

PART 1 - GENERAL

- 1. IN GENERAL, THE SCOPE OF WORK INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:
1. HVAC - SUPPLY AND INSTALL SYSTEMS AS SHOWN COMPLETE WITH ALL NECESSARY FITTINGS AND ACCESSORIES REQUIRED FOR COMPLETE AND OPERATIONAL SYSTEMS.
2. HRV-1 REFRIGERANT COOLING SYSTEM - THE DIRECT EXPANSION SPLIT SYSTEMS ON THIS PROJECT INCLUDES WALL MOUNT EVAPORATORS PIPED TO AN AIR COOLED OUTDOOR CONDENSER EQUIPPED WITH VARIABLE SPEED COMPRESSOR.
3. PLUMBING - SUPPLY AND INSTALL SYSTEMS AS SHOWN COMPLETE WITH ALL NECESSARY FITTINGS AND ACCESSORIES REQUIRED FOR COMPLETE AND OPERATIONAL SYSTEMS.
4. CONTROLS - SUPPLY AND INSTALL ALL NECESSARY CONTROL WIRING, RELAYS, CALIBRATION AND COMPONENTS DESCRIBED HEREIN AND AS REQUIRED TO MAKE THE HVAC SYSTEMS FULLY OPERATIONAL. NO DDC SYSTEM WILL BE UTILIZED.
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL LOCAL AND PROVINCIAL BY-LAWS, THE LATEST EDITIONS OF THE NATIONAL BUILDING CODE OF CANADA, SMACNA STANDARD AND TO THE REQUIREMENTS OF THE AUTHORITIES HAVING JURISDICTION.
3. THIS CONTRACTOR SHALL GIVE ALL NOTICES, OBTAIN ALL PERMITS AND PAY ALL FEES IN ORDER THAT THE WORK HEREIN MAY BE CARRIED OUT.
4. ALL LABOUR, MATERIALS AND WORKSMANSHIP SHALL BE WARRANTED FOR A PERIOD OF ONE (1) YEAR AFTER THE DATE OF ACCEPTED SUBSTANTIAL COMPLETION OF THE WORK.
5. CUTTING AND PATCHING IS TO BE THE RESPONSIBILITY OF THIS CONTRACTOR. SURFACES AFFECTED BY THIS WORK ARE TO BE RESTORED TO THEIR ORIGINAL CONDITIONS.
6. SUBMIT SHOP DRAWINGS FOR ALL EQUIPMENT.
7. PROVIDE OPERATION AND MAINTENANCE MANUALS WITH OPERATIONAL, MAINTENANCE AND PERFORMANCE DATA FOR ALL EQUIPMENT.
8. CONNECTIONS INTO EXISTING SYSTEMS TO BE MADE AT A DATE AND TIME APPROVED BY OWNER, MAKE REQUEST FOR CONNECTION DATE AND TIME IN WRITING.
9. SUBMIT ONE COPY OF FIELD RED-LINED RECORD DRAWINGS TO OWNER FOR REVIEW. MAKE CORRECTIONS AS NOTED AND INCLUDE IN OPERATION AND MAINTENANCE MANUALS.
10. WHERE PRODUCTS ARE LISTED AS "STANDARD OF ACCEPTANCE" THE CONTRACTOR MAY USE ANY PRODUCT OF EQUAL OR SUPERIOR CHARACTERISTICS. THE ACCEPTABILITY OF A PRODUCT WILL ULTIMATELY BE DETERMINED AT THE SHOP DRAWING STAGE.
11. ONLY TRADE CONTRACTORS COMPETENT IN THE INSTALLATION OF BLACK IRON HEATING LINES WILL BE CONSIDERED QUALIFIED FOR THIS WORK.
12. COORDINATE ALL PIPE ROUTING WITH ELECTRICAL. NON-COORDINATED WORK MAY REQUIRED ADJUSTMENT AT CONTRACTOR'S EXPENSE.

PART 2 - PRODUCTS

- 1. HVAC DUCT WORK
1. ALL AIR SYSTEM DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED STEEL, WITH APPROPRIATE REINFORCING, IN ACCORDANCE WITH THE APPROPRIATE SMACNA PRESSURE CLASSIFICATION. RADIIUS REINFORCEMENT AT LEAST TWICE THE DUCT DIAMETER SHALL BE USED WHERE SPACIAL PERMITS. ALL DUCTWORK SHALL BE SEALED WITH LOW PRESSURE DUCT SEALER AND FIBERGLASS CLOTH, APPLIED IN TWO COATS.
2. DUCT ACCESSORIES
1. BALANCING DAMPERS: TO SMACNA.
2. TURNING VANES: TO SMACNA.
3. FLEXIBLE CONNECTIONS: LOCATION ON INTAKE AND DISCHARGE OF ALL VENTILATION EQUIPMENT 1/16 INCH THICK GALVANIZED SHEET METAL FRAME WITH FABRIC CLENCHED BY MEANS OF DOUBLE LOCKED SEAMS. FABRIC TO BE NEOPRENE COATED GLASS, FIRE RESISTANT, SELF EXTINGUISHING, TEMPERATURE RATED AT -22 DEG F TO 245 DEG F, WEIGHT OF 0.25 LBS/SQ FT.
4. ACCESS DOORS: NON-INSULATED DUCTS SANDWICH CONSTRUCTION OF SAME MATERIAL AS DUCT, ONE SHEET METAL THICKNESS HEAVIER, COMPLETE WITH SHEET METAL ANGLE FRAME. INSULATED DUCTS - SANDWICH CONSTRUCTION OF SAME MATERIAL AS DUCT, ONE SHEET METAL THICKNESS HEAVIER, COMPLETE WITH SHEET METAL ANGLE FRAME AND 1 IN. THICK RIGID GLASS FIBRE INSULATION. GASKETS: NEOPRENE OR FOAM RUBBER. HARDWARE: UP TO 12 IN X 12 IN; 2 SASH LOCKS, 12 IN. TO 18 IN.; 4 SASH LOCKS, 18 IN. TO 40 IN.; PIANO HINGE AND MINIMUM 2 SASH LOCKS. DOORS OVER 4 IN.; PIANO HINGE AND 2 HANDLES OPERABLE FROM BOTH SIDES.
