

FILE NAME: DATE: 2010.12.07 DESCRIPTION: HVAC - MAIN FLOOR PLAN PROJECT No.: 2008-095-03 ADDRESS: 185 KINGS STREET

MECHANICAL SPECIFICATION

1. MECHANICAL GENERAL REQUIREMENTS
1.1 APPLICATION
1.1.1 In addition to the Instructions to Bidders, General Conditions of the Contract and Special Requirements, this section applies to and governs each mechanical section.
1.2 WORK EXCLUDED FROM MECHANICAL DIVISION
1.2.1 Painting and Color Coding - to the City's approval and as required by applicable codes.
1.2.2 Electrical wiring and connections (including between motors, equipment and controls and motor starting switches and alarm devices) by Electrical Section.
1.2.3 The Mechanical Contractor shall lay out all locations of proposed openings with the General Contractor (GC). The GC shall perform all cutting and patching required to accommodate mechanical equipment, piping, or ductwork. The GC shall confirm the location of existing precast floor reinforcement strands prior to coring openings through the existing floor system. All curbs and counterflashing for mechanical equipment to be provided by the GC. All concrete pads (interior and exterior) for mechanical equipment to be provided by the GC.

2. PLUMBING MATERIAL AND METHODS
2.1 All drainage piping shall be sloped at 1/50 unless otherwise shown.
2.2 The top of floor drains shall be located to suit the slope of the floor.
2.3 All plumbing piping shall be anchored at maximum 9' (1500 mm) intervals.
2.4 Piping shall have adequate clearance through each wall opening to permit unrestricted expansion.
2.5 When penetrating a fire separation, the separation must be returned to its original rating with a ULC listed firestop system in compliance with CAN-AS115-M.
2.6 Unless otherwise shown, the water supply to every group of fixtures in the same room shall be 3/4" (19mm) with a 1/2" (12mm) water supply and shut off to each fixture.
2.7 Where a vent pipe passes through the roof, it shall be insulated according to the insulation schedule, to a distance of 10' into the heated space.
2.8 All piping exposed to public view shall be cleaned of all excess joining material. Piping shall be primed and painted to the City's specifications.
2.9 All piping within ceiling return-air plenums to conform to the flame and smoke spread requirements of the Manitoba Plumbing Code.
2.10 All serviceable items shall be installed in such a manner that they may be serviced as specified by manufacturer. Mechanical contractor shall be responsible for the coordination and installation of all access hatches that may be required in order to service items in otherwise inaccessible spaces.
2.10 SCHEDULE OF PIPE AND FITTINGS
2.10.1 Interior drain and vent piping above ground:
1. Up to 62 mm (2 1/2") diameter - Type DWV copper tube with cast solder fittings and joints, drainage pattern, or 50 mm (2") Bibby-St. Croix class 4000 cast iron M.J.
2. 75 mm (3") diameter and over - Bibby-St. Croix class 4000 cast iron mechanical joint soil pipe and fittings with stainless steel M.J. clamps as required to meet latest CSA B70 specifications in sizes up to and including 250 mm (10"), Bibby-St. Croix class 4000 hub and spigot soil pipe and fittings in 300 mm (12") and 375 mm (15") sizes.
2.10.2 Interior Domestic water piping (Cold and Hot Recirculating):
1. Type 'L' hard temper copper tube
1. Up to 50 mm (2") diameter with wrought or cast solder fittings and joints.
2. Over 50 mm (2") diameter with silver braze fittings.
2.10.3 Chilled Water, Heat Pump Loop, Natural Gas Piping, Vent, Drain and Overflow Piping
