Adhesives, tie wires, tapes.

.4 Recovery.

.5 All outdoor mounted ductwork.

1.2 Quality Assurance

.1 Insulation shall be installed by skilled workmen regularly engaged in this type of work.

.2 Materials shall meet fire and smoke hazard ratings as stated in this section and defined in applicable current building codes.

1.3 Submittals

.1 Submit shop drawings which indicate complete material data, "K" value temperature rating, density, finish, recovery jacket of materials proposed for this project and indicate thickness of material for individual services.

.2 Submit samples of proposed insulating materials and recovering.

1.4 Job Conditions

.1 Deliver material to job site in original non-broken factory packaging, labelled with manufacturer's density and thickness.

.2 Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer. Make good separation of joints or cracking of insulation due to thermal movement, poor workmanship or material defects.

1.5 Alternatives

.1 Alternative insulations are subject to approval. Alternatives shall provide the same or better thermal resistance at normal conditions as material specified.

2. PRODUCTS

2.1 General

.1 Insulation Material, Recovery Jackets, Vapour Barrier Facings, Tapes and Adhesives: Composite fire and smoke hazard ratings shall not exceed 25 from flame spread and 50 for smoke developed.

.2 Insulating materials and accessories shall withstand service temperatures without smouldering, glowing, smoking or flaming.

.3 Recovery Jackets:

- ULC labelled thermo-canvas.
- 0.5 mm embossed aluminum sheet.

.4 All insulation materials shall meet current Building Code Standards, and packages or containers of such materials shall be appropriately labelled.

2.2 Materials

.1 Exposed Rectangular Ducts: Rigid fibrous glass or mineral fibreboard insulation, "K" value maximum 0.035 W/m.°C at 24°C. Factory applied reinforced aluminum foil vapour barrier for cold ducts. Hot duct service temperature 20°C to 65°C. Cold ducts service temperature -40°C to 65°C.

.2 Round Ducts and Concealed Rectangular Ducts: Flexible fibrous glass or mineral fibre insulation, "K" value maximum 0.035 W/m.°C at 24°C. Factory applied reinforced aluminum foil vapour barrier for cold ducts. Hot duct service temperature 20°C to 65°C. Cold duct service temperature -40° to 65°C .

.3 Acoustic Lining: Fibrous glass or mineral fibreboard insulation with "K" value maximum 0.035 W/m.°Cat 24°C. Absolute roughness of exposed surface not to exceed 0.58 mm, coated to prevent fibre erosion at air velocities up to 25.4 m/s , 24 kg/m³ minimum density for ductwork and 75 kg/m³ for plenums. Substrate must not be dark in colour. Service temperature -40°C to 65°C.

3. EXECUTION

3.1 Preparation

.1 Do not install covering before ductwork and equipment has been tested and approved.

.2 Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application. Finish with systems at operating conditions where possible.

3.2 Installation

.1 Ensure insulation is continuous through inside walls. Pack around ducts with fireproof self-supporting insulation materials, properly sealed.

.2 Finish insulation neatly at hangers, supports and other protrusions.

.3 Do not insulate ductwork with external thermal insulation where acoustic duct insulation is specified.

.4 Locate insulation or cover seams in least visible locations. Locate seams on ductwork in ceiling spaces on the underside of the duct.

.5 Provide recovering jackets on exposed insulation throughout, including equipment rooms. Insulation located in crawl spaces, shafts and suspended ceiling spaces is not considered exposed. Make smooth any uneven insulated surface before recovering.

.6 Exposed Rectangular Ducts: Secure rigid insulation with galvanised anchors or welded pins on 400 mm centres. Secure in place with retaining pins. Seal all insulation joints and breaks with joint tape. Seal adhesive; cover joints with 100 mm strips of open mesh cloth imbedded between two coats of lap seal adhesive. Use vapour barrier tape for insulation joints or breaks on cold ducts.

.7 Round Ducts and Concealed Rectangular Ducts: Adhere flexible insulation to ductwork with adhesive applied in 150 mm wide strips on 400 mm centres. Provide annealed tie wire tied at 400 mm centres for securing duct insulation. Butt insulation and seal joints and breaks with lap seal adhesive; cover joints with joint tape. Use vapour barrier tape for cold ducts.

.8 Acoustic Lining: Apply to interior of ducts where shown. Secure to ductwork with adhesive using 50% coverage and anchors or weld pins on 400 mm centres. Secure in place with retaining clips. Cut off excess fastener length and cover with brush coat of mastic over protrusions and all raw edges. Use 25 mm thick insulation unless otherwise noted. Provide vapour barrier located on the warm side for outside air intakes. Bevel corners at joints and butt together. Install acoustic gauze over all cut corners and joints and brush coat with lap seal adhesive.

