

1.0

GENERAL

1. VISIT JOBSITE DURING TENDER. DRAWINGS INDICATE APPROXIMATE LOCATION OF EXISTING MECHANICAL EQUIPMENT AND SERVICES. VERIFY EXACT LOCATIONS OF EXISTING MECHANICAL EQUIPMENT AND SERVICES AND ALLOW FOR NECESSARY RELOCATING OF NOTED SERVICES (OR RECONNECTION TO EXISTING SERVICES) TO SUIT NEW CONSTRUCTION.

2. ALL WORK SHALL CONFORM TO MANITOBA BUILDING CODE AND LOCAL AUTHORITIES. APPLY FOR, OBTAIN AND PAY FOR ALL NECESSARY PERMITS.

3. COORDINATE INSTALLATION WITH ALL RELATED TRADES, AND EXISTING BUILDING PLANS. VERIFY ALL DIMENSIONS AND LOCATIONS OF EXISTING EQUIPMENT AND SERVICES PRIOR TO PROCEEDING WITH WORK.

4. SUBMIT SHOP DRAWINGS FOR ALL EQUIPMENT TO CONTRACT ADMINISTRATOR.

5. PROVIDE ONE YEAR WARRANTY FOR ALL EQUIPMENT.

6. ALL CONNECTIONS TO EXISTING BUILDING MECHANICAL SERVICES SHALL BE COORDINATED WITH THE CONTRACT ADMINISTRATOR.

7. ALL NECESSARY CUTTING AND PATCHING SHALL BE PERFORMED BY CONTRACTOR. MECHANICAL SUBCONTRACTOR TO CO-ORDINATE ON SITE.

8. REFER TO INSTRUCTIONS TO BIDDERS FOR REQUIREMENTS REGARDING PROJECT PHASING, WORKING HOURS, SHUT-DOWN PROCEDURES, ACCESS, ETC.

9. PRIOR TO DRILLING HOLES AND/OR OPENINGS IN EXISTING STRUCTURE, CONTRACTOR SHALL RETAIN SERVICES OF NATIONAL TESTING LABORATORIES LIMITED TO LOCATE AND MARK ALL STRUCTURAL REINFORCING STEEL LOCATED IN AREA WHERE CUTTING OR DRILLING IS PROPOSED. AT NO TIME SHALL REINFORCING STEEL BE CUT WITHOUT PRIOR WRITTEN APPROVAL FROM STRUCTURAL ENGINEER QUALIFIED AND LICENSED TO PRACTICE IN PROVINCE OF MANITOBA. NO HOLES OR OPENINGS WILL BE PERMITTED WITHIN AREA OF STRUCTURAL DROP PANELS LOCATED AT COLUMNS.

10. ALL INTERIOR SPACE POWER HAMMERING, DRILLING AND OTHER NOISY WORK SHALL BE PERFORMED BETWEEN HOURS OF 6:00 P.M. AND 8:00 A.M.

11. BID QUOTATIONS SHALL BE BASED ON THE USE OF SPECIFIED EQUIPMENT, UNLESS ACCEPTANCE FOR THE USE OF EQUAL MANUFACTURERS IS OBTAINED FROM THE ENGINEER PRIOR TO SUBMISSION OF TENDERS. ALTERNATE MANUFACTURERS MAY BE QUOTED AS AN INCREASE OR DECREASE AMOUNT UP TO THE TENDER PRICE, WITHOUT PRIOR ACCEPTANCE OF THE CONTRACT ADMINISTRATOR.

12. FURNISH TO THE OWNER THREE (3) COMPLETE SETS OF MANUFACTURER'S OPERATING AND MAINTENANCE INSTRUCTIONS FOR ALL EQUIPMENT REQUIRING MAINTENANCE. REVIEW INSTRUCTIONS WITH OWNER'S REPRESENTATIVE TO ENSURE A THOROUGH UNDERSTANDING OF THE EQUIPMENT AND ITS OPERATION.

