1. GENERAL

MAKE SITE VISIT(S) AS NECESSARY BEFORE BID SUBMISSION TO ESTABLISH AND VERIFY ALL EXISTING CONDITIONS, MAKE ALLOWANCE FOR ANY NEW OR EXISTING SERVICE AND EQUIPMENT RELOCATIONS NECESSARY TO COMPLETE THE WORK AND INCLUDE IN THE BID PRICE. EXTRAS WILL NOT BE ALLOWED FOR FAILURE TO PROPERLY EVALUATE EXISTING CONDITIONS.

THE DRAWINGS SHOW THE GENERAL INTENT OF THE WORK, NOT THE DETAILS OF INSTALLATION. CO-ORDINATE THE ROUTING AND INSTALLATION OF ALL MECHANICAL SERVICES WITH ALL EXISTING CONDITIONS, STRUCTURE AND THE WORK OF ALL OTHER TRADES. PROVIDE INSTALLATION DRAWINGS AS REQUIRED.

DO NOT SCALE MECHANICAL DRAWINGS. TAKE FIELD DIMENSIONS PRIOR TO ANY INSTALLATION

PROVIDE WORK IN ACCORDANCE WITH FULL INTENT AND MEANING OF DRAWINGS AND SPECIFICATIONS. THE WORD "PROVIDE" WHERE USED IN THE CONTRACT DOCUMENTS, IS TO BE INTERPRETED AS "SUPPLY AND INSTALL".

REGULATORY REQUIREMENTS CONFORM TO GOVERNING MUNICIPAL AND PROVINCIAL CODES, RULES AND REGULATIONS AND/OR AUTHORITIES HAVING JURISDICTION

PERMITS AND FEES OBTAIN ALL PERMITS REQUIRED FOR INSTALLATION OF MECHANICAL TRADES WORK, ARRANGE FOR INSPECTIONS TESTS THEREWITH AND PAY ALL COSTS FOR PERMITS, INSPECTIONS, AND ASSOCIATED FEES. OBTAIN PERMITS IMMEDIATELY AFTER NOTIFICATION OF AWARD OF CONTRACT.

ENSURE THAT PROVINCIAL TAXES ARE INCLUDED WHERE REQUIRED.

WARRANTY PROVIDE A WRITTEN WARRANTY FOR ALL MATERIALS. EQUIPMENT AND LABOUR FOR A ONE-YEAR PERIOD TO BEGIN AT THE TIME WHEN THE WORK IS DESIGNATED ACCEPTABLE BY THE CONTRACT ADMINISTRATOR.

PROVIDE MANUFACTURER'S WRITTEN CERTIFICATION OF THE INSTALLATION AND OPERATION OF ALL SYSTEMS AND MAJOR EQUIPMENT

EXISTING SERVICE DO NOT SHUT DOWN OR MAKE CONNECTIONS TO ANY EXISTING SERVICE WITHOUT WRITTEN PERMISSION OF THE CONTRACT ADMINISTRATOR BE RESPONSIBLE FOR DEMOLITION AND REMOVAL OF MECHANICAL EQUIPMENT AND SERVICES DESIGNATED FOR

PROTECT ALL WORK AND MATERIALS. BEFORE AND AFTER ERECTION, FROM WEATHER AND OTHER HAZARDS, AND KEEP

IN A CLEAN AND ORDERLY MANNER.

REMOVAL ON DRAWINGS.

ADJUSTMENT AND OPERATION OF SYSTEMS WHEN WORK IS COMPLETE, ADJUST ALL EQUIPMENT ITEMS, OF VARIOUS SYSTEMS. FOR PROPER OPERATION WITHIN FRAMEWORK OF DESIGN INTENT, AND OPERATING CHARACTERISTICS AS PUBLISHED BY EQUIPMENT

MANUFACTURER EQUIPMENT BASES AND PADS: VERIFY SIZE OF BASES INDICATED ON DRAWINGS WITH ACTUAL REQUIREMENTS. CONSTRUCT BASES AND PADS AT LEAST 150 MM (6") HIGH. EXTEND BASES 50 MM (2") BEYOND EQUIPMENT BASE. CHAMFER ALL UPPER PERIMETER

EDGES OF BASE, SUPPLY ANCHOR BOLTS AND SLEEVES, TO

TRADE SECTION CONSTRUCTING BASES MISCELLANEOUS STEEL SUPPLY AND INSTALL MISCELLANEOUS STRUCTURAL SUPPORTS, PLATFORMS, AND BRACES, AS REQUIRED TO HANG OR SUPPORT ALL EQUIPMENT, PIPING, DUCTWORK AND SIMILAR ITEMS.

EQUIPMENT INSTALLATION INSTALL AND START UP ALL ITEMS OF EQUIPMENT, DEVICES AND SYSTEMS IN ACCORDANCE WITH MOST RECENT MANUFACTURER'S PUBLISHED GUIDELINES AND RECOMMENDATIONS. CONTRACTOR IS RESPONSIBLE FOR ASCERTAINING MANUFACTURERS INSTALLATION GUIDELINES AND RECOMMENDATIONS.

CUTTING AND PATCHING WHERE PIPES AND DUCTS ARE SHOWN PASSING THROUGH EXISTING WALLS, FLOORS, AND ROOF, CUT AND PATCH THE NECESSARY OPENINGS, SHOULD CUTTING, REPAIRING, AND PATCHING OF PREVIOUSLY FINISHED WORK, OF OTHER TRADES, BE REQUIRED TO ALLOW INSTALLATION OF MECHANICAL WORK, PAY ALL COSTS FOR TRADE SECTION CONCERNED TO PERFORM WORK.

2. SUBMITTALS

SHOP DRAWINGS SUBMIT SHOP DRAWINGS FOR ALL EQUIPMENT SUPPLIED BY MECHANICAL DIVISION. SUBMIT ELECTRONIC COPIES OF SUCH DRAWINGS TO CONTRACT ADMINISTRATOR FOR REVIEW. EACH SHOP DRAWING AND/OR BROCHURE MUST BEAR STAMP AND SIGNATURE OF RESPONSIBLE OFFICIAL IN CONTRACTOR'S AND SUBCONTRACTOR'S ORGANIZATION, FOR EACH SUBMISSION. AS EVIDENCE THAT DRAWING HAS BEEN CHECKED AGAINST REQUIREMENTS AS CALLED FOR IN SPECIFICATIONS AND DRAWINGS.

OPERATION AND MAINTENANCE INSTRUCTION MANUALS PROVIDE PDF COPIES OF COMPLETE OPERATION AND MAINTENANCE INSTRUCTIONS FOR EQUIPMENT FURNISHED UNDER THIS CONTRACT. MANUALS SHALL INCLUDE THE FOLLOWING INFORMATION: CONTROL SHOP DRAWINGS AND OPERATING SEQUENCE, INCLUDING WIRING OF COMPONENTS.