5. INSTRUMENT TEST PORTS: PLASTIC FITTINGS PLUGS TO HOLES TO MAINTAIN DUCT LEAKAGE CLASSIFICATION.
6. BALANCE DAMPERS: SINGLE BLADE - V-GROOVED STIFFENED ONE SHEET METAL GAUGE HEAVIER THAN DUCT, MAX 10 IN. MULTIPLE BLADE - FACTORY MANUFACTURER OF MATERIAL COMPATIBLE TO DUCTWORK, OPPOSED BLADE CONFIGURATION WITH LOCKING QUADRANT
7. FIRE DAMPERS: FD, ARRANGEMENT TYPE B OR C, LISTED AND BEAR LABEL OF ULC AND ANSIPFPA 90A. FIRE DAMPER ASSEMBLIES TO BE FIRE TESTED IN ACCORDANCE WITH CAN4 S112. FACTORY FABRICATED FOR FIRE RATING REQUIREMENT TO MAINTAIN INTEGRITY OF FIRE WALL AND/OR FIRE SEPARATION. CONSTRUCTION: MILD STEEL TOP HINGED; INTERNAL BLADE TYPE; SIZED TO MAINTAIN FULL DOT CROSS SECTION. FUSIBLE LINK ACTUATED, WEIGHTED TO CLOSE AND LOCK IN CLOSED POSITION WHEN RELEASED OR HAVING NEGATOR SPRING CLOSING OPERATOR FOR MULT LEAF TYPE OR ROLL DOOR TYPE IN HORIZONTAL POSITION WITH VERTICAL AIR FLOW; 40 X 40 X 3 MM RETAINING ANGLE IRON FRAME, ON FULL PERIMETER OF FIRE DAMPER, ON BOTH SIDES OF FIRE SEPARATION BEING PIERCED. ACCEPTABLE MATERIAL, CONTROLLED AIR, MAXAM, NALOR, E.H. PRICE, RUSKIN.
3. ENERGY RECOVERY VENTILATOR (ERV-1):
1. HEAT TRANSFER CORE TO BE FIXED PLATE, RESIN MEDIA, ENTHALPHY HEAT EXCHANGER CORE FOR SENSIBLE AND LATENT HEAT RECOVERY. INTAKE FILTERS FOR FRESH RETURN AIR TO BE MERV 8 STYLE WASHABLE FILTERS, 150 DIA TOP STYLE CONNECTIONS TO UNIT. HINGED INSULATED PANELS FOR ACCESS TO FILTERS, HEAT RECOVERY CORE AND BLOWERS. ECM DRIVE MOTORS, 120V / 1 PH / 60 HZ 135 WATT TOTAL FOR ELECTRONIC BALANCING. UNIT TO BE SUPPLIED WITH TOUCH WALL CONTROL. PROVIDE EXTERNAL SPRING INSULATORS FOR CEILING HUNG INSTALLATION. UNIT TO CARRY A 10 YEAR FACTORY WARRANTY ON ENERGY RECOVERY CORE AND 5 YEAR FACTORY WARRANTY ON REMAINDER OF PARTS. SUPPLY WITH ONE SPARE SETS OF FILTERS. SUPPLY WITH NEW 200 DIA WALL CAPS. EXHAUST AIR WALL CAP 45 DEGREE, ALUMINUM WITH BRIDSCREEN AND BACKDRIFT DAMPER; GREENHECK MODEL WC-8 OR EQUIVALENT, INTAKE AIR WALL CAP, 90 DEGREE, ALUMINUM WITH BRIDSCREEN, GREENHECK MODEL WTHD-8-90 OR EQUIVALENT.
2. PERFORMANCE: 115 L/S SA, 115 L/S EA, 65% SENSIBLE RECOVERY EFFICIENCY AT -25C, SA ESP 100 PA, EA ESP 100 PA.
3. STANDARD OF ACCEPTANCE: VENMAR AVS X30ERV ECM.
4. FANS
1. EXHAUST FANS (EF-1 TO EF-5): CABINET CEILING TYPE, 6" ROUND DISCHARGE CONNECTOR, ALUMINUM GRILLE WITH WHITE FINISH. ALUMINUM CONSTRUCTION HOODED WALL CAP WITH BRIDSCREEN AND DAMPER. CAPACITY OF 35 L/S AT 125 PA STATIC PRESSURE, 1.14 AMPS /115V/1 PH/60 HZ, 2.0 SONES MAXIMUM, 3 HR UL RATED CEILING RADIATION DAMPER, STANDARD OF ACCEPTANCE: FAN, GREENHECK SP-B110; WALL CAP, GREENHECK WC-6.
5. GRILLES AND DIFFUSERS
1. SUPPLY AND RETURN AIR GRILLES: TYPE 1, 14 GA STEEL, SQUARE, LATTICE FACE TYPE WITH MOUNTING FRAME TO SUIT CEILING OR WALL TYPE. FINISH: OFF-WHITE BAKED ENAMEL. MANUFACTURE SHEET METAL PLENUM TO CONNECT DUCT TO GRILLE. SIZE 300 X 300 MM PROVIDE WITH FIRE DAMPER.