13. PROVIDE A MARK-UP OF THE CONTRACT DRAWINGS FOR RECORD "AS-BUILT" DRAWINGS. REVISED AS REQUIRED TO SHOW ANY CHANGES FROM THAT ORIGINALLY SHOWN.

14. PROVIDE AS-BUILT DRAWING IN AUTOCAD FORMAT, COMPLETE WITH DISK PAID FOR BY MECHANICAL SUBCONTRACTOR.

15. ALL DUCTWORK AND PIPING TO BE INSTALLED STRAIGHT, PARALLEL TO THE BUILDING WALLS.

16. PIPE HANGERS SHALL BE GRINNELL FIG. 65 FOR STEEL PIPE AND FIG. CT65 FOR COPPER PIPE, ALL WITH FIG. 140 THREADED ROD ATTACHED TO FIG. 117 EXPANSION CASE SET IN HOLES DRILLED IN CONCRETE, OR ATTACHED TO FIG. 225 OR 227 CLAMP ATTACHED TO JOISTS OR BEAMS.

17. PROVIDE FIRESTOPPING FOR ALL OPENINGS IN FIRE SEPARATIONS FOR PASSAGE OF PIPES, DUCTS, ETC. TO MAINTAIN INTEGRITY OF FIRE SEPARATIONS AS PER MANUFACTURER'S PUBLISHED RECOMMENDATIONS.

18. INSTALLATION OF WORK SHALL BE COORDINATED WITH THE CONTRACTOR AND SHALL BE SCHEDULED SO AS NOT TO ENDANGER OR DISTURB THE USERS OF THE BUILDING. SHUTDOWN OF EXISTING BUILDING SYSTEMS SHALL BE COORDINATED WITH THE CONTRACT ADMINISTRATOR.

19. ALL WIRING FOR EQUIPMENT SPECIFIED HEREIN SHALL BE BY THE ELECTRICAL SUBCONTRACTOR, UNLESS OTHERWISE NOTED.

20. CONTRACTOR SHALL REVIEW ALL EQUIPMENT REQUIRING ELECTRICAL HOOK-UP WITH ELECTRICAL SUBCONTRACTOR AND ELECTRICAL DRAWINGS PRIOR TO ORDERING EQUIPMENT. ENSURE PROPER ELECTRICAL CHARACTERISTICS ARE DETERMINED FOR ALL AFFECTED AND RELATED WORK.

21. PRIOR TO INSTALLATION OF THE CEILING, NOTIFY THE CONTRACT ADMINISTRATOR AND ARRANGE FOR A FINAL REVIEW OF THE WORK. FOR UNDERTAKING THIS REVIEW, THE FOLLOWING SHALL BE COMPLETED:

21.1. ALL SYSTEMS TO BE FULLY OPERATIONAL, AS-BUILT DRAWINGS SUPPLIED AND OPERATING AND MAINTENANCE MANUALS SUBMITTED. TWO (2) DAYS NOTIFICATION (IN WRITING) IS REQUIRED TO BE GIVEN TO THE CONSULTANTS PRIOR TO REVIEWS BEING UNDERTAKEN.

21.2. ALL DEFICIENCIES SHALL BE COMPLETED WITHIN TWO (2) WEEKS OF AN AGREED PERIOD OF TIME AFTER FINAL REVIEW AND A LETTER SHALL BE SUBMITTED TO THE CONSULTANT WITHIN THAT TIME ADVISING OF SUCH. FAILURE TO COMPLETE WORK MAY RESULT IN WORK BEING DONE BY THE OWNER AND THE COSTS DEDUCTED FROM FINAL PAYMENT.

22. WHERE MECHANICAL SERVICES ARE CONCEALED WITHIN WALLS, FLOORS OR CEILINGS AND CANNOT BE VISUALLY IDENTIFIED, PROVIDE ELECTRONIC SCANNING DEVICES OR OTHER APPROVED MEANS TO LOCATE AND IDENTIFY CONCEALED SERVICES PRIOR TO WORK START. MAKE GOOD ANY DAMAGE TO EXISTING MECHANICAL SERVICES AT NO COST TO THE CONTRACT.