WIRING DIAGRAM OF CONTROL PANELS OPERATING INSTRUCTIONS, INCLUDING START-UP AND SHUT-DOWN PROCEDURE. MAINTENANCE INSTRUCTIONS, INCLUDING PREVENTIVE MAINTENANCE INSTRUCTIONS FOR COMPONENTS OF

EQUIPMENT COMPLETE PARTS LIST OF ASSEMBLIES AND THEIR COMPONENT PARTS. SHOWING MANUFACTURER'S NAME. CATALOGUE NUMBER, AND NEAREST REPLACEMENT SOURCE. LIST OF RECOMMENDED SPARE PARTS AND QUANTITY OF

EACH ITEM TO BE STOCKED. MANUFACTURERS' WARRANTIES AND GUARANTEES.

RECORD DRAWINGS MAINTAIN AN ACCURATE DIMENSIONAL RECORD OF DEVIATIONS AND CHANGES FROM CONTRACT DRAWINGS. TRANSFER AS-BUILT MARK-UPS TO AUTOCAD/REVIT AND SUBMIT AUTOCAD AND PDF FILES TO THE CONTRACT ADMINISTRATOR WITH THE O&M MANUALS AT COMPLETION

OF PROJECT. **EQUIPMENT NAMEPLATES** PROVIDE LAMINATED WHITE PHENOLIC PLASTIC NAMEPLATES WITH 10MM HIGH BLACK LETTERS FOR EQUIPMENT INSTALLED UNDER THIS DIVISION. INCLUDE EQUIPMENT NUMBER AND EQUIPMENT NAME GENERALLY AS LISTED ON DRAWING SCHEDULES. SUBMIT LIST OF NAMEPLATES TO CONTRACT ADMINISTRATOR FOR REVIEW PRIOR TO

FIRESTOPPING AND SMOKE SEAL PROVIDE A ULC LISTED FIRESTOP SYSTEM TO SEAL AROUND ALL MECHANICAL SERVICES WHICH PENETRATE PART OF A

FABRICATION.

BUILDING ASSEMBLY REQUIRED TO HAVE A FIRE RESISTANCE DETAILED SHOP DRAWINGS TO THE CONTRACT ADMINISTRATOR FOR REVIEW. INCLUDE THE FOLLOWING: MANUFACTURER'S TECHNICAL PRODUCT DATA AND INSTALLATION INSTRUCTIONS FOR EACH SPECIFIC TYPE AND LOCATION OF PENETRATION. CERTIFICATION THAT PROPOSED FIRESTOPPING MATERIALS AND ASSEMBLIES COMPLY WITH CAN4-S115-M. ULC LISTINGS WITH COPIES OF ULC DATA SHEETS FOR EACH SPECIFIC TYPE AND LOCATION OF PENETRATION.

3. MATERIALS AND EQUIPMENT

PROVIDE ACCESSES DOOR OF AT LEAST 200MMx200MM (8"x8") IN SIZE AS REQUIRED IN WALLS AND CEILINGS TO ENSURE THAT ACCESS IS PROVIDED FOR ALL EQUIPMENT, VALVES OR APPURTENANCES, BOTH NEW AND EXISTING. PROVIDE ACCESS DOORS COMPATIBLE WITH ADJACENT FINISHES AND WHERE APPLICABLE, WITH A FIRE RATING EQUAL TO THE SURFACES IN WHICH INSTALLED.

4. PIPING CONSTRUCTION METHODS

EXPANSION AND CONTRACTION INSTALL ALL PIPING SO AS TO BE FREE FROM STRAIN AND DISTORTION DUE TO EXPANSION AND CONTRACTION AS GOVERNED BY REQUIREMENTS OF ANSI B31.1, EXCEPT AS HEREINAFTER MODIFIED. ALLOW FOR EXPANSION AND CONTRACTION BY OFFSETS, EXPANSION U-BENDS OR LOOPS. DO NOT USE EXPANSION JOINTS OF ANY TYPE UNLESS SPECIFICALLY INDICATED ON DRAWINGS.

LINES, GRADES AND SLOPES: INSTALL LIQUID AND AIR LINES FREE OF POCKETS AND PITCH TO DRAIN. AT LOW POINTS IN LINE, WITH VALVES OR TRAPS INSTALLED AS REQUIRED FOR DRAINAGE OF THE

INSTALL PIPING TO FOLLOWING SLOPES DRAINAGE PIPING: 1:50 ON DRAINS OF NPS 3 SIZE AND LESS AND 1:100 ON DRAINS OF NPS 4 AND LARGER. DOMESTIC WATER LINES: PITCH TO LOW POINTS SO THAT ALL LINES MAY BE COMPLETELY DRAINED. HOT WATER HEATING, CHILLED WATER AND CONDENSER WATER LINES: SLOPE UP 1:500 IN DIRECTION OF FLOW. STEAM AND CONDENSATE LINES: SLOPE DOWN 1:500 IN DIRECTION OF FLOW. COMPRESSED AIR, NATURAL GAS, FUEL OIL: SLOPE DOWN 1:1000 IN DIRECTION OF FLOW.

PROVIDE UNIONS OR FLANGES IN FOLLOWING LOCATIONS FOR BY-PASSES AROUND EQUIPMENT, CONTROL VALVES, DEVICES IN PIPING SYSTEMS, AND ELSEWHERE INDICATED ON DRAWINGS AT CONNECTION TO STEAM TRAPS AND IN BY-PASSES AROUND TRAPS. AT CONNECTIONS TO EQUIPMENT (LOCATE BETWEEN SHUT-OFF VALVE AND EQUIPMENT). IN SCREWED, OR SOLDER JOINT, DRAINAGE TUBING AT INLET SIDE OF TRAP PROVIDE DIELECTRIC UNIONS, OR ISOLATING TYPE

COPPER TUBING AND FERROUS PIPING. PIPING CONNECTIONS TO MAINS: MAKE BRANCH CONNECTIONS OF STEAM. GAS. AND COMPRESSED AIR LINES, TO RESPECTIVE HORIZONTAL PIPING OF LARGER DIAMETER, TO UPPER QUADRANT OF LARGER MAKE DOWN FEED PIPING CONNECTIONS, TO HORIZONTAL SUPPLY AND RETURN WATER MAINS, ON BOTTOM QUADRANT

COMPANION FLANGES, AT ALL CONNECTIONS BETWEEN

OF MAINS.