2. STANDARD OF ACCEPTANCE: E.H. PRICE 80-FR
6. DUCT HEATERS (DH-1)
1. ELECTRIC DUCT REHEAT COIL COMPLETE WITH TERMINAL BLOCKS FOR POWER AND CONTROL WIRING. AIR PROTECTING SWITCH AND OVERCURRENT PROTECTION. ELECTRICAL 208 V / 1 PH / 60 HZ. DUCT HEATER TO BE STAND ALONE CONTROL AND TO BE COMPLETE WITH DUCT THERMOSTAT AND SCR CONTROLLER. SET SUPPLY AIR TO 2C. STANDARD OF ACCEPTANCE: THERMOLECO FC SERIES, SIZES AND CAPACITY AS FOLLOWS:
1. DH-1 - 2 KW SIZED TO FIT A 200MM DIA. DUCT.
7. HUMIDIFIER (H-1)
1. UNIT SHALL BE CSA CERTIFIED AND ULC LISTED. ALL COMPONENTS TO BE HOUSED IN FACTORY FABRICATED CABINET FOR WALL MOUNTING. INTEGRAL BLOWER PACK FOR ROOM DISTRIBUTION AND BOTTOM WATER DRAIN. CYLINDER TO BE DISPOSABLE TYPE WITH 208V-1 PHASE, 60HZ, 12.7 AMP. SUPPLY COMPLETE WITH WATER FILTER ASSEMBLY. WALL MOUNT, DIGITAL DISPLAY HUMIDISTAT WITH 6-10 VOLT MODULATING CONTROL. AUTOMATIC DRAIN DOWN. INTERNAL WATER TEMPERING TO 60C FOR DRAIN DOWN. SYSTEM CONTROL TO BE COMPLETELY STAND ALONE WITH NO TIES TO A BUILDING MANAGEMENT SYSTEM. SYSTEM TO BE COMPLETE WITH SPARE CYLINDER AND SPARE INLINE WATER FILTER CARTRIDGE. PROVIDE, START UP, AND REPORT BY NORTEC TECHNICIAN. PERFORMANCE: 6.9LB/HR WITH MANUFACTURER'S REPRESENTATIVE TO PERFORM START-UP AND TRAINING TO BUILDING OPERATOR. STANDARD OF ACCEPTANCE: NORTEC RH-2 SPACE WITH 1510142 HUMIDISTAT.

PART 2 - PRODUCTS (Cont'd)

- 8. DUCT INSULATION
1. OA AND EA ROUND DUCTWORK TO ERV-1: MINERAL FIBER BLANKET TO CG58 51-GP-11M WITH VAPOUR BARRIER TO CG58 51-GP-52M. PROVIDE TWO 25 MM LAYERS. STANDARD OF ACCEPTANCE: SCHULLER MICROLITE DUCT WRAP FSK; MANSON ALLEY WRAP FSK; KNAUF DUCT WRAP FSK.
2. SA AND RA ROUND DUCTWORK TO ERV-1: MINERAL FIBER BLANKET TO CG58 51-GP-11M WITH VAPOUR BARRIER TO CG58 51-GP-52M. PROVIDE TWO 50MM LAYERS. STANDARD OF ACCEPTANCE: SCHULLER MICROLITE DUCT WRAP FSK; MANSON ALLEY WRAP FSK; KNAUF DUCT WRAP FSK.
3. SQUARE DUCTWORK: TWO 50MM LAYERS OF RIGID MINERAL FIBER TO CG58 51-10-92 WITH VAPOUR BARRIER JACKET AND FACING MATERIAL TO CG58 51-GP-52MA MANVILLE SPIN-GLAS FSK-AP; MANSON A.K. BOARD FSK; KNAUF INSULATION BOARD FSK.
4. ACOUSTICAL LINED DUCTS: PROVIDE A 50 MM LAYER OF CLOSED CELL FLEXIBLE ACOUSTICAL LINER IN SQUARE SA AND RA DUCTWORK FROM ROOM 102 AND 113 TO THE MAIN SUPPLY AND RETURN DUCTS. SUPPLY COMPLETE WITH ONE 50 MM LAYERS LAYER OF RIGID MINERAL FIBER ON THE EXTERIOR. DIMENSIONS SHOWN FOR DUCTWORK ARE TO THE INTERIOR OF THE ACOUSTICAL LINER. STANDARD OF ACCEPTANCE: ARMACELL.
9. REFRIGERANT COOLING SYSTEM
1. CU-1 CONDENSER
1. AIR COOLED PACKAGED UNIT COMPLETELY ASSEMBLED FOR WALL MOUNTING. UNIT TO BE WEATHER-PROOFED, SUPPLY COMPLETE WITH ALUMINUM WALL MOUNT BRACKETS, INCLUDE HERMETIC COMPRESSOR, CONDENSER COILS, FANS AND MOTORS, CONTROLS, HOLDING CHARGE OF REFRIGERANT R410A APPLIED AND SEALED AT FACTORY AND SPRING ISOLATORS FOR MOUNTING ON EQUIPMENT SUPPORTS, AND FACTORY MOUNTED ELECTRICAL DISCONNECT. UNITS MAY BE SHIPPED WITH A FACTORY SEALED CHARGE OF NITROGEN WITH PROPER REFRIGERANT CHARGING RESERVED FOR THE FIELD.
2. CASING TO BE ASSEMBLED OF HEAVY GAUGE GALVANIZED STEEL WITH ACCESS PANELS FOR SERVICING UNIT. FINISH COLOUR TO BE FACTORY STANDARD.
3. CONDENSING UNIT TO BE SINGLE CIRCUIT TYPE WITH A VARIABLE SPEED HERMETIC COMPRESSOR AND OIL CAPTURE/COLLECTION SYSTEM TO ISOLATE OIL DISTRIBUTION TO WITH CONDENSING UNIT. UNIT TO BE SUPPLIED WITH SUCTION AND DISCHARGE VALVES, CRANKCASE HEATER AND RUBBER IN SHEAR OR SPRING ISOLATORS.
4. CONDENSER FANS TO BE HORIZONTAL DISCHARGE, DIRECT DRIVE AND TOTALLY BALANCED WITH STEEL BLADES AND ZINC-PLATED STEEL HUBS. CONDENSER COIL TO BE SLAB TYPE WITH ALUMINUM FINNS, MECHANICALLY BONDED TO COPPER TUBES, TESTED TO 450 PSI COMPLETE WITH LOUVERED METAL GRILLES.