1. Sizes 13 mm (1/2") to 50 mm (2") inclusive shall be schedule 40 black, stretch reduced, continuous weld, steel pipe to A.S.T.M. specification A-53 with 150 lb. welding fittings and 150 lb. malleable iron ground joint screwed unions.
2. Sizes 63 mm (2 1/2") to 150 mm (6") inclusive shall be schedule 40 black, electric resistance weld, open hearth, steel pipe to A.S.T.M. specification A-53 with 150 lb. welding fittings and 150 lb. forged steel welding flanges.
3. Sizes 200 mm (8") to 300 mm (12") inclusive shall be electric resistance weld open hearth, hydraulically cold expanded black steel pipe to A.S.T.M. Specification A-53 with 150 lb. welding fittings and 150 lb. forged steel welding flanges.
2.10.4 Hot Water Heating Piping
1. Sizes 13 mm (1/2") to 50 mm (2") inclusive shall be schedule 40 black, stretch reduced, continuous weld, steel pipe to A.S.T.M. Specification A-53 with 150 lb. malleable iron ground-joint unions, or Type 'L' hard temper copper tube.
2.10.5 Refrigerant Piping
1. Shall be Type 'L', hard drawn, degreased, scaled-at-the-mill copper tubing, cleaned sealed at the mill. Pre-charged refrigerant lines are not to be used.
2. Refrigerant Fittings
3. Shall be wrought copper tube equal to Mueller Streamline. Long radius elbows shall be used.
2.10.6 Dielectric Couplings
1. Install dielectric couplings in all locations where dissimilar metals are joined. Couplings are to be compatible with and suit the pressure rating of the system.
2. Isolating unions shall be used on pipes 50 mm (2") and smaller.
3. Isolating flanges shall be used on pipes 63 mm (2-1/2") and larger.
2.10.7 Condensate Piping
1. Up to 62 mm (2") diameter - Type DWV copper tube with cast solder fittings and joints, drainage pattern.
2. 25 mm (1") diameter and smaller - Type 'L' hard temper copper tube
2.10.8 Pipe hangers and supports:
- All piping shall be suspended with device type hangers with hanger rods as required.
3. INSULATION
3.1 PIPING INSULATION
1. Molded pipe insulation shall be manufactured to meet ASTM C 585 for sizes required in the particular system. It shall be of a type suitable for installation on piping systems as defined in section 1.01 SCOPE above.
2. Molded fibrous glass pipe insulation shall comply with the requirements of ASTM C 547.
3. Pipe Insulation Types
TYPE A
1. Fiberglass Paper-Free ASJ Pipe Insulation - Owens Corning Evoluton Fiberglas Pipe Insulation or equal. Factory applied paper free all service jacket and adhesive closure system, rated for a maximum service temperature of 650F (454C). Circumferential joints shall be sealed with paper free butt strips that are compatible with facing. Strapping is not required to complete the closure. Sufficient thickness of insulation shall be used to maintain the outer surface temperature of the operating system below +150F (65C) unless otherwise stated. Manufacturer's data regarding thickness constraints in relation to operating temperature shall be followed.
2. When multiple layers are required, all inner layers) shall be No Wrap.
3. On cold systems all penetrations of the facing and exposed ends of insulation shall be sealed with a mold resistant vapor barrier mastic. Jacket shall be a suitable vapor retardant for high humidity applications (>90%). Mastic pipe section ends at every fourth pipe section joint and at each fitting to provide isolation of water incursion.
4. NOTE: Alternate paper free insulation systems may include but not be limited to unfaced fiber glass pipe insulation with a field applied paper free jacket material such as PVC (polyvinyl chloride) or PVDC (polyvinylidene chloride).