INSTALL SLEEVES WHERE PIPING PASSES THROUGH FOUNDATIONS, ABOVE GRADE FLOORS, AND WALLS. FABRICATE SLEEVES OF SCHEDULE 40 BLACK STEEL PIPE OR TYPE "K" COPPER TUBING. SLEEVES FOR PIPING PASSING THROUGH ROOFS WILL BE SUPPLIED AND INSTALLED UNDER THIS DIVISION. MAKE SLEEVES LARGE ENOUGH TO PASS FULL THICKNESS OF PIPE COVERING WHERE SAME IS USED, AND WITH SUFFICIENT CLEARANCE BETWEEN PIPE AND SLEEVE TO ALLOW FOR ANY LATERAL MOVEMENT OF PIPING DUE TO

EXPANSION AND CONTRACTION. FILL SLEEVES FOR FUTURE USE WITH LIME MORTAR.

PROVIDE ESCUTCHEON PLATES ON BARE PIPING PASSING THROUGH FINISHED WALLS OR FLOORS.

PROVIDE DRAIN VALVES WITH HOSE THREAD OUTLET CONNECTION, OR VALVE WITH LONG NIPPLE ON OUTLET, AT ALL LOW POINTS OF EACH WATER SYSTEM, AND ABOVE ALL RISER OR BRANCH STOP VALVES, FOR PROPER DRAINAGE

VALVE TAGS AND INDEXES UPON COMPLETION OF WORK, FURNISH AND INSTALL 25 MM (1") DIA. BRASS TAG AT EACH VALVE BEARING AN INDEX NUMBER DESIGNATING VALVE. PROVIDE IN DUPLICATE. TYPEWRITTEN DIRECTORY MOUNTED IN GLAZED HARDWOOD

FRAME FOR EACH SYSTEM, GIVING THE VALVE INDEX NUMBER, SIZE, MAKE AND CATALOGUE NO. AND "SERVICE" OF EACH VALVE AND LOCATION OF VALVE. PIPE IDENTIFICATION LABEL PIPING INSTALLED UNDER THIS DIVISION TO INDICATE

CONTENT AND DIRECTION OF FLOW. INCLUDE OPERATING PRESSURE OR VACUUM, AS APPLICABLE. LOCATE LABELS AS FOLLOWS: AT EVERY END OF EVERY PIPE RUN. ADJACENT TO VALVE OR ITEM OF EQUIPMENT SERVICES. ON EACH EXPOSED PIPE PASSING THROUGH WALL. PARTITION OR FLOOR AT INTERVALS OF 15M (50'-0") ALONG EVERY EXPOSED PIPE RUN EXCEEDING 15M (50'-0") IN LENGTH. AT EVERY ACCESS POINT ON

CONCEALED PIPING. PROVIDE LABELS OF PLASTIC COATED TAPE, WITH SELF-ADHESIVE BACKING SURFACE. FOR INSTALLATION ON INSULATED PIPE, PROVIDE ADHESIVE SUITABLE FOR THIS APPLICATION. CONFORM WITH CAN/CGSB-24.3-92 FOR PRIMARY LABEL COLOUR, AND WITH LEGEND AND DIRECTION ARROWS IN BLACK. PRINT LEGEND IN FULL WHEREVER FEASIBLE, OR A RECOGNIZED ABBREVIATION OF SERVICE

5. PIPE HANGERS AND SUPPORTS

SUPPORT OR SUSPEND ALL PIPING WITH NECESSARY HANGERS, STRUCTURAL SUPPORTS AND/OR BRACKETS AS REQUIRED. TO PREVENT SAGGING. WARPING AND VIBRATION. DO NOT ALLOW LOADS, OF ANY NATURE, TO BE TRANSMITTED THROUGH PIPING CONNECTIONS TO FOUIPMENT.

PROVIDE SUITABLY DAMPENED SPRING HANGERS FOR FIRST THREE SUPPORTS FROM EQUIPMENT CONNECTION ON PIPING SUBJECT TO EXCESSIVE MOVEMENT. DO NOT HANG ANY PIPE, FROM ANOTHER PIPE, UNLESS SPECIFICALLY INDICATED ON DRAWINGS.

FOR ALL INSULATED PIPING UP TO NPS 4, CARRYING LIQUIDS AT TEMPERATURES 10.5°C (51°F) AND HIGHER, USE STANDARD WEIGHT CLEVIS HANGERS. PROVIDE INSULATION PROTECTION BEARING PLATES AT ALL HANGERS AND SUPPORTS FOR ALL INSULATED. FOR NON-INSULATED PIPING USE CLEVIS TYPE OF WROUGHT STEEL CONSTRUCTION. FOR COPPER TUBING PROVIDE COPPER COATED HANGERS. ATTACH HANGER RODS, TO BUILDING STRUCTURE, BY MEANS OF MALLEABLE IRON BEAM CLAMPS OR CONCRETE INSERTS

FOR HORIZONTAL RUNS OF PLUMBING AND DRAINAGE PIPING COMPLY WITH HANGER SPACING REQUIREMENTS OF OBC PART 7 (PLUMBING). FOR HORIZONTAL RUNS OF BLACK OR GALVANIZED STEEL PIPE, OTHER THAN FOR PLUMBING SERVICE, DO NOT EXCEED MAXIMUM DISTANCES BETWEEN SUPPORTS AND WITH MINIMUM DIAMETER RODS AS FOLLOWS 9mm (1/2") THROUGH 75mm (3"): 3.66m (12') SPACING, 12mm (1/2) ROD DIA. 100mm (4") THROUGH 200mm (8"): 5.8m (19') SPACING, 22mm (7/8") ROD DIA. FOR HORIZONTAL RUNS OF COPPER TUBING FOR SERVICES OTHER THAN PLUMBING, DO NOT EXCEED 1.8 M (6 FT.)

BETWEEN HANGERS. FOR HORIZONTAL RUNS OF PIPING FABRICATED OF PVC FOR SERVICES OTHER THAN PLUMBING, DO NOT EXCEED 1.22 M IN A HORIZONTAL RUN. PEX TUBING SHALL BE SUPPORTED AT INTERVALS NOT EXCEEDING 800 MM (32 IN), UNLESS OTHERWISE SPECIFIED BY THE MANUFACTURER.

VERTICAL PIPING SUPPORTS: SUPPORT VERTICAL PLUMBING AND DRAINAGE PIPING AS REQUIRED BY OBC PART 7 (PLUMBING), UNLESS MORE STRINGENT REQUIREMENTS ARE SPECIFIED HEREIN. SUPPORT CAST IRON SOIL PIPE AT EVERY FLOOR. FOR SUPPORTS AT INTERMEDIATE FLOORS, USE STEEL EXTENSION PIPE CLAMP, BOLTED SECURELY TO PIPE, REST ENDS OF CLAMP ON THE PIPE SLEEVE OR ON THE FLOOR. PROVIDE LATERAL STABILITY, OF VERTICAL PIPING, BY FABRICATED BRACKETS OR MALLEABLE IRON EXTENSION TYPE SPLIT HANGERS. RUN VERTICAL PIPING AT COLUMNS IN THE COLUMN WEBS, ON EITHER OR BOTH SIDES OF THE COLUMN, UNLESS OTHERWISE DIRECTED BY THE CONTRACT ADMINISTRATOR.