5. CONDENSER TO CARRY A 7 YEAR FACTORY WARRANTY ON THE COMPRESSOR AND 2 YEAR FACTORY WARRANTY ON THE PARTS.
6. PERFORMANCE: -18 C WETBULB MINIMUM CONDENSER ENTERING AIR TEMPERATURE, 208V/1 PH/60 HZ, 15.74 AMPS, MINIMUM SIZE 36 MBH
7. SYSTEM MUST BE COMPLETE WITH CENTRALIZED SYSTEM CONTROLLER. THE BUILDING WILL HAVE NO BMS SYSTEM TO INTERLOCK WITH.
8. STANDARD OF ACCEPTANCE: CONDENSER MITSUBISHI CITY MULTI, PUMP-P36NHMU, STANDARD OF ACCEPTANCE CENTRAL CONTROLLER: MITSUBISHI TC-248
AC-1,2,3,4,5 EVAPORATORS:
1. INTERIOR WALL MOUNTED AIR CONDITIONING UNITS COMPLETE WITH BUILT IN CONTROLS, WIRED WALL MOUNTED CONTROLLERS, DIRECT EXPANSION TYPE COOLING COIL, WITH MODULATING THERMOSTATIC EXPANSION VALVE, 208V, 1PH, 60HZ.
2. MINIMUM SIZE: AC-1, 3, 4, 6 MBH; AC-2, 12 MBH; AC-5, 8 MBH.
3. STANDARD OF ACCEPTANCE EVAPORATOR - MITSUBISHI SERIES PKFY
4. STANDARD OF ACCEPTANCE CONTROLLER: PAR-21MAA
5. STANDARD OF ACCEPTANCE EXTERNAL HEATER ADAPTER: MITSUBISHI PAC-YU25HT,
3. REFRIGERANT PIPING, VALVES, PIPE INSULATION, FITTINGS AND ACCESSORIES
1. TUBING: PROCESSED FOR REFRIGERATION INSTALLATIONS, FACTORY CLEANED, DEOXYDIZED, DEHYDRATED AND SEALED SEAMLESS REFRIGERATION GRADE COPPER TUBING.
2. HARD COPPER: TO ASTM B280, TYPE ACR.
3. ANNEALED COPPER: TO ASTM B280, WITH MINIMUM WALL THICKNESS AS PER CSA B52 AND ANSIA/ASME B31.5.
4. FITTINGS: DESIGN PRESSURE 305 PSI AND TEMPERATURE 248 F. FABRICATED TO CSA AND ANSI STANDARDS, BEAR THE MARK OF THE MANUFACTURER AND BE REGISTERED FOR USE WITH REFRIGERANT R410A IN THE PROVINCE OF NEW BRUNSWICK. CONFORM TO ANSIA/ASME B16.22, ANSIA/ASME B16.24 AND ANSIA/ASME B16.25 AND SHALL BE WROUGHT COPPER OR FORGED BRASS SOLDER TYPE OR FLARED FITTINGS MAY BE USED FOR SOFT ANNEALED COPPER TUBING. ELBOWS AND RETURN BENDS TO BE LONG RADIUS TYPE.
5. JOINTS: BRAZING MATERIALS SHALL CONFORM TO AWS A5.8 AND BE SIL-FOX-15 PHOSPHOR-COPPER-SILVER ALLOY FOR COPPER PIPING JOINED BY COPPER FITTINGS, 24.659 PSI SILVER SOLDER FOR BRASS FITTINGS AND 95-5 SOLDER FOR CONNECTIONS TO EQUIPMENT, COILS AND OR ACCESSORIES.
6. FLEXIBLE CONNECTIONS AT EQUIPMENT COILS NPS 3/8 NOMINAL OR LESS SHALL BE MADE USING COILED SOFT COPPER TUBING. FOR LARGER SIZES, SEAMLESS FLEXIBLE BRONZE HOSE WITH BRONZE WIRE Braid COVERING SHALL BE USED. USE FACTORY SEALED NEOPRENE JACKET UNIT WHERE FREEZING MAY OCCUR.
7. SERVICE VALVES: VALVES SHALL MEET ANSI B31.5 FOR VALVE CONSTRUCTION.
8. SERVICE VALVES TO BE ANGLE, BALL OR GLOBE AS PER PACKAGED SPLIT SYSTEM MANUFACTURER'S RECOMMENDATIONS AND SHALL BE INSTALLED STRATEGICALLY SO AS TO FACILITATE SYSTEM CHARGING AND SERVICING OF REFRIGERATION PIPING SYSTEM COMPONENTS WITHOUT THE NEED TO EVACUATE THE ENTIRE SYSTEM CHARGE.
9. NPS 7/8 AND UNDER: CLASS 500, 500 PSI, GLOBE OR ANGLE NON-DIRECTIONAL TYPE, DIAPHRAGM, PACKLESS TYPE, WITH FORGED BRASS BODY AND BONNET, MOISTUREPROOF SEAL FOR BELOW FREEZING APPLICATIONS, BRAZED CONNECTIONS.
10. OVER NPS 7/8: CLASS 375, 375 PSI, GLOBE OR ANGLE TYPE, DIAPHRAGM, PACKLESS TYPE, BACK-SEATING, CAP SEAL, WITH CAST BRONZE BODY AND BONNET, MOISTUREPROOF SEAL FOR BELOW FREEZING APPLICATIONS, BRAZED CONNECTIONS.
11. RELIEF VALVES: SAFETY RELIEF TYPE SHALL HAVE FUSIBLE PLUG OR RUPTURE DISC IN FORGED BRASS BODY. PRESSURE RELIEF TYPE SHALL HAVE FORGED BRASS BODY.
12. CHECK VALVES: SPRING OPERATED, GUIDED PISTON TYPE WITH FORGED BRASS BODY IN FLARE CONNECTION SIZED NPS 7/8 AND UNDER.