3.5 SHEET METAL
3.5.1 Duct Insulation and Lining
A Type
1. External duct insulation shall be Fibreglass rigid vapour seal duct insulation, type R.F.F.R.K. full faced, with a K-factor of .035 (24) at 23,268°C (75°F) mean temperature, and a vapour permeance rating of less than 0.05 perm., a 72 kg per cubic meter (4.5 lb. per cubic foot) factory applied U.L. approved aluminum foil.
2. Application
1. All insulation shall be applied with edges tightly butted and secured by impaling on pins welded to the duct. Pins shall be on 300 mm (12") centres. There shall be a minimum of two rows of fasteners per side. Secure insulation with suitable clips. All joints, punctures, or breaks shall be sealed with two (2) brush coats of vapour barrier mastic. Between coats, embed a layer of glass fabric to reinforce the mastic.
D Type
1. External duct insulation shall be Fibreglass flexible duct insulation, type R.F.F.R.K. full faced, with vapour permeance of .03 perm., a 18.4 kg per cubic meter (1.15 lb. per cubic foot) density and a factory applied aluminum foil vapour barrier.
2. Application
1. Adhere to duct surface with adhesive applied in strips about 150 mm (6") wide on approximately 300 mm (12") centres. But all edges of insulation and seal joints with a tape of flange adhered over the joint. Fibreglass Tying Cord, 16 gauge annealed wire or flare door staples can be used for securing the insulation until the adhesive sets. Seal all breaks with tape.
3.5.2 Schedule of Sheet Metal Insulation and Lining Requirements. Refer to Item A for description of types.
Service Thickness Type
All conditioned air supply ductwork maximum per side 400 mm (16").
25 mm (1") D
All fresh air Intakes from louver up to the mixing plenum. 50 mm (2") A
All exhaust/relief air ductwork from the exhaust/fan relief to the exhaust louver. 50 mm (2") D
All exhaust air ductwork from the point where the duct passes through the roof or wall to 3000 mm (10'-0") inside the space. 50 mm (2") D
4. SHEET METAL - VENTILATION
4.1 All ductwork shall be fabricated and installed to the requirements of SMACNA.
4.2 All ducts shall be minimum of 26 gauge.
4.3 Provide flexible duct connection at outlet of exhaust fans.
4.4 Provide cradles with stand-offs at support points for externally insulated ducts. Stand-offs equal to duct thickness.
4.5 Install balance dampers on each branch duct.
4.6 Duct access panels shall be constructed such that doors and frames shall be rigid and close-fitting, constructed of No. 22 gauge materials with flat iron or angle on stiffening frame, with rubber gaskets, suitable galvanized hinges with brass pins, and at least two galvanized cam locks. Secure frame and hardware to ducts by rivets. Doors in insulated ductwork to be double panel construction with a 25mm (1") insulating filler.
4.7 All exhaust and return air ductwork and all supply ductwork shall have Duro-Dyne S-2 duct sealer applied to all joints and seams to provide an airtight installation and FT-2 fibreglass duct tape where required. All ductwork installed outdoors shall be sealed with Tremco Mono black acrylic sealer.
4.8 All duct sizes on the drawings refer to inside duct dimensions. Where acoustically lined, the external duct dimensions shall be increased by the thickness of the lining.
4.9 Air balance report for all H.V.A.C systems to be conducted by AABC certified testing company. Testing shall include fire damper verification. Provide (1) one copy of the report to the Contract Administrator for review.
4.10 All serviceable items, including but not limited to balancing dampers and HVAC equipment, shall be installed in such a manner that they may be serviced as specified by the manufacturer. Mechanical contractor shall be responsible for the coordination and installation of all access hatches that may be required in order to service items in otherwise inaccessible spaces.