6. TESTING AND BALANCING

PRESSURE TESTS PROVIDE PRESSURE TESTS ON ALL PIPING INCLUDED IN THIS CONTRACT. FURNISH ALL PUMPS, COMPRESSORS, GAUGES AND CONNECTORS NECESSARY FOR TESTS. CONDUCT HYDROSTATIC TESTS FOR A MINIMUM PERIOD OF 2 HOURS. DURING THIS TIME THE PRESSURE SHALL REMAIN

CONSTANT FOR PNEUMATIC TESTS, FIRST PRESSURIZE SYSTEM WITH AIR TO APPROXIMATELY ONE-HALF SPECIFIED PRESSURE, BUT NOT TO EXCEED 345 KPA (50 PSIG), AND EXAMINE ALL JOINTS FOR LEAKS WITH A SOAPSUDS SOLUTION. REPAIR ANY LEAKS. CONDUCT FINAL TESTS ON NATURAL OR PROPANE GAS PIPING IN ACCORDANCE WITH REQUIREMENTS OF LOCAL LITILITY OR GOVERNING AUTHORITY

FORWARD COPIES OF ALL FINAL TESTS ON ALL PRESSURE

AND DRAINAGE PIPING TO CONTRACT ADMINISTRATOR. ASSUME RESPONSIBILITY FOR TESTING, BALANCING, AND PLACING ALL LIQUID SYSTEMS IN OPERATION. RETAIN INDEPENDENT BALANCING FIRM TO BALANCE WATER HANDLING SYSTEMS. ON COMPLETION OF TESTING AND BALANCING OF ALL SYSTEMS, SUBMIT TO CONTRACT ADMINISTRATOR A TYPEWRITTEN REPORT (3 COPIES) OF FINDINGS, INCLUDING COMPLETE DATA OF PUMP AND FAN PERFORMANCE, STATIC PRESSURES, WATER FLOW RATES, FINAL READINGS AT ALL OUTLETS, AND AMPERE READINGS OF ALL MOTORS, TAKEN AT MOTOR TERMINALS WHEN EQUIPMENT IS OPERATING UNDER FULL LOAD CONDITIONS. SUBMIT WITH EACH COPY OF REPORT, COMPLETE SETS OF

PIPING LAYOUT PRINTS NEATLY MARKED IN RED, SHOWING ALL LOCATIONS AT WHICH TEST READINGS WERE TAKEN. AND FLOW MEASUREMENT. SHOW DIFFERENTIAL PRESSURE ACROSS PUMPS. OBTAIN PIPING LAYOUT PRINTS FROM CONTRACT ADMINISTRATOR.

INSULATION SECTION 15250

DOMESTIC COLD WATER AND CITY WATER PIPING FIBROUS GLASS SPLIT SECTIONAL PIPE INSULATION CONFORMING TO CAN/CGSB-51.9-92 25 MM (1") THICKNESS WITH FACTORY APPLIED VAPOUR BARRIER JACKET AND SELF-SEAL LAP JOINT. FIRE RETARDANT ELASTOMERIC CLOSED CELL FOAM OR NEOPRENE TUBING OF 10 MM (3/8") NOMINAL THICKNESS MAY BE USED INSTEAD OF FIBROUS GLASS INSULATION ON COLD WATER RUNOUTS TO PLUMBING FIXTURES, NOT

EXCEEDING 1.5 M (5') IN LENGTH, HOT WATER HEATING PIPING FIBROUS GLASS SPLIT SECTIONAL PIPE INSULATION OF THE THICKNESS HEREINAFTER SPECIFIED WITH FACTORY APPLIED VAPOUR BARRIER JACKET AND SELF-SEAL LAP JOINT. 13mm (1/2") THROUGH 32mm (1-1/4") PIPE SIZE =38mm (1-1/2") THICKNESS. 38mm (1-1/2") AND LARGER PIPE SIZE = 50mm (2")

THICKNESS. 2. SURFACE FINISHES

EXPOSED INTERIOR PIPING FINISH EXPOSED INSULATED PIPING, VALVES AND FITTINGS WHERE SUBJECT TO POTENTIAL DAMAGE. WITH PVC JACKETING. PVC MUST HAVE ATTAINED 25/50 FIRE RATING. BASED ON CAN/ULC-S102-M88 TESTING. PIPING AT HIGH LEVEL AND NOT SUBJECT TO DAMAGE DOES NOT REQUIRE PVC JACKETING.

PLUMBING SECTION 15400

REFERENCES

THE SYSTEMS SHALL CONFORM TO ALL APPLICABLE CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING: CSA-B64.10-11: SELECTION AND INSTALLATION OF BACKFLOW PREVENTERS CSA-B149.1-15: NATURAL GAS AND PROPANE INSTALLATION

GENERAL PIPING & EQUIPMENT SECTION 15600

REFERENCES

THE SYSTEMS SHALL CONFORM TO ALL APPLICABLE CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING: CSA-B52-05: MECHANICAL REFRIGERATION CODE CSA-B214-12: INSTALLATION CODE FOR HYDRONIC HEATING SYSTEMS

2. SPECIALTIES

PRESSURE GAUGES

"Y" TYPE, CLASS 125 CAST IRON BODY STRAINER WITH REMOVABLE MONET SCREEN C/W CLEANOUT MAXIMUM PRESSURE DROP 6 KPA (0.9 PSIG).

THERMOMETERS

STEM TYPE THERMOMETERS: 230 MM (9") SCALE, ADJUSTABLE ANGLE TYPE. WITH RED APPEARING MERCURY LENS FRONT TUBE, AND CAST ALUMINUM CASE. DIAL TYPE THERMOMETERS: 114 MM (4-1/2") DIAL SIZE UNIVERSAL ANGLE TYPE, WITH LINEAR SCALE, BLACK CAST ALUMINUM CASE. CHROME PLATED RING, BRONZE BUSHED BRASS MOVEMENT WITH ADJUSTABLE POINTER. PROVIDE SENSING BULBS SUITABLE FOR MEDIUM BEING MEASURED. FURNISH BULBS IN AIR DUCTS WITH APPROVED MOUNTING FLANGE AND BULBS IN PIPING OR EQUIPMENT WITH STAINLESS STEEL SEPARABLE WELLS.

STANDARD GAUGES: CAST ALUMINUM CASE, AND BLACK FINISH, PHOSPHOR BRONZE BUSHED ROTARY TYPE MOVEMENT. BRONZE BOURDON TUBE, 114 MM (4-1/2") DIAL WITH COMBINED PSI AND KILOPASCAL SCALE. DIFFERENTIAL PRESSURE GAUGES: CAST ALUMINUM CASE AND BLACK FINISH, PHOSPHOR BRONZE BUSHED ROTARY MOVEMENT, BRONZE BOURDON TUBES, 114 MM (4-1/2)DIAL WITH COMBINED PSI AND KILOPASCAL SCALE.