13. GUIDED PISTON TYPE, SPRING OPERATED WITH BOLTED BONNET OR COVER PLATE IN SWEAT CONNECTIONS OVER NPS 7/8.
14. SOLENOID VALVES: SHALL HAVE FIELD REPLACEABLE COIL, SERVICEABLE WITHOUT REMOVING VALVE FROM LINE. SOLENOID VALVES FOR PUMP DOWN CIRCUITS SHALL EACH BE SUPPLIED WITH A MANUAL LIFT STEM. RATE COILS ACCORDING TO TEMPERATURE SERVICE.
15. PROVIDE UPSTREAM OF THERMOSTATIC EXPANSION VALVES AND STRAINERS AS INDICATED.
16. EXPANSION VALVES: EXPANSION VALVES SHALL BE THERMOSTATIC TYPE WITH EXTERNAL EQUALIZER, ADJUSTABLE SUPERHEAT SETTING, CAPACITY AND BULB CHARGE AND LENGTH TO SUIT OPERATING CONDITIONS.
1. ACCEPTABLE MATERIAL: MUELLER BRASS CO., ALCO, SPORLAN.
17. FILTER - DRYERS: LIQUID LINE FILTER DRYERS SHALL MEET ARI 710-STANDARDS, AND SHALL BE UL APPROVED AND RATED TO 5WP-500 PSI. SIZE SHALL NOT BE LESS THAN RECOMMENDED BY PACKAGED SPLIT SYSTEM MANUFACTURERS FOR THE NOMINAL TONNAGE RATING FOR R410A REFRIGERANT. ALL FILTER-DRYERS SHALL BE REPLACEABLE CARTRIDGE TYPE.
1. ACCEPTABLE MATERIAL: MUELLER BRASS CO., ALCO, SPORLAN.
18. SIGHT GLASS: INSTALL A MOISTURE INDICATING DOUBLE SIGHT GLASS UPSTREAM OF EACH EXPANSION VALVE AND/OR AS RECOMMENDED BY PACKAGED SPLIT SYSTEM MANUFACTURER.
1. ACCEPTABLE MATERIAL: MUELLER BRASS CO., ALCO, SPORLAN.
19. PIPE INSULATION: USE ON REFRIGERATION SUCTION LINES AND LIQUID LINES. MATERIAL CAN/CGSB-54.40 FLEXIBLE ELASTOMERIC UNICELLULAR SHEET AND PIPE COVERING. INSULATION MUST BE CONTINUOUS WITH NO BREAKS AT SUPPORTS. PROVIDE INSULARD UNICOVER SUPPORTS OR APPROVED EQUIVALENT AT SUPPORTS TO ENSURE CONTINUOUS INSULATION. 13 MM THICK FOR BRANCH LINES IN ALL BELOW CEILING AREAS, 25 MM THICK FOR ALL ATTIC AND OUTDOOR SPACES. PROVIDE WHITE PVC CHASE OVER EXPOSED INSULATION IN OFFICE AREAS AND OUTDOORS.
1. ACCEPTABLE MATERIAL: RBX INDUSTRIES INC. RUBATEX R-180-FS; ARMSTRONG AP ARMAFLEX

PART 2 - PRODUCTS (Cont'd)

- 10. PLUMBING
1. DOMESTIC HOT AND COLD WATER PIPING: ABOVE GROUND PIPING SHALL BE COPPER TYPE 'L' HARD DRAWN WITH WROUGHT COPPER FITTINGS SUITABLE FOR 95-5 SOLDER CONNECTIONS. PIPE AND FITTING RATINGS TO BE 125 PSI. TRAP PRIMER PIPING, AND UNDERSLAB DOW, DHW, PEX.
2. SANITARY DRAIN WASTE AND VENT PIPING 1 1/2" AND LARGER SHALL BE FIRE RESISTANT IPEX SYSTEM XFR. CONDENSATE DRAIN PIPING TO BE COPPER DWV.
3. PIPING SUPPORTS: SUPPORT ALL PIPING AT A MAXIMUM OF 8' ON CENTER. AVOID ANCHORING THE PIPE AT ANY LOCATION. SUPPORTS SHALL BE SECURELY FASTENED TO AN ADEQUATE BUILDING SUPPORT. ENSURE MINIMUM SLOPE IS MAINTAIN WHERE REQUIRED.
4. PIPING INSULATION: DOMESTIC HOT WATER PIPING INSULATION TO BE 25MM PREFORMED FIBERGLASS WITH ALL PURPOSE JACKET. MITERED SECTIONS MUST BE USED FOR ALL ELBOWS AND FITTINGS. DOMESTIC COLD WATER PIPING TO BE THE SAME AS THAT FOR HOT WATER PIPING PLUS REINFORCED FOIL JACKET FOR CONTINUOUS VAPOUR BARRIER. EXPOSED PIPING SHALL HAVE A FINAL WRAP OF WHITE PVC JACKETING.
5. ACCESS DOORS: AT EVERY PLACE WHERE ACCESS OPENINGS ARE REQUIRED FOR THE MAINTENANCE OF EQUIPMENT.
6. BFP-1 & BFP-2: REDUCED PRESSURE PRINCIPAL BACK FLOW PREVENTER COMPLETE WITH QUARTER TURN BALL VALVES AND STRAINER. STANDARD OF ACCEPTANCE: WATTS 009Q7-S.
7. FD-1: FLOOR DRAIN, GENERAL DUTY, CAST IRON BODY, 5" ROUND, ADJUSTABLE HEAD, NICKEL BRONZE STRAINER, INTEGRAL SEEPAGE PAN, TRAP PRIMER CONNECTION, CLAMPING COLLAR. STANDARD OF ACCEPTANCE: ZURN ZN-415 SERIES, JR SMITH
8. SH-1: PRESSURE BALANCE SHOWER VALVE AND HEAD, INTEGRAL STOPS, INTEGRAL PRESSURE BALANCE CARTRIDGES WITH CHECKS, ADJUSTABLE SCREW STOP TO LIMIT HANDLE TURN. SEE LIMIT TO 105°F, H2O KINETIC TECHNOLOGY SHOWERHEAD ARM AND FLANGE, POLISHED CHROME PLATED FINISH. 1.8GPM/FM. STANDARD OF ACCEPTANCE: DELTA T13H18.