2.0

INSULATION

1. INSULATE CONDITIONED AIR DUCTWORK WITH 1" FIBERGLAS RFFRK FLEXIBLE DUCT INSULATION INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

2. EXTERIOR DUCTWORK TO HAVE 2" FIBERGLAS RFFRK REINFORCED FOIL FACE VAPOUR SEAL DUCT INSULATION PF385, 3/4 LB/CU.FT. DENSITY. PROVIDE FASTENERS TO BOTTOM SURFACE OF DUCT BY IMPALING ON WELDED PINS ON 12" CENTRES. SPOT ADHESIVE ON 12" CENTRES ON ALL SIDES OF DUCTWORK. APPLY INSULATION WITH EDGES TIGHTLY BUTTED TOGETHER AND SECURED WITH 100% COVERAGE OF 3M NO. 17 DUCTWORK LOCATED ON THE ROOF. PROVIDE OVERWRAP OF 45 MIL THICK, REINFORCED "FIRESTONE ULTRAPLY 78" OR EQUAL. SEAL ALL SEAMS AS RECOMMENDED BY MATERIAL MANUFACTURER. PRIOR TO MATERIAL INSTALLATION, PINS, METAL FASTENERS AND OTHER SHARP EDGES OR POINTS SHALL BE BENT AWAY FROM OVERWRAP OR CUT OR GROUND OFF. TO ENSURE THAT OVERWRAP WILL NOT BE PUNCTURED. PROVIDE SLIGHT PEAK ALONG TOP CENTRE LINE SO MOISTURE WILL RUN OFF.

3. INSULATE ALL LIQUID AND SUCTION REFRIGERANT PIPING LINES WITH 12MM (1/2") ARMSTRONG ARMAFLEX AP SEALED WITH ARMSTRONG 520 ADHESIVE. REFINISH WITH ARMSTRONG WB ARMAFLEX FINISH.

4. INSULATE ALL DOMESTIC WATER PIPING WITH 1/2" FIBERGLAS 7 LB. DENSITY, PIPE INSULATION WITH ASJ AS PER MFG. RECOMMENDATIONS. SEAL ALL BREAKS, JOINTS WITH ASJ TAPE.

3.0

PLUMBING

1. PROVIDE LABOUR, MATERIAL, EQUIPMENT AND SERVICES NECESSARY FOR AND INCIDENTAL TO SUPPLY AND INSTALLATION OF SYSTEMS SHOWN ON DRAWINGS.

2. GAS PIPING

2.1. GAS PIPING SHALL BE BLACK STEEL PIPE, EQUAL TO ASTM A-63 SCHEDULE 40 WITH 150 LB STANDARD BLACK MALLEABLE IRON SCREWED FITTINGS. ALL WORK SHALL COMPLY WITH CANCSA, A NATIONAL STANDARD OF CANADA, NATURAL GAS AND PROPANE INSTALLATION CODE B149-1-05, COMPLETE WITH MANITOBA DEPARTMENT OF LABOUR GAS NOTICES, AND SHALL BE PERFORMED BY FULLY QUALIFIED GAS FITTERS AND/OR WELDERS LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA.

3. JOINTING

3.1. MAKE ALL JOINTS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

3.2. BRACE FITTINGS NECESSARY TO PREVENT JOINTS FROM COMING APART UNDER PRESSURE.

3.3. MAKE JOINTS IN DOMESTIC WATER AND DRAINAGE SYSTEMS WITH SOLDER CONTAINING NO LEAD. SOLDER MATERIAL SHALL BE SILVERBRITTE 100 OR EQUAL CONSISTING OF COMBINATION OF TIN, COPPER AND SILVER.