AIR VENTS PROVIDE AUTOMATIC AIR VENTS, COMPLETE WITH DRIP TRAYS, AT HIGH POINTS OF WATER PIPING SYSTEMS AND ALSO IN ANY OTHER LOCATION NOTED ON DRAWINGS.

AIR SEPARATORS FURNISH AIR SEPARATORS IN WATER AND GLYCOL/WATER PIPING SYSTEMS OF SIZE AND CAPACITY INDICATED ON DRAWINGS

CHEMICAL POT (BYPASS) FEEDER CARBON STEEL WITH 19MM NPT CONNECTIONS POLYETHYLENE FUNNEL, MESH STRAINER. PROVIDE COMPLETE WITH WALL BRACKET.

SIDE STREAM FILTER PROVIDE COMPLETE WITH FILTER, SIGHT FLOW INDICATOR. BALL VALVE AND NIPPLES. 19MM NPT CONNECTIONS.

PRE-CHARGED VERTICAL STEEL EXPANSION TANK WITH INTEGRAL HEAVY DUTY BUTYL RUBBER DIAPHRAGM. DRAIN VALVES

PROVIDE 13 MM (1/2") BRASS SEDIMENT FAUCETS WITH HOSE THREAD OUTLETS AT LOW POINTS OF WATER AND COMPRESSED AIR PIPING SYSTEMS. BALANCING VALVES

FOR SIZES 50 MM (2") AND UNDER . USE VALVE WITH ADJUSTABLE HIDDEN MEMORY FOR TAMPER PROOF BALANCING, CAST COPPER ALLOY BODY COMPLETE EPOXY RESIN COATING, SELF SEALING TEST POINTS FOR PRESSURE, TEMPERATURE SENSING PROBES, PROTECTIVE CAP AND END CONNECTIONS TO SUIT PIPING SYSTEM. FOR SIZES 65 MM (21/2") AND OVER, VALVE WITH ADJUSTABLE HIDDEN MEMORY FOR TAMPER PROOF BALANCING, CAST COPPER ALLOY BODY COMPLETE EPOXY RESIN COATING, SELF SEALING TEST POINTS FOR PRESSURE, TEMPERATURE SENSING PROBES, PROTECTIVE CAP AND END CONNECTIONS TO SUIT PIPING SYSTEM.

FLEXIBLE PIPING CONNECTIONS FURNISH FLEXIBLE METAL HOSES ON PIPING CONNECTIONS TO HEATING AND COOLING COILS, ON SUCTION AND DISCHARGE CONNECTIONS TO PUMPS, AND IN PIPING SYSTEMS WHERE INDICATED ON DRAWINGS.

3. SNOW MELT SYSTEM

EXPANSION TANK

FURNISH AND INSTALL, IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE TUBING MANUFACTURER, A HYDRONIC SNOW MELT DISTRIBUTION SYSTEM AS INDICATED IN DRAWINGS. SYSTEM SHALL BE COMPLETE AND SHALL INCLUDE SYSTEM

DESIGN, TUBES, TUBE BEND SUPPORTS, TUBE TIE- WIRES, HEAT EMISSION SHEETS (IF REQUIRED), VALVES, FITTINGS, MANIFOLDS, MANIFOLD SUPPORTS, TELESTATS (VALVE ACTUATORS), TEMPERATURE SENSORS, 115/24V AC (ULC APPROVED) TRANSFORMER, ALL REQUIRED CONTROLS, AND EQUIPMENT CABINETS. TUBE SHALL BE WARRANTED FOR 25

DESIGN - THE HYDRONIC SNOW MELT SYSTEM IS TO BE DESIGNED IN ACCORDANCE WITH REQUIREMENTS INDICATED ON DRAWINGS.

SUBMITTALS SHOP DRAWINGS - ARE TO BE COMPLETE WITH SYSTEM LAYOUT, SCHEMATIC, CONTROLS, DESCRIPTIONS OF MATERIALS, DETAILS AND INSTALLATIONS SHALL BE SUBMITTED FOR APPROVAL.

ALL COMPONENTS - OF SYSTEM SHALL BE PROVIDED BY ONE MANUFACTURER INCLUDING TUBING, TUBING FITTINGS, MANIFOLDS, MANIFOLD SUPPORT BRACKETS, WIRE TIES, TUBING AND BEND SUPPORTS.

4. TESTING OF PIPING

TEST PIPING IN CONTRACT ADMINISTRATOR'S PRESENCE, IN ACCORDANCE WITH TESTING REQUIREMENTS SPECIFIED IN SECTION 15010, GENERAL MECHANICAL REQUIREMENTS.

CONDENSATE HYDROSTATICALLY TEST CONDENSATE PIPING AT 1-1/2 TIMES OPERATING PRESSURE BUT IN NO CASE LESS THAN

862 KPA (125 PSIG). HYDROSTATICALLY TEST WATER PIPING AT 862 KPA (125

PSIG) PRESSURE. NATURAL GAS

CONDUCT FINAL TESTS ON NATURAL GAS PIPING IN ACCORDANCE WITH THE PROVINCIAL GAS UTILIZATION CODE AND WITH REQUIREMENTS OF LOCAL GAS COMPANY OR GOVERNING AUTHORITY

CLEANING OF PIPING

MECHANICAL SUBCONTRACTOR TO CLEAN ALL NEW HOT WATER PIPING.

FLUSH SYSTEMS TO REMOVE LOOSE DIRT AND HYDROSTATICALLY TEST TO DETECT EXCESSIVE WATER

ADD CHEM-AQUA 61501 INDUSTRIAL CLEANER, OR EQUAL. MIX CONCENTRATION IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND CIRCULATE FOR 24 TO 72 HOURS AT TEMPERATURE BETWEEN 21-60°C.

DRAIN SYSTEMS, REFILL WITH FRESH WATER AND CIRCULATE FOR MINIMUM OF 4 HOURS TO FLUSH OUT REMAINING CHEMICAL SOLUTION.

REFILL HOT WATER SYSTEMS WITH CLEAN GLYCOL/WATER MIXTURE AND TOP OFF WATER TREATMENT LOOP. INCLUDE SUPPLIER OF WATER TREATMENT SYSTEMS SUPERVISION AND ASSISTANCE DURING INSTALLATION FOR

CLEAN OUT AND STARTUP PROCEDURES. PROVIDE WRITTEN

EQUIPMENT

REPORT TO CONTRACT ADMINISTRATOR.