9. WC: WATER CLOSET, 8.0 LPE (1.8 GPF) BOWL, VITREOUS CHINA FINISH, ANTIMICROBIAL SURFACE, PRESSURE ASSIST SYPHON JET, ELONGATED RIM, CLOSE COUPLED, BOLT CAPS, (420mm) FLOOR TO TOP OF BOWL, MAP RATING OF 1000. FLUSH TANK: VITREOUS CHINA, STANDARD OF ACCEPTANCE: AMERICAN STANDARD CADET RIGHT HEIGHT ELONGATED PRESSURE-ASSISTED, CRANE, KOHLER, ZURN, SEAT: WHITE, OPEN FRONT MOLDED SOLID PLASTIC, LESS COVER, SS CHECK HINGE, POSTS, WASHERS AND NUTS. STANDARD OF ACCEPTANCE: BEMIS C195SS/C, CONTECO 500CCSS, OLSONITE 10CC/SS, STOPS: LOCKSHIELD SCREWDRIVER ANGLE STOP CW 300 MM FLEXIBLE RISER, BRASS SUPPLY NIPPLE AND SS WALL FLANGE. STANDARD OF ACCEPTANCE: TECK 47T1316SD, POWERS CRANE P4212, MCGUIRE H166L-K-N3.
10. LV: BARRIER FREE, WALL HUNG, VITREOUS CHINA LAVATORY WITH RECTANGULAR BASIN, 102MM FAUCET HOLE CENTERS, INTEGRAL BACK SPLASH, SELF DRAINING DECK AREA, UP FRONT OVERFLOW, REAR OUTLET AND WALL HANGER. SIZE: APPROXIMATELY 540 MM X 559 MM (21-1/4" X 22"). PROVIDE FOR ALL WALL MOUNTED PLUMBING FIXTURES, FACTORY MANUFACTURED FLOOR MOUNTED CHAIR CARRIER SYSTEMS. STOPS: SUPPLY FITTING TO BE SOLID CAST BRASS BODY WITH INTEGRAL PROXIMITY SENSOR, WITH 5 L/M VANDAL RESISTANT ACTUATOR OUTLET, SUPPLY FITTING TO BE CW 24 VOLT HARD WIRED INFRARED SENSOR, RECESSED CONTROL BOX MOUNTED IN WALL BELOW SINK WITH STAINLESS STEEL ACCESS COVER, STOPS: MIXING VALVE TEMPERATURE LIMIT STOP, BRADED HOSE AND CSA CERTIFIED SUPPLY 120/24 VOLT TRANSFORMER, SUPPLY ALL INTER-CONNECTING COMPONENTS FOR A COMPLETE OPERATIONAL SYSTEM AS PER MANUFACTURER'S RECOMMENDATIONS. THE PLUMBING CONTRACTOR IS RESPONSIBLE FOR THE SUPPLY AND INSTALLATION FOR ALL LOW VOLTAGE (24V) WIRING FOR ALL ELECTRONIC PLUMBING FIXTURES.
SUPPLY STOPS ON HOT AND COLD WATER TO BE HEAVY PATTERN, CAST BODY WHEELCHAIR STOPS CW FLEXIBLE BRAIDED STAINLESS STEEL RISERS. WASTE FITTING TO BE OFFSET CAST PLUG WITH OPEN GRID STRAINER. TRAP TO BE CAST BRASS ADJUSTABLE P-TRAP WITH CLEAN OUT. WASTE FITTING, TRAP AND SUPPLIES TO BE COMPLETE WITH PROTECTIVE PIPE COVERING SYSTEM CONFORMING TO ADA REQUIREMENTS. STANDARD OF ACCEPTANCE: LARONDE, AMERICAN STANDARD, CRANE, KOHLER, ZURN, CARRIER, ZURN Z1231 SUPPLY FITTING, ZURN Z6955-XL-S-E-HW-CWB-TM-V-1, DELTA, KOHLER, AMERICAN STANDARD, STOPS: TECK 47T2512SD, POWERS CRANE P4252, MCGUIRE H165L-K-N5, ZURN, WASTE FITTING, DELTA 33T290, MCGUIRE 159WC STOP: DELTA 33T311, MCGUIRE 8872C PIPE COVERS: TRUEBRO #103, ZURN.
11. KS: STAINLESS STEEL COUNTERTOP SINK SINGLE COMPARTMENT, LEDGE BACK TYPE 302 STAINLESS STEEL, 20 GA. THICK, SELF RIMMING, UNDERCATED, COUNTERTOP INSTALLATION WITH CLAMPS, INTEGRAL SS BASKET STRAINER/STOPPER, AND POLY TAILPIECE. SIZE: APPROX. 520 MM X 510 MM X 200 MM (20"-12" X 20" X 8") STANDARD OF ACCEPTANCE: KINDRED LBD750P-1, STOPS: 8"(200MM) CENTER SET CHROME PLATED BRASS, SUPPLY STOPS ON HOT AND COLD WATER TO BE HEAVY PATTERN, CAST BODY WHEELCHAIR STOPS CW FLEXIBLE BRAIDED STAINLESS STEEL RISERS. WASTE FITTING TO BE OFFSET/CAST PLUG WITH OPEN GRID STRAINER. TRAP TO BE CAST BRASS ADJUSTABLE P-TRAP WITH CLEAN OUT. WASTE FITTING, TRAP AND SUPPLIES TO BE COMPLETE WITH PROTECTIVE PIPE COVERING SYSTEM CONFORMING TO ADA REQUIREMENTS.