.9 Where duct velocities exceed 15 m/s, cover internal duct insulation with 0.8 mm perforated galvanised steel with 24% free area.

.10 Fasten aluminum recovery jacket in place with aluminum banding on 200 mm centres or screws or rivets on 150 mm centres.

3.3 Insulation Installation Thickness Schedule

Ducts and Equipment	Insulation Thickness mm	Recovery Jacket
Combustion Air & Relief Duct	50	Canvas
Exhaust Ducts within 3000 mm of Exterior Walls or Openings	25	Canvas
Outside Air Intake Ducts	50	Canvas
Supply Ducts Heating System	25	Canvas
Supply Ducts Ventilation Systems	25	Canvas
Acoustic Lining (where indicated)	25	--
Ventilation Equipment	50	Canvas

END OF SECTION

1. GENERAL

1.1 Scope

.1 All pumps except where integral with a manufactured piece of equipment.

.2 Pumps controls where self contained.

1.2 Submittals

.1 Submit with shop drawings certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Show pump weights, motor and pump operating or efficiencies and electrical power characteristics.

1.3 Quality Assurance

.1 Pumps shall be aligned by qualified millwright and alignment certified.

.2 Ensure pumps operate at specified system fluid temperatures without vapour binding and cavitation, are non-overloading in parallel or individual operation, operate within 25% of midpoint of published maximum efficiency curve.

.3 Motors shall be high efficiency and/or inverter only as specified in Section 15010.

2. PRODUCTS

2.1 General

.1 Statically and dynamically balance rotating parts.

.2 Construction shall permit complete servicing without breaking piping or motor connections.

.3 Pumps shall operate at 1750 r/min unless specified otherwise.

.4 Pump connections shall be flanged.

2.2 Vertical In-Line Pump

.1 Type: Centrifugal, single stage, close coupled in-line, back pullout design, suitable for vertical operation.

.2 Casing: Cast iron, rated for greater of 1200 kPa or 1.5 times actual discharge working pressure. Suction and discharge gauge port, air vent, wear rings, seal flush connection, drain plug, flanged suction and discharge.

.3 Impeller: Bronze, fully enclosed, keyed to shaft and secured with locknut.

.4 Shaft: Stainless steel or carbon steel with bronze or stainless steel sleeve through seal chamber.

.5 Seals: High performance multiple spring outside type balanced mechanical seal, 1790 kPa maximum stuffing box pressure. Tungsten Carbide rotating face against stationary carbon seat. Viton secondary seat.

.6 Seals: Packing gland with minimum four rings Teflon impregnated packing.

.7 Motor: Open drip proof unless noted otherwise in pump schedule.

.8 For pumps 3.7 kw and larger, provide split spacer couplings.

2.3 Submersible Sump Pumps

.1 Type: Completely submersible vertical centrifugal.

.2 Casing: Cast iron volute and oil filled motor chamber.

.3 Impeller: Bronze or cast iron, non-clog, on corrosion on corrosion resistant alloy steel shaft.

.4 Bearing: Ball bearings.

.5 Accessories: Oil resistant power cord with 3-prong connector.

.6 Controls (Duplex): Packaged, prewired alternator with diaphragm type liquid level controls and control panel to cut in second pump on rising level or pump failure, separate liquid level control high level alarm.

.7 Provide explosion proof motor, pump assembly and floats for pumps in Headworks Area.

2.4 Filtered Effluent Water Booster Pumps Package

.1 Assembly: Packaged pressure boosting system complete with three pumps, control panel, pressure tank, float switch, pressure switches and pressure relief valve.

.2 Control panel to contain the following: minimum run timers, low water cut off and alarm, run lights and alternator; two pressure switches and one float.

.3 Operation to be lead/lag with third pump on alternator sequence. Low water cut off to have dry contacts and auto reset pumps/manual reset alarm.

.4 Pressure relief/sustaining/backpressure valve designed to send excess water to the storage tank. Valve to be hydraulically activated and rated for 8 L/s continuous service.

.5 Pressure Tank: Refer to Section 15130.

2.5 Positive Displacement Pumps

.1 Type: Single stage, rotary gear or sliding vane.

.2 Pumps: Cast iron casing hardened shaft with stainless steel sleeves and mechanical seal, self-lubricating bronze bearings, inlet and outlet connections and integral bypass type adjustable relief valve.