VERTICAL INLINE VERTICAL IN-LINE CENTRIFUGAL PUMPS DESIGNED FOR MINIMUM (1034 KPA) 150 PSIG WORKING PRESSURE. USE RADIALLY SPLIT CASING DESIGN WITH CAST IRON CASINGS AND ALL BRONZE IMPELLERS. PROVIDE SUCTION GUIDE AND COMBINATION SHUTOFF, BALANCING AND CHECK VALVE WITH EACH PUMP. SEE EQUIPMENT SCHEDULE FOR SERIES, CAPACITIES AND DETAILS PROVIDE PUMPS WITH MECHANICAL SEALS AND STAINLESS STEEL SHAFT SLEEVES. PROVIDE PUMPS COMPLETE WITH ALL NECESSARY AUXILIARY SEAL PIPING.

PROVIDE SUCTION GUIDE, POT TYPE ELBOW STRAINER SIZED TO MATCH PUMP INLET FLANGE. USE CAST IRON BODY, STEEL GUIDE VANES. STRAINER OF 3 MM (1/8") STAINLESS STEEL MESH, PLUS A FINE MESH BRASS STARTUP

SUPPORT PUMP FROM STRUCTURE INDEPENDENT OF PIPING, OR FROM FLOOR WITH PIPE LEG SUPPORT WITH STEEL SADDLE AT TOP AND STANDARD IPS FLOOR FLANGE. STARTERS AND POWER WIRING TO PUMP MOTORS FROM STARTERS BY DIVISION 16.

IN-LINE, CLOSE-COUPLED, SINGLE STAGE, CENTRIFUGAL PUMPS DESIGNED FOR INSTALLATION IN A VERTICAL OR HORIZONTAL POSITION, OPERATING TO 175 PSIG MAXIMUM WORKING PRESSURE AND 225°F (107°C) MAXIMUM OPERATING TEMPERATURE PUMP VOLUTE SHALL BE CAST IRON AND IMPELLER SHALL BE BRONZE/BRASS.

STARTERS AND ELECTRICAL WIRING BY DIVISION 16.

BOILERS : CONDENSING CSA LISTED MODULATING NATURAL GAS BOILERS WITH 10:1 BURNER TURNDOWN AND HEATING OUTPUTS AS LISTED IN SCHEDULE. BOILERS SHALL HAVE A CORROSION RESISTANT HEAT EXCHANGER SUITABLE FOR FULL CONDENSING OPERATION AND ASME RATED UP TO 160 PSIG. BOILERS SHALL COME COMPLETE WITH TOUCH SCREEN CONTROLLER AND INCORPORATE THE FOLLOWING FUNCTIONALITY: PASSWORD SUPPORT, OUTDOOR RESET. PUMP DELAY WITH FREEZE PROTECTION, DHW PRIORITIZATION (FOR FUTURE USE), LEAD/LAG SCHEDULING, DATA LOGGING, NIGHT SETBACK, AND ABLE TO CONTROL 1 SYSTEM PUMP, 2 BOILER PUMPS, 1 DHW PUMP. BOILER SHALL BE CATEGORY IV DIRECT VENT SUITABLE FOR USE WITH CPVC VENTING. BOILER SHALL SHIP COMPLETE WITH THE FOLLOWING: HIGH LIMIT WITH MANUAL RESET, LOW WATER CUT OFF WITH

MANUAL RESET, INLET/OUTLET TEMP SENSORS, T&P GAUGE,

VOLTAGE 120V/1/60 SECTION 15700

CONTROLS SECTION 15900

ELECTRICAL CODE.

RELIEF VALVE.

GENERAL

ELECTRICAL PROVIDE POWER BOTH HIGH >120V AND LOW <120 VOLTAGE REQUIRED FOR THIS SECTION. ELECTRICAL INTERLOCK WIRING OF EQUIPMENT SPECIFIED UNDER OTHER SECTIONS OF THIS DIVISION IS THE RESPONSIBILITY OF TRADE SECTION INSTALLING THAT EQUIPMENT, UNLESS INDICATED OTHERWISE. SUPPLY AND INSTALL OF ELECTRICAL WIRING INCLUDING RACEWAYS FOR COMPONENTS FURNISHED UNDER THIS SECTION. INSTALL WIRING IN ACCORDANCE WITH GOVERNING

SYSTEM DESCRIPTION SUPPLY AND INSTALL JOHNSON CONTROLS DIRECT DIGITAL CONTROLLERS COMPLETE WITH SENSORS, ELECTRICAL CONTROL WIRING, AND GATEWAY TO CONNECT TO EXISTING DIRECT DIGITAL CONTROL SYSTEM RESULTING IN A COMPLETE AND OPERATING CONTROL SYSTEM CAPABLE OF PROVIDING FUNCTIONS SPECIFIED AND PERFORMING ASPECTS OF SEQUENCE OF OPERATIONS. INSTALL AND COORDINATE CONTROLS SUPPLIED WITH

EQUIPMENT UNLESS NOTED OTHERWISE QUALIFICATIONS MINIMUM OF 5 YEARS EXPERIENCE INSTALLING SIMILAR SYSTEMS INVOLVING COMPUTER BASED CONTROL SYSTEMS AND BE LICENSED REPRESENTATIVE, AFFILIATE, OR OPERATING DIVISION OF CONTROLS MANUFACTURER. WHOLESALERS OR FRANCHISED DEALER/REPRESENTATIVES

ARE TRAINED AND CERTIFIED AS QUALIFIED BY CONTROLS MANUFACTURER UPON COMPLETION OF INSTALLATION, VERIFY BY TEST AND WRITTEN REPORT, THAT SYSTEM IS FULLY FUNCTIONAL, INSTALLED IN ACCORDANCE WITH PLANS AND SPECIFICATIONS, AND CALIBRATED WITHIN OPERATIONAL LIMITS SPECIFIED.

ARE NOT ACCEPTABLE. USE INSTALLATION PERSONNEL THAT

WARRANTY PROVIDE LABOUR, MATERIAL AND EQUIPMENT NECESSARY TO MAINTAIN BENEFICIAL PERFORMANCE OF ENTIRE BUILDING AUTOMATION SYSTEM FOR PERIOD OF 2 YEARS AFTER ACCEPTANCE OF SYSTEM, OR PARTS THEREOF,

SEQUENCE OF OPERATIONS PROVIDE NECESSARY CONTROL DEVICES AND APPLICATION SOFTWARE TO CARRY OUT DESCRIBED SEQUENCES OF OPERATION. SEE DRAWINGS FOR REQUIRED SEQUENCE OF OPERATIONS

2. SUBMITTALS

AND MOUNTING METHOD.