5. CONTROLS
5.1 GENERAL
5.1.1 Div. 15 shall supply all necessary equipment control components (i.e. operators, switches, timers, relays, transformers, dampers, valves, etc.) for the complete system.
5.1.2 Div. 15 shall supply the control and wiring shop drawings to the Contract Administrator and Div. 16 for review.
5.1.3 Div. 16 shall provide all necessary control wiring and conduit (including low voltage) for mechanical systems. Wiring materials and installation to conform to local electrical code. All wiring and conduit to meet the requirements of the Electrical Code and the Div. 16 specifications.
5.2 MATERIALS
- See HVAC EQUIPMENT
5.3 SEQUENCE OF OPERATION:
5.3.1 EF-1: Operate continuously during all occupied periods.
5.3.2 EF-2: Operate continuously.
5.3.3 EF-3 - Phase 2: Operate continuously during all occupied periods.
5.3.4 F-1: Operate continuously during all occupied periods.
5.3.5 F-2 - Phase 2: Operate continuously during all occupied periods.
5.3.6 AC-1/UCU-1: Controls and thermostat by equipment supplier.
5.3.7 AC-2/UCU-2: Controls and thermostat by equipment supplier.
5.3.8 HP-16: existing controls to remain. Relocate thermostat as indicated on drawings
5.3.9 HP-17: existing controls to remain. Relocate thermostat as indicated on drawings
5.3.10 P-1, 2: Interlocked with associated heat pump operation
6. PLUMBING FIXTURES AND EQUIPMENT
6.1 Sinks
SK-1 - Salvage sink from demolition
6.2 HWT-1: Hot Water Tank
- Rheem/Rag Commercial Electric Model EGSP8 having an input of 3 kW and a recovery rate of 12 GPH at a 100' temperature rise, and equipped for 208 volt, 1 phase operation. Tank shall be lined with a double coating of exclusive Rheem/Rag high temperature glass formula and furnished with rigidly supported anode rods. Tank shall be designed for 150 psi working pressure and be approved-listed and constructed in accordance with Canadian Electrical Codes. Tank shall be completely insulated with R-Foam Insulation having a minimum insulating factor of R-16. Water heater shall be equipped with immersion 'screw-in' elements, surface thermostat, and manual reset high temperature limit control. Large terminal block that accepts either copper or aluminum field connect wire, plus grounding screw for attaching an equipment grounding conductor.
6.3 P-1, P-2: Circulation Pumps
- Bell & Gossett Model PL. The pumps shall be of the horizontal permanently lubricated type, specifically designed for quiet operation. Suitable for 225° F operation at 150 PSIG working pressure. The pumps shall have a solid high-strength alloy steel shaft supported by XL11 permanently lubricated sealed precision bearings. Bearings are to be permanently oil lubricated. Pump shaft shall connect to a non-metallic Nylon Impeller. Pump shall have integral stainless steel face plate and double sided stainless steel neck rings for increased life and seasonal start-up capabilities. Pump volute shall be of cast bronze. The connection style shall be flanged. The motor shall be isolated from circulating fluid through use of a carbon/bronze seal attached on a stainless steel shaft sleeve. Motors shall be of an Open Drip-Proof design and shall be non-overloading at any point on the pump curve. Motors shall be UL and CSA listed. Pump shall be of a maintenance free design and be capable of operating in variable speed applications. Pump manufacturer shall be ISO-9001 certified. All piping adjacent to each pump shall be adequately supported from the structure so that no weight is carried on the pump casings. In addition, long sweep elbows shall be used on each pump section and discharge. See clause 'Sound Control' for vibration isolators.