STANDARD OF ACCEPTANCE: SUPPLY FITTING: ZURN Z6955-XL-S-E-HW-CWB-TM-V-1, DELTA, KOHLER, AMERICAN STANDARD, STOPS: TECK 47T2312SD, POWERS CRANE, MCGUIRE: STOPS: DELTA 33T311, MCGUIRE 8872C PIPE COVERS: TRUEBRO #103, ZURN.
12. JS: JANITOR SINK: PRECAST 610 MM X 610 MM X 250 MM HIGH TERRAZZO BASE, INTEGRAL, 1,200 MM HIGH STAINLESS STEEL WALL GUARDS, CHROME PLATED BRASS DRAIN BODY AND STAINLESS STEEL CAPS ON ALL SIDES. STANDARD OF ACCEPTANCE: FIAT MSB-2424, WILLIAMS, ZURN. STOPS: FAUCET WITH WALL BRACE, CROSS INDEXED HANDLES, PAIL HOOK, HOSE OUTLET, INTEGRAL STOPS, VACUUM BREAKER AND ESCUTCHEONS, POLISHED CHROME PLATED FINISH. STANDARD OF ACCEPTANCE: WILLIAMS T-15-VB, TECK 28T2384, CHICAGO 540-LD-8975-WXF. ACCESSORIES: MINIMUM 760 MM LONG RUBBER HOSE WITH BRASS COUPLING AND STAINLESS STEEL HOSE BRACKET, STAINLESS STEEL MOP HANGER WITH 3 RUBBER SPRING LOADED GRIPS. STANDARD OF ACCEPTANCE: HOSE AND BRACKET: FIAT #832-A, WILLIAMS T-35, TECK 28T911, MOP HANGER: FIAT #899-CC, WILLIAMS T-40, TECK 28T910.
13. TPS: TRAP PRIMER STATION: PRIME FLOOR DRAIN TRAPS WITH COLD WATER USING AN ELECTRONIC, 110V, 28A SURFACE MOUNTED TRAP PRIMING UNIT, WITH ATMOSPHERIC VACUUM BREAKER, SOLENOID VALVE, 24-HOUR CLOCK, MANUAL OVER-RIDE SWITCH, GALVANIZED CABINET AND DISTRIBUTION MANIFOLD. STANDARD OF ACCEPTANCE: PRECISION PLUMBING PRODUCTS MODEL P15 SERIES, ZURN, MIFAB.
14. WATER HAMMER ARRESTORS (S): WATER HAMMER ARRESTORS (S) STAINLESS STEEL BELLOWS OR COPPER PISTON CONSTRUCTION TO PDI-WM 211. STANDARD OF ACCEPTANCE: ZURN SERIES 1700 BELLOWS OR SERIES 1705 PISTON; J.R. SMITH SERIES 5000 BELLOWS; ANCON SERIES SG BELLOWS AND PISTON; ENPOCO SERIES HT BELLOWS AND SERIES HTW PISTON. PRECISION PLUMBING PRODUCTS SERIES SC, WATTS, MIFAB.
11. CONTROLS
1. CONTROL RELAYS: R- SWITCHING AND ISOLATING RELAYS SHALL BE PROVIDED BY THIS TRADE CONTRACTOR WHEREVER REQUIRED FOR PROPER OPERATION OF THE CONTROLLED DEVICES PER SEQUENCE SPECIFIED.
1. STANDARD OF ACCEPTANCE: OMRON.

PART 3 - EXECUTION

- 1. HVAC
1. FABRICATE AND INSTALL DUCTWORK AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, ASHRAE/SMACNA STANDARDS AND AS INDICATED.
2. INSTALL FLEXIBLE CONNECTIONS AT INLETS AND OUTLETS OF AHUS.
3. PROVIDE ACCESS DOORS FOR ALL DEVICES REQUIRING MAINTENANCE AND AS REQUIRED BY CODE.
4. INSTALL INSTRUMENT TEST PORTS TO RECOMMENDATIONS OF SMACNA AND WHERE DIRECTED BY TAB CONTRACTOR.
5. DUCT LEAKAGE TESTING NEED NOT BE PERFORMED.
6. CONTRACTOR SHALL OBTAIN THE SERVICES OF AN INDEPENDENT AIR BALANCING AGENCY FOR TESTING, ADJUSTING AND BALANCING THE SYSTEM. THIS INCLUDES RTU-1 AND HRV-1. TAB ACCURACY TOLERANCE TO BE PLUS OR MINUS 10% OF DESIGN VALUES. BALANCING AGENT TO COORDINATE DAMPER POSITIONS AT AHUS TO ACCOMMODATE MINIMUM OUTDOOR AIR SETTINGS. SATISFACTORY OPERATION OF AIR HANDLING EQUIPMENT MUST BE CONFIRMED PRIOR TO THE START OF BALANCING. THREE COPIES OF COMPLETE TEST REPORT SHALL BE SUBMITTED TO OWNER FOR REVIEW. ONCE REVIEWED AND ACCEPTED THE BALANCE REPORTS SHALL BE INCLUDED IN THE OPERATION AND MAINTENANCE MANUALS.
7. MANUFACTURER'S REPRESENTATIVE OF THE AIR HANDLING UNIT IS TO PERFORM START-UP OF UNIT, PROVIDE START-UP REPORT TO OWNER, AND PROVIDE TRAINING TO BUILDING OPERATOR.

PART 3 - EXECUTION (Cont'd...)

- 2. REFRIGERANT COOLING SYSTEM
1. THE PIPING SYSTEM DESIGN INCLUDING PROPOSED PIPING, MATERIALS AND COMPONENTS ARE TO BE REVIEWED AND APPROVED BY THE APPLICABLE PACKAGED SPLIT SYSTEM MANUFACTURERS PRIOR TO PIPING INSTALLATION. SPLIT SYSTEM MANUFACTURER APPROVED PIPING, MATERIALS AND COMPONENT SELECTIONS TO BE SUBMITTED TO CONSULTANT FOR REVIEW PRIOR TO INSTALLATION. MANUFACTURER TO CERTIFY COMPLETED INSTALLATION REPORT TO START-UP.