4. CLEANING AND FLUSHING

4.1. ON COMPLETION, FLUSH OUT PIPING SYSTEM TO REMOVE ANY FOREIGN MATERIAL IN PIPING.

5. TESTING

5.1. PRESSURE TEST ALL PIPING SYSTEMS AS FOLLOWS:

5.1.1. PLUMBING SYSTEM - IN ACCORDANCE WITH LOCAL REGULATIONS.

5.1.2. WATER SUPPLY PIPING - TEST WITH WATER TO 100 PSIG AT HIGHEST POINT OF SYSTEM. MAINTAIN PRESSURE WITHOUT LOSS FOR 4 HOURS.

5.1.3. CONSULTANT'S REPRESENTATIVE SHALL WITNESS TESTS. GIVE 48 HOURS NOTICE IN ADVANCE OF TESTS.

5.1.4. NATURAL GAS SYSTEM - IN ACCORDANCE WITH LOCAL REGULATIONS.

6. HANGERS

6.1. WATER - GRINNELL CT65 PLATED CLEVIS.

6.2. DRAINAGE - GRINNELL 260 CLEVIS.

6.3. INSTALL HANGERS 6 FT. ON CENTRE FOR PIPES UP TO 1", 8 FT. ON CENTRE FOR PIPES 1 1/4" AND LARGER.

4.0

VENTILATION

1.1. GALVANIZED IRON SCHEDULE:

MAX. SIDE UP TO 24" 25 TO 30"

GAUGES (USSG) 24 24

BRACING NONE 1" X 1" X 1/8" ANGLE, 4' FROM JOINT.

31 TO 40"

22

1" X 1" X 1/8" ANGLE, 4' FROM JOINT.

ROUND DUCT UP TO 19"

26

NONE

1.2. WHERE DUCT WIDTH EXCEEDS 18" IN LARGEST DIMENSION, STIFFEN BY BREAKING SHEETS DIAGONALLY.

1.3. DUCT SIZES SHOWN ARE INSIDE DIMENSIONS. IF DUCTS ARE ACOUSTICALLY LINED, OUTSIDE DUCT SIZE TO BE INCREASED TO SUIT.

1.4. DUCTWORK SHALL BE CONSTRUCTED AS RECOMMENDED IN ASHRAE GUIDE.

1.5. SEAL ALL JOINTS (NEW AND EXISTING) AIRTIGHT WITH DURO-DYNE S-2 DUCT SEALER OR EQUAL, IN STRICT ACCORDANCE WITH MANUFACTURER'S PUBLISHED RECOMMENDATIONS. PRIOR TO APPLICATION, DUCTWORK TO BE DRY AND FREE OF GREASE, ETC. USE 1/4" BEAD OF MATERIAL ALONG JOINT, WHEN DRY, TO HAVE 1/8" DEPTH EXTENDING 1" ON EACH SIDE OF JOINT OR SEAM.

1.6. SIZE ROUND DUCTS, INSTALLED IN PLACE OF RECTANGULAR DUCTS, FROM ASHRAE TABLE OF EQUIVALENT RECTANGULAR AND ROUND DUCTS.

1.7. PRIOR TO FABRICATION OF DUCTWORK, CHECK ALL CEILING SPACES AND HEIGHTS FOR CONFLICTION WITH OTHER TRADES.

1.8.1. DUCT AND EQUIPMENT SUPPORTS, HANGERS AND INSERTS

1.8.2. SUPPORT HORIZONTAL DUCTS ON MAXIMUM 8'-0" CENTRES BY NON-PERFORATED GALV. STEEL, RIVETTED STRAP FOR DUCTWORK 36" (EITHER DIMENSION) OR LESS, AND MINIMUM 1" X 1" X 1/8" GALV. IRON PASSING UNDER DUCTS 37" OR OVER (EITHER DIMENSION) WITH 3/8" DIAM. THREADED RODS SUSPENDING ANGLES FROM STRUCTURE.