SHOP DRAWINGS PREPARE AND SUBMIT SHOP DRAWINGS FOR EQUIPMENT AND SYSTEMS COVERED BY THIS SECTION. AS MINIMUM

INCLUDE FOLLOWING: COMPLETE CATALOGUE DATA AND INSTALLATION INSTRUCTIONS FOR EACH CONTROL COMPONENT. GENERAL SYSTEM ARCHITECTURE SCHEMATICS AND RISER DIAGRAMS. SCHEDULE OF CONTROL PANELS SHOWING SIZE, LOCATION

SCHEMATIC DIAGRAMS ILLUSTRATING IN LADDER FORM (NOT LADDER LOGIC) CORRECT INTERFACE WIRING FOR CONTROLLED SYSTEMS. DESCRIPTIVE POINT LIST, DEFINING EVERY POINT WITHIN SYSTEM, INCLUDING PSEUDO OR CALCULATED POINTS. SEQUENCE OF OPERATION DIAGRAMS AND DESCRIPTIVE PROSE, WITH FULLY ANNOTATED ENGLISH LANGUAGE FLOW

CHARTS. DETAILED SOFTWARE DESCRIPTION OF CONTROL AND MONITORING ROUTINES FURNISHED WITH SYSTEM. PROJECT TEST PLAN, INDICATING HOW SYSTEM WILL BE TESTED AND FOUND TO BE OPERATING IN ACCORDANCE WITH PLANS AND SPECIFICATION.

AS-BUILT SHOP DRAWINGS PROVIDE COMPLETE AND APPROVED AS-BUILT SHOP DRAWINGS DETAILING EQUIPMENT, INSTALLATION DETAILS

TRAINING

GENERAL

PROVIDE THE CITY'S SYSTEM OPERATORS COMPLETE INSTRUCTIONS FOR PROPER CONTROL OF SYSTEM UNDER MODES OF OPERATION INCLUDING BUT NOT LIMITED TO SUMMER/WINTER, OCCUPIED/UNOCCUPIED, ENERGY MANAGEMENT AND ALARM EVENT SEQUENCES. CONDUCT INSTRUCTIONS DURING NORMAL WORKING HOURS. MONDAY THROUGH FRIDAY AT SITE, PROVIDE 16 HOURS OF ON-SITE TRAINING CONSISTING OF BOTH CLASSROOM AND HANDS-ON TRAINING.

ADDRESS FOLLOWING OPERATOR FUNCTIONS:

SENSOR/ACTUATOR OPERATION. SYSTEM ARCHITECTURE AND BASIC THEORY OF OPERATION. OPERATOR LEVEL (PASSWORD LEVEL 1) INTERFACE TO SYSTEM FOR PASSWORD ACCESS, ALARM HANDLING, POINT ADDRESSING, MANUAL COMMANDS AND DISPLAY OF STATISTICAL DATA.

PROGRAM LEVEL (PASSWORD LEVEL 2) OPERATION FOR COMMAND CONTROL AND DEFINITION OF ENERGY MANAGEMENT PARAMETERS CONFIGURATION LEVEL (PASSWORD LEVEL 3) FOR DATABASE ENTRY AND MODIFICATION. USER INTERFACE

SUPERVISORY COMPUTER AND OTHER PERIPHERALS OPERATION

EQUIPMENT

IDENTIFICATION OF EQUIPMENT IDENTIFY EACH PIECE OF EQUIPMENT WITH NAMEPLATE IDENTIFYING EQUIPMENT AND FUNCTIONS WITH LETTER AND NUMBER DESIGNATION. USE LAMINATED PLASTIC NAMEPLATES OF AT LEAST 75 X $25 \times 3 \text{ MM}$ (3" $\times 1$ " $\times 1/8$ ") WITH BLACK FACE AND WHITE CENTRE AND 6 MM (1/4") HIGH ENGRAVED

MOUNT RELAYS, TRANSDUCERS, GAUGES AND SIMILAR DEVICES IN CONTROL PANELS

LETTERING. SECURELY ATTACH TO EQUIPMENT.

AUTOMATIC CONTROL VALVES CHARACTERISTICS OF CONTROL VALVES SHALL BE SUITED TO REQUIRED APPLICATION.

PERMISSIBLE PRESSURE DROPS: HOT WATER CONVECTORS - 1 PSIG. VALVE TYPE: VALVES 1-1/2 THROUGH 2": SCREWED BODIES.

VALVES 1/2" THROUGH 1-1/4" MAY HAVE FEMALE NPT

VALVES 2-1/2" AND LARGER: FLANGED BODIES.

SIZE VALVES FOR FLOWS IN ACCORDANCE WITH FOLLOWING

PROVIDE THE FOLLOWING EQUIPMENT: TEMPERATURE SENSORS CURRENT SENSING RELAYS WATER FLOW METERS RELAYS

INLET AND MALE NPT UNION OUTLET.

PIPING STANDARDS

SNOW/ICE/RAIN SENSORS

1. HEATING WATER PIPING

BURIED (IN-FLOOR HEATING LOOP PIPING) AND ABOVE FLOOR HEATING PIPING PEX-A TUBING WITH O2 BARRIER RATED FOR IN-FLOOR HEATING APPLICATIONS, CHEMICALLY STABILIZED TO UV EXPOSURE. 100 PSI PRESSURE RATING AT 180°F AND 25 YEAR MANUFACTURER WARRANTED FOR CONSEQUENTIAL DAMAGES. TUBING, FITTINGS AND STABLIZING RING TO BE SUPPLIED BY ONE MANUFACTURER AND SYSTEM TO BE CERTIFIED AS ONE SYSTEM BY CSA TO ASTM F876, ASTM F877, ASTM F1960 AND CAN/CSA B137.5.

ABOVE FLOOR PIPING 50mm (2") AND SMALLER TYPE "L" HARD DRAWN COPPER TUBING CONFORMING TO ASTM B 88-99. TYPE "L" SOFT ANNEALED COPPER TUBING MAY BE USED WITHIN CONVECTOR ENCLOSURES. FITTINGS: WROUGHT COPPER SOLDER JOINT PRESSURE TYPE. WITH IPS TO COPPER ADAPTERS AT SCREWED CONNECTIONS.

SCHEDULE 40, CONTINUOUS WELD OR ELECTRIC RESISTANCE WELDED BLACK CARBON STEEL CONFORMING TO ASTM A 53/A53M-99B GRADE B WITH THREADED ENDS (PLAIN

FITTINGS:CLASS 150 BLACK MALLEABLE IRON SCREWED FITTINGS CONFORMING TO ASTM A 197/A197M-98 AND ASME B16.3-1998.OR CLASS 2000 FORGED STEEL SOCKET WELDING TYPE, CONFORMING TO ASTM A 105/A105M-98 GRADE 2 AND ASME B16.11-1996. PLUGS: CLASS 3000 SCREWED, SQUARE HEAD, MACHINED FROM SOLID STEEL OR FORGING TO ASTM A 105/A105M-98 GRADE 2.