7. HVAC EQUIPMENT
7.1 Motorized Damper
TAMCO Series 9000 Thermally Insulated Damper - Extruded aluminum damper frame shall not be less than .080" (2.03mm) in thickness. Blades to be extruded aluminum profiles, internally insulated with expanded polyurethane foam and shall be thermally broken. Complete blade shall have an insulating factor of F-2.9 and a temperature index of 55. Blade seals shall be of extruded EPDM. Frame seals shall be of extruded silicone. Seals to be secured in an integral slot within the aluminum extrusions, earings are to be composed of a Celcon inner bearing fixed to a 7/16" (11.1mm) aluminum hexagon blade pin, rotating within a polycarbonate outer bearing inserted in the frame, resulting in no metal-to-metal or metal-to-plastic contact. Dampers are to be designed for operation in temperatures ranging between -40°F (-40°C) and 185°F (85°C). Leakage shall not exceed 3 cfm/ft² (15.2 l/s/m²) against 1" (25 kPa) w.g. differential static pressure.
7.2 Motorized Damper Actuator
The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
Where shown, for power-failure/safety applications, an internal mechanical, spring-return mechanism shall be built into the actuator housing.
STANDARD OF ACCEPTANCE: Belimo / Siemens
7.3 EF-1
- Greenheck Model CSP-A290 inline cabinet exhaust fan, 260 cfm @ 0.25" S.P., 1033 rpm, 80 Watts, 2.0 sones, c/w back-draft damper, Motor overload, Speed Controller mounted and wired internally, and hanging vibration isolators.
7.4 EF-2
- Greenheck Model CSP-A200 inline cabinet exhaust fan, 160 cfm @ 0.25" S.P., 774 rpm, 48 Watts, 1.0 sones, c/w back-draft damper, Motor overload, Speed Controller mounted and wired internally, and hanging vibration isolators.
7.5 EF-3 - Phase 2
- Greenheck Model CSP-A390 inline cabinet exhaust fan, 300 cfm @ 0.25" S.P., 1111 rpm, 144 Watts, 1.3 sones, c/w back-draft damper, Motor overload, Speed Controller mounted and wired internally, and hanging vibration isolators.
7.6 F-1
- Greenheck Model CSP-A290 inline cabinet exhaust fan, 260 cfm @ 0.25" S.P., 1033 rpm, 80 Watts, 2.0 sones, c/w back-draft damper, Motor overload, Speed Controller mounted and wired internally, and hanging vibration isolators.
7.7 F-2 - Phase 2
- Greenheck Model CSP-A390 inline cabinet exhaust fan, 300 cfm @ 0.25" S.P., 1111 rpm, 144 Watts, 1.3 sones, c/w back-draft damper, Motor overload, Speed Controller mounted and wired internally, and hanging vibration isolators.
7.8 Electric Duct Heater Coils
- Thermoc, Capacity and electrical requirements as per the schedules. Dimensions of duct heater to match duct sizes on drawing. Heaters shall be flanged construction, open coil, complete with air purging switch, automatic reset cut-out, built-in transformer, built-in disconnect switch. Where indicated on the schedules heaters shall have built-in SCR proportional controller.
7.9 Baseboard Electric Heaters
- Oulette OFM, Standard: white, epoxy/polyester powder paint, Voltage - 208V, 1-phase, Construction - 20 to 22-gauge steel, Linear high-limit temperature control with automatic reset, Heating element - Stainless steel tubular heating element with aluminum fins, Built-in thermostat kit. Warranty - 1-year warranty against defects.
7.10 Force Flow Electric Wall Mount Heater
- Oulette OAC, Standard: white, epoxy/polyester powder paint, Voltage - 208V, 1-phase, Construction - 18-gauge steel front cover, Bottom air outlet, High-limit temperature control with automatic reset, Fan - Closed, factory-lubricated motor, 160 cfm fan (1.5 to 4.8kW; 55 cfm). Fan delay purges heater of residual heat, Heating element - Durable tubular heating element with fins, Control - Built-in thermostat with control knob or tamperproof adjustable with a screwdriver included, Warranty - 1-year warranty against defects.
7.11 AC/UCU Split Systems (AC-1, AC-2, CU-1, CU-2)
- Mitsubishi - PKA Series, provide commercial air cooled split systems consisting of wall suspended fan unit and remote air cooled condensing units with capacities and characteristics as described in the Equipment Schedules.
1. Outdoor condensing unit: Factory assembled, single piece with all required wiring, piping, controls, R-410A refrigerant charge, Galvanized steel cabinet with baked enamel finish, Removable access panels for access to all components, Direct driven statically and dynamically balanced propeller type condenser fans with class A insulation and permanently lubricated ball bearings and internal thermal overload protection, Variable Compressor Speed Inverter Technology discharge valves, rubber vibration isolators, aluminum fins/copper tube, cleaned, dehydrated, and sealed condenser coil, Refrigeration components: liquid and suction line service valves and service gauge ports, accumulator, pressure relief, liquid and suction line piping kit, and refrigerant operating charge. Controls: Short cycling protection, automatic restart on power failure, high temperature and freeze protection, system diagnostics, compressor motor overcurrent, over temperature protection, low ambient control to -40°F.
2. Indoor fan section: Cabinet is zinc coated steel with baked enamel paint and matching mounting brackets, Centrifugal fan with automatic motor driven vertical air sweep, coils are copper tube, aluminum fins and galvanized steel tube sheets with drip pan and drain connection. Permanently lubricated multi-speed fan motor with inherent overload protection, Wired remote system controller complete with interconnecting cable, Factory installed condensate pump.
7.12 Diffusers & Grille Schedule (Based on E.H. Price)
- On Drawings
7.13 Louvers: Price Model DE430 stationary drainable louvers feature alloy 6063-T5 extruded 4" aluminum blades positioned at a 39° angle. Nominal 50% free area, baked enamel finish (coordinate colour with City).

NOTES :

Notes section including APEGM Certificate of Authorization, drawing revision table, and mechanical specification title block.

Drawing title block and revision table for MECHANICAL SPECIFICATION, MANDARIN BUILDING, ALTERNATE EMERGENCY COMMUNICATION CENTRE - DESIGN.