2. CONDENSER UNIT TO BE INSTALLED ON WALL SUPPORT BRACKETS.
3. INSTALL AND TEST ALL REFRIGERANT PIPING SYSTEMS IN ACCORDANCE WITH CSA B52.
4. INSTALL PIPE SUPPORTS AT EACH MAJOR COMPONENT AND EVERY 6 FEET OF SPACING ON PIPE RUNS. HOWEVER, LIQUID AND GAS LINES MAY BE SUPPORTED IN VERTICAL AND HORIZONTAL RUNS AS INDICATED USING A CUSHION CLAMP IN UNISTRUT LADDER. UNISTRUT SHALL BE POSITIONED 4" CLEAR OF THE SURFACE OF, AND OFF TO ONE SIDE OF, THE EQUIPMENT SERVED TO PERMIT SERVICE ACCESS. PIPING SHALL BE SECURELY ANCHORED TO MINIMIZE VIBRATION, HOWEVER, FLEXIBLE TO ACCOMMODATE THERMAL EXPANSION.
5. PIPING SHALL BE INSTALLED STRAIGHT AND PARALLEL TO BUILDING LINES WHENEVER POSSIBLE.
6. GRADE HORIZONTAL PIPE CARRYING GASES 1:240 DOWN IN THE DIRECTION OF FLOW.
7. KEEP THE NUMBER OF ELBOWS AND FITTINGS TO A MINIMUM.
8. INSTALL PIPING TO BE INSTALLED UNWANTED CONDENSATE OR OIL FROM FLOWING BACK INTO COMPRESSOR OR EVAPORATOR.
9. KEEP PIPING JOINTS SEALED EXCEPT WHEN FABRICATING.
10. BLEED DRY NITROGEN INTO PIPING WHEN SWEATING CONNECTIONS.
11. BRAZE FLEXIBLE PIPE VIBRATION ISOLATORS AND STUB CONNECTORS ON SEALED HERMETIC COMPRESSORS USING ALLOYS WHICH MELT AT 1103 FOR BELOW UNLESS STIPULATED OTHERWISE BY PACKAGED SPLIT SYSTEM MANUFACTURE. LEAK TEST TO CSA B52 BEFORE EVACUATION TO 240 PSI AND 145 PSI ON HIGH AND LOW SIDES RESPECTIVELY.
12. MANUFACTURER'S REPRESENTATIVES TO INSPECT SPLIT SYSTEM INSTALLATIONS, START-UP UNITS, AND PROVIDE A WRITTEN REPORT OF THE RESULTS TO THE CONSULTANT.
1. PLUMBING
1. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
2. PIPE PRESSURE TESTING: ALL POTABLE AND DRAINAGE PIPING SYSTEMS ARE TO BE TESTED IN ACCORDANCE WITH THE NATIONAL PLUMBING CODE OF CANADA AFTER INSTALLATION. TESTS SHALL BE WITNESSED BY THE OWNER. ANY LEAKS FOUND DURING TESTING MUST BE REPAIRED AND A RETEST COMPLETED BEFORE THE SYSTEM IS ACCEPTABLE. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT REQUIRED TO CARRY OUT TESTS AND SHALL MAINTAIN AN ACCURATE AND UP TO DATE RECORD OF ALL TESTING.
2. CONTROLS
1. SUPPLY ALL CONTROL DEVICES, ACTUATORS, RELAYS, WIRING, CONDUIT AND MISCELLANEOUS CONTROL MATERIALS FOR COMPLETE OPERATION OF THE EQUIPMENT AS DESCRIBED, MOTOR STARTERS, MANUAL AND MAGNETIC, AND PROTECTION ARE TO BE PROVIDED BY DIVISION 16 UNLESS NOTED OTHERWISE.
2. INSTALL ALL INSTRUMENTATION WHERE INDICATED. WHERE POSITION IS NOT SHOWN, INSTALL IN A POSITION BEST SUITED FOR PROPER OPERATION.
3. ALL EQUIPMENT MUST BE PROVIDED WITH PROPRIETARY OR "VENDOR" STAND ALONE CONTROLS AS LISTED BELOW. NO BUILDING MANAGEMENT SYSTEM IS BEING UTILIZED.
1. MINI SPLIT AIR CONDITIONING SYSTEM
2. ERV-1
3. HUMIDIFIERS H-1
4. ALL CONTROLS TO BE SETUP, CALIBRATED AND VERIFIED FOR CONTROL SEQUENCE OPERATIONS AS SPECIFIED. PUT ALL CONTROLS THROUGH ALL SPECIFIED SEQUENCES AND VERIFY CORRECT OPERATION ON SITE.
5. SEQUENCE OF OPERATION
1. EF-1-5 IS TO BE MANUALLY CONTROLLED VIA WALL LIGHT SWITCH.
2. ERV-1
1. ERV-1 SHALL RUN CONTINUOUSLY.
2. DH-1 LOCATED IN THE OUTSIDE AIR DUCT TO ERV-1 SHALL HAVE THE THERMOSTATIC SENSOR LOCATED IN THE EXHAUST DUCT FOR MAINTAINING AN EXHAUST TEMPERATURE OF 2C TO PREVENT FROSTING OF THE CORE.
3. MINI SPLIT SYSTEM
1. WALL MOUNT EVAPORATORS AC-1 TO AC-5 SHALL ACT AS THE PRIMARY SOURCE OF HEATING WITH THE BASEBOARDS ACTING AS A SECOND STAGE OF HEAT.
2. CONDENSER CU-1 WILL SWITCH OVER FROM HEATING TO COOLING MODE UPON MAJORITY OF EVAPORATORS CALLING FOR COOLING.
3. A CENTRAL CONTROLLER IS TO BE PROGRAMMED WITH SET BACK ROOM TEMPERATURES AS DICTATED BY OCCUPANT SCHEDULE AND REQUIREMENTS.



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