ABOVE FLOOR PIPING, 63mm (2-1/2") AND LARGER SCHEDULE 40 CONTINUOUS WELD OR ELECTRIC RESISTANCE WELDED BLACK CARBON STEEL CONFORMING TO ASTM A 53/A53M-99B GRADE B, WITH BEVELED ENDS. FITTINGS:SCHEDULE 40 SEAMLESS CARBON STEEL BUTT WELDING FITTINGS CONFORMING TO ASTM A 234/A234M-99

FLANGES:

CLASS 150 FORGED STEEL SLIP-ON OR WELDNECK RAISED FACE TYPE CONFORMING TO ASTM A 181/A181M-95B GRADE 1 AND ASME B16.5-1996.

WPB AND ASME B16.9-1993.

1.6 MM (1/16") GARLOCK 3200 WITH SBR BINDER OR EQUIVALENT ASBESTOS-FREE MATERIAL MANUFACTURED BY

SEMI-FINISHED HEX HEAD MACHINE BOLTS AND SEMI-FINISHED HEX NUTS, BOTH OF CARBON STEEL CONFORMING TO ASTM A 307-97 CLASS A.

PIPE: SCHEDULE 40 SEAMLESS OR ELECTRIC RESISTANCE

WELDED BLACK CARBON STEEL PIPE CONFORMING TO ASTM A 53/A53M-99B GRADE B WITH GROOVED ENDS CONFORMING TO CSA B242-M1980 (R1998). FITTINGS: MALLEABLE IRON CONFORMING TO ASTM A 47/A47M-99 GRADE 32510 OR 35018, WITH GROOVED ENDS CONFORMING TO CSA B242-M1980 (R1998).

CAST SEGMENTED MALLEABLE IRON CONFORMING TO ASTM A

47/A47M-99 GRADE 32510 OR 35018, GROOVED

MECHANICAL TYPE, CONFORMING TO CSA B242-M1980

(R1998), WITH OVAL TRACK-HEAD BOLTS AND HEAVY HEX

NUTS CONFORMING TO ASTM A 183-98 AND SYNTHETIC

RUBBER GASKETS CONFORMING TO ASTM D2000, AND SUITABLE FOR SERVICE.

HINGED, TWO PIECE, SHOULDERED OR KEYED CAST MALLEABLE IRON CONFORMING TO ASTM A 47/A47M-99 GRADE 32510 WITH ELASTOMERIC GASKET SUITABLE FOR SERVICE, AND LOCK BOLT.

FLANGE BOLTING

SEMI-FINISHED HEX HEAD MACHINE BOLTS AND HEX NUTS CONFORMING TO ASTM A 307-97 CLASS A.

2. NATURAL GAS PIPING

PIPING 50mm (2") AND SMALLER ABOVE FLOOR PIPING (EXPOSED)

SCHEDULE 40 ERW OR CW BLACK CARBON STEEL PIPE CONFORMING TO ASTM A 53/A53M-99B GRADE B, WITH THREADED ENDS. FITTINGS:CLASS 150 BLACK MALLEABLE IRON SCREWED FITTINGS CONFORMING TO ASTM A 197/A197M-98 AND ASME B16.3-1998.

FLANGE BOLTS HEX. HEAD MACHINE BOLTS WITH HEXAGON NUTS. BOTH

OF SEMI-FINISHED CARBON STEEL CONFORMING TO ASTM A 307-97 CLASS A. GASKETS

ASBESTOS-FREE MATERIAL MANUFACTURED BY ANCHOR.

OF 1.6 MM (1/16") THICKNESS, OR EQUIVALENT

GARLOCK NO. 3000 WITH NITRILE BINDER FLAT RING TYPE

3. FLUE GAS VENT PIPING (DIRECT VENTS)

MATERIAL TYPE AND/OR TEMPERATURE RATING SHALL BE INCLUDED IN THE PIPE PRINT LINE AS WELL AS ON THE MANDATORY ORANGE AND BLACK WARNING LABEL APPLIED TO EACH FITTING. WARNING LABELS SHALL BE INCLUDED ON PIPE AND FITTINGS, AS REQUIRED BY ULC S636 AND CLEARLY DISTINGUISH A CERTIFIED GAS VENTING SYSTEM FROM EVERY DAY, NON-CERTIFIED PLUMBING PIPE. DO NOT MIX PIPE. FITTINGS. SOLVENTS, OR JOINING METHODS FROM DIFFERENT BH VENT MANUFACTURERS: EXCHANGING COMPONENTS FROM VARIOUS MANUFACTURERS VIOLATES THE CONDITIONS OF CERTIFICATION IN THE ULC S636 STANDARD AND VOIDS THE PRODUCT WARRANTY.

SYSTEM S636 PVC VENT PIPING AND FITINGS, AS MANUFACTURED BY IPEX, SHALL CARRY A ULC S636 CLASS IIA CERTIFICATION AND ARE CERTIFIED FOR USE UP TO AND INCLUDING 65°C (149°F). PROPER SYSTEM 636 PVC CEMENT AND PRIMER IS TO BE USED FOR INSTALLATION.

MANUFACTURED BY IPEX. SHALL CARRY A ULC S636 CLASS

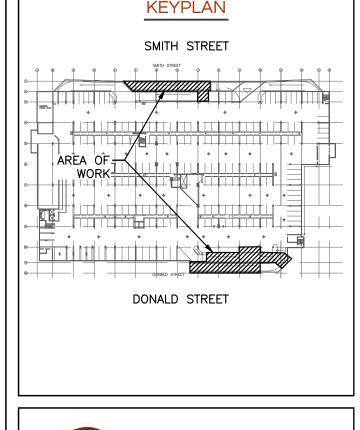
INCLUDING 90°C (194°F). PROPER SYSTEM 636 CPVC

SYSTEM S636 CPVC VENT PIPING AND FITINGS, AS

IIB CERTIFICATION AND ARE CERTIFIED FOR USE UP TO AND WINNIPEG CEMENT AND PRIMER IS TO BE USED FOR INSTALLATION. Toll Free 1-866-919-4531

We Make Buildings Work 1385 North Routledge Park, Unit 9 London, ON N6H 5N5

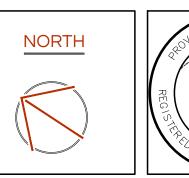
P 519.472.7640 **E** info@callidus.ca





CLIENT-CENTRIC. CHALLENGE DRIVEN

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RAS

PROJECT

MILLENNIUM LIBRARY

SNOW MELT DESIGN

DRAWN

REVIEWED

18.04.06

MEMBER

37420

SGH

ADDRESS

251 DONALD STREET WINNIPEG MANITOBA

PROJECT NO.

CE-3749

DRAWING TITLE

MECHANICAL

SPECIFICATION

DRAWING NUMBER