1.8.2. FOR INSERTS IN EXISTING CONCRETE, USE HILTI H.K.D. STEEL ANCHORS.

1.9. MANUAL VOLUME DAMPERS TO BE #16 GALV. STEEL, STIFFENED DAMPERS HARDWARE TO BE DURO-DYNE KS-145, KS-385 OR KS-12 AS RECOMMENDED BY MANUFACTURER.

1.10. NEW ROOF TOP UNIT RTU-2 AND CONDENSING UNIT CU-2

1.10.1. GENERAL

1.10.1.1. NEW ROOF TOP UNIT RTU-2 AND NEW CONDENSING UNITS ARE BASED ON ENGINEERED AIR PRODUCTS.

1.10.2. UNIT CONSTRUCTION

1.10.2.1. UNIT CASING SHALL BE OF MINIMUM 16 GA. ALUMINUM. SURFACES ON INDOOR AND OUTDOOR UNITS SHALL BE CLEANED WITH A DEGREASING SOLVENT TO REMOVE OIL AND METAL OXIDES. OUTDOOR UNITS SHALL BE PRIMED WITH A TWO-PART ACID BASED ETCHING PRIMER. ALL UNPROTECTED METAL AND WELDS SHALL BE FACTORY COATED.

1.10.2.2. ALL EXPOSED SURFACES SHALL HAVE A FINISH COAT OF ALKYD ENAMEL TO ALL EXPOSED SURFACES WITH AN ASTM B117 11 SALT SPRAY RATING OF 500 HRS.

1.10.2.3. ALL WALLS, ROOFS, AND FLOORS SHALL BE OF FORMED CONSTRUCTION WITH AT LEAST TWO BREAKS AT EACH JOINT. JOINTS SHALL BE SECURED BY SHEET METAL SCREWS OR POP RIVETS. WALL AND FLOOR JOINTS SHALL BE BROKEN IN AND ON ALL OUTDOOR UNITS ROOF JOINTS BROKEN OUT (EXPOSED) FOR RIGIDITY. ALL JOINTS SHALL BE CAULKED WITH A WATER RESISTANT SEALANT. UNITS SHALL BE PROVIDED WITH ACCESS DOORS TO THE FOLLOWING COMPONENTS: FANS, MOTORS, FILTERS, DAMPERS AND OPERATORS, ACCESS PLENUMS, HUMIDIFIERS/WET CELLS, ELECTRICAL CONTROL PANELS AND BURNER/COMPRESSOR COMPARTMENTS. ACCESS DOORS SHALL BE AS LARGE AS PRACTICAL FOR EASY ACCESS. SCREWED WALL PANEL ACCESS WILL NOT BE ACCEPTABLE FOR THE ABOVE LISTED COMPONENTS.

1.10.2.4. UNITS SHALL BE PROVIDED WITH ENGA MANUFACTURED HINGED ACCESS DOORS WITH E-PROFILE GASKET, FULLY LINED, AND A MINIMUM OF TWO LEVER HANDLES.

1.10.2.5. WHENEVER POSSIBLE, HINGED ACCESS DOORS TO AREAS OF NEGATIVE PRESSURE SHALL OPEN OUT, AND TO AREAS OF POSITIVE PRESSURE SHALL OPEN IN. WHERE SPACE CONSTRAINTS REQUIRE THE USE OF OUTWARD OPENING DOORS TO AN AREA OF POSITIVE PRESSURE, A CLEAR WARNING LABEL AND SAFETY DEVICE MUST BE AFFIXED.

1.10.2.6. ACCESS DOORS SHALL BE OPERABLE FROM INSIDE THE UNIT AIR TUNNEL. LIFT OUT ACCESS PANELS SCREWED, BOLTED, OR SECURED WITH TWO OR MORE CAMLOCK FASTENERS IN LOCATIONS WHERE IT WOULD BE BENEFICIAL FOR NON-REGULAR ACCESS.