.3 Drive: Flexible coupling with coupling guard.

.4 Base: Cast iron common mounting for pump and motor with drip rim and drain tapping.

3. EXECUTION

3.1 Installation

.1 Provide drains for bases and stuffing boxes piped to and discharging into floor drains.

.2 Provide domestic water and drain for seal flush water heat exchangers. Pipe to nearest floor drain.

.3 Provide air cock and drain connection on horizontal pump casings.

.4 Decrease from line size, with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 100 mm and over.

.5 Check and align pumps prior to start-up.

3.2 Performance

.1 Refer to the Pump Schedule.

END OF SECTION

1. GENERAL

1.1 Scope

.1 Cleanouts.

.2 Air chambers or water hammer arresters.

.3 Floor drains.

.4 Sumps, catch basins and manholes.

.5 Backflow preventers.

.6 Vacuum breakers.

.7 Backwater valves.

1.2 General Requirements

.1 Provide materials, equipment and labour to install plumbing as required by Provincial and Local Codes and as specified herein.

.2 Provide water and drainage connections to equipment furnished in other sections of this specification and as supplied by the Owner.

.3 Provide an approved water meter and bypass installation conforming to Local Codes and Standards.

.4 Provide and include charges for connections to Municipal and Utility Company Service.

1.3 Submittals

.1 Submit shop drawings for review by the Engineer, in accordance with the general conditions. Provide shop drawings for the following items:

- Floor Drains
- Backflow preventers
- Vacuum Breakers

2. PRODUCTS

2.1 Clean-Outs and Clean-Out Access Covers

.1 Provide caulked or threaded type extended to finished floor or wall surface. Provide bolted coverplate clean-outs on vertical rainwater leaders only. Ensure ample clearance at clean-out for rodding of drainage system.

.2 Floor cleanout access covers in unfinished areas shall be round with nickel bronze scoriated frames and plates. Provide round access covers in finished areas with depressed centre section to accommodate floor finish. Wall cleanouts to have chrome plated caps.

2.2 Water Hammer Arresters

.1 Fit water supply to each fixture or group of fixtures with an air chamber. Provide air chambers same size as supply line or minimum, and minimum long.

.2 Install stainless steel bellows type water hammer arresters on water lines connected to solenoid valves and to fixture or group of fixtures complete with accessible isolation valve.

2.3 Floor Drains

.1 Floor drains shall have lacquered cast iron body with double drainage flange, weep holes combined two piece body reversible clamping device and adjustable nickel/bronze strainer.

.2 Floor drains in equipment rooms shall have polished bronze funnel type strainer.

.3 Floor drains for vehicle areas shall have lacquered extra heavy duty type drain body with grate and sediment bucket. The entire drain assembly, body, sump, and grate shall be factory coated with 3 M Scotchkote 206 standard for fusion bonded epoxy coating.

2.4 Equipment Drains

.1 Provide a sloped connection from packaged equipment drain pans to nearest sanitary sewer trapped connection. Slope at minimum of 0.5% grade. Drain sizes to be complete with 100 mm deep trap at unit.

.2 Provide in each section of a built-up air handling unit which maintains water carry over a galvanised waterproof drain pan with a minimum of 50 mm sides and a floor sloped to a 50 mm floor drain, to be full width of the plenum and a rim of 1/2 the plenum height in length. Drain is to be flashed into the waterproof floor and is to slope to an open trapped sanitary connection at a rim of 0.5% grade. Floor drain trap is to be deep enough to ensure a water seal at a maximum pressure of the fan system with a rim depth of.

2.5 Sump

.1 Reinforced concrete sumps shall have necessary drainage fittings, checkered steel plate covers with gasket seal frames anchor bolts.

.2 Provide grated cover over one sump compartment when used for area drain.

2.6 Backflow Preventer Assemblies

.1 Provide backflow preventer assembly complete with shut-off valves before and after check valves and test cocks. Assembly shall meet current AWWA requirements and CSA B64 standards.

.2 Provide complete reduced pressure principle type assembly, consisting of pressure differential relief valve, located between two (2) positive seating replaceable check valves with stainless steel or bronze seats Watts No. 909. Provide strainer between gate valve and first check valve on units and smaller.

.3 Provide complete double check valve type assembly consisting of two (2) positive sealing replaceable check valves with stainless steel or bronze seats. Provide check valve on units and smaller. Watts No. 709.

.4 Provide complete atmospheric vent backflow preventer assembly, consisting of two (2) positive sealing replaceable check valves with bronze seats, integral stainer and threaded vent connection. Watts No. 9D.

2.7 Vacuum Breaker Assemblies

.1 Provide pressure type vacuum breaker assembly complete with shut-off valves before and after check valves and test cocks. Assembly shall consist of one (1) positive sealing check valve and one (1) atmospheric vent disk with stainless steel or bronze seats complete with shut-off valves before and after check valves and test cocks. Assembly shall meet AWWA requirements and CSA B64 standards. Watts No. 800.

.2 Provide atmospheric type vacuum breaker assembly complete with shut-off valve before assembly. Assembly shall consist of one (1) free floating poppet to seal the atmospheric vent under flow conditions. Watts No. 288A. For bottom inlet and outlet, Watts No. 388ASC.

.3 Provide hose connection type vacuum breaker assembly, consisting of a check valve disc assembly to be vandal proof and drainable. Watts No. 8A. For freezing conditions, Watts No. NF8.

2.8 Backwater Valve Assemblies

.1 Provide complete assembly, epoxy coated, cast-iron body, bronze flapper check valve, bolted access cover with neoprene gasket heavy gauge steel epoxy coated access housing and neoprene gasketted heavy-duty nickel-bronze cover.

2.9 Trap Seal Primers

.1 Bronze automatic trap primer complete with sediment strainer, union and access door for concealed installations with copper tubing connections between primer valve and floor drain.

2.10 Pressure Reducing Valves

.1 25 mm and smaller: Bronze body, SS integral stainer, renewable SS seat, high temperature rated diaphragm suitable for hot or cold water. Rated at maximum inlet pressure of 2100 kPa, maximum reduced pressure 175 kPa, maximum temperature 90°C.

.2 30 mm and larger: Pilot operated, cast iron body, modified globe design, threaded ends to 50 mm, flanged ends 65 m and larger. Maximum inlet pressure 1225 kPa. Maximum temperature 90°C. Bronze trim. Pilot control system: bronze with SS trim, hydraulically operated, diaphragm actuated.

.3 Size to suit flow capacities and service.

.4 Provide with gate valve and union on inlet and outlet, globe valve bypass, pressure gauge on inlet and outlet and pressure relief valve on reduced pressure side.

3. EXECUTION

3.1 Installation

.1 Lubricate clean-out plugs with mixture of graphite and linseed oil. Prior to building turnover remove clean-out plugs, re-lubricate and reinstall using only enough force to ensure permanent leakproof joint.

.2 Install backflow prevention devices on plumbing lines, to code requirements, where contamination of domestic water may occur. Generally necessary on boiler make-up lines, hose bibbs and flush valves.

.3 Where floor drains are located over occupied areas, provide waterproof installation.

.4 Install trap primers on all floor drains.

.5 Drainage lines shall grade 2 mm per 100 mm unless otherwise indicated on drawings.

.6 Install pressure reducing valves to limit maximum static pressure at plumbing fixtures to 550 kPa.

.7 Locate plumbing vents minimum 5 m from air intakes.

END OF SECTION

PLUMBING FIXTURES AND TRIM

1. GENERAL

1.1 Scope

.1 Plumbing fixtures and trim.

1.2 General Requirements

.1 Provide new fixtures, CSA approved, free from flaws and blemishes with finished surfaces clear, smooth and bright.

.2 Provide CSA approved plumbing fittings. Visible parts of fixture brass and accessories shall be heavily chrome plated.

.3 Fixtures shall be product of one manufacturer. Fittings of same type shall be of product of one manufacturer.

.4 Protect fixtures against use and damage during construction.

1.3 Job Conditions

.1 Check millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

1.4 Submittals

.1 Submit shop drawings for review.

2. PRODUCTS

2.1 Stainless Steel Sink

.1 Bowl: 790 mm x 520 mm x 180 mm O.D., 20 gauge, 18-8 stainless steel, self-rimming bowl double compartment with under coating, 90 mm crumb cup, holes drilled in ledgeback complete with under deck clamps. KIL Steel Queen QDL-2031/7.

.2 Trim: Sink supply faucet, 70 mm indexed blade handles, 200 mm high gooseneck swing spout with aerator, 200 mm centres, polished chrome finish.

3. EXECUTION

3.1 Installation

.1 Install each fixture with its own trap, easily removable for servicing and cleaning. At completion thoroughly clean plumbing fixtures and equipment.

.2 Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers and escutcheons.

END OF SECTION