1.10.2.7. ALL UNITS SHALL BE INTERNALLY INSULATED WITH 2" (51 MM) THICK, 1 1/2 LB./ FT.3 (24 KG/M3) DENSITY COATED INSULATION.

1.10.2.8. THE COATED INSULATION SHALL BE SECURED TO METAL PANELS WITH A FIRE RETARDANT ADHESIVE AND WELDED STEEL PINS AT 18" (450 MM) O/C. ALL LONGITUDINAL INSULATION JOINTS AND BUTT ENDS SHALL BE COVERED BY A SHEET METAL BREAK TO PREVENT DETERIORATION OF EXPOSED EDGES. DRAIN PANS AS NOTED ON DRAWINGS SHALL BE INSULATED ON THE UNDERSIDE OF UNIT CASING FLOORS IN WALK IN SECTIONS SHALL BE FABRICATED WITH 14 GA (2.0 MM) GALVANIZED CHECKER PLATE STEEL. PROVIDE REINFORCING CHANNELS UNDER FLOOR TO MINIMIZE DEFLECTION.

1.10.2.9. COOLING COIL DRAIN PANS SHALL BE FABRICATED OF 304 STAINLESS STEEL AND ARE AN INTEGRAL PART OF THE FLOOR PANELING, A MINIMUM OF 2" (51 MM) DEEP WITH WELDED CORNERS. DRAIN PANS SHALL EXTEND A MINIMUM OF 6" (152 MM) DOWNSTREAM OF COIL FACE AND BE PROVIDED WITH A 1 1/2" (38 MM) S.S. M.P.T. DRAIN CONNECTION. ALL COOLING COIL DRAIN PANS SHALL HAVE A FAST PAN AND BE SLOPED AND PITCHED SUCH THAT THERE IS NO STANDING WATER. INTERMEDIATE DRAIN PANS SHALL BE PROVIDED WHERE REQUIRED FOR EFFECTIVE MOISTURE REMOVAL.

1.10.2.10. OUTDOOR UNITS SHALL BE WEATHERPROOFED AND EQUIPPED FOR INSTALLATION OUTDOORS. UNITS SHALL BE FABRICATED TO PREVENT THE INFILTRATION OF RAIN AND SNOW. LOUVERS OR HOODS SHALL BE PROVIDED ON AIR INTAKES AND EXHAUST OPENINGS. RAIN GUTTERS OR DIVERTERS SHALL BE INSTALLED OVER ALL ACCESS DOORS. ALL JOINTS SHALL BE CAULKED WITH A WATER RESISTANT SEALANT. THE ROOF JOINTS SHALL BE TURNED UP 2" (51 MM) WITH THREE BREAK INTERLOCKING DESIGN AND THE OUTER WALL PANELS SHALL EXTEND A MINIMUM OF 1/2" (6 MM) BELOW THE FLOOR PANEL.

1.10.2.11. OUTDOOR UNITS OVER 16 FT. (4.9 M) WIDE, OVER 10 FT. (3.1 M) HIGH, EQUIPPED WITH A SLOPED ROOF, OR WITH UNIT SPLT(S) SHALL BE PROVIDED WITH A MEMBRANE ROOF TO ENSURE PREVENTION OF INFILTRATION OF RAIN AND SNOW THROUGH THE TOP OF THE UNIT.

1.10.2.12. MEMBRANE ROOF MATERIAL SHALL CONFORM TO ASTM TEST METHODS D-638, D-3045, D-1004, D-2136, G154, D-5670, AND D-5635. THE MEMBRANE ROOF MATERIAL SHALL MEET OR EXCEED CAN/CSG8 37.54-M 1995 TYPE II CLASS A & B. ROOFING MATERIAL IS MINIMUM 48 MIL (1.2 MM) THICK THERMOPLASTIC MEMBRANE WITH FIBERGLASS REINFORCEMENT. MEMBRANE IS ADHERED TO ROOF SURFACE WITH CLEAR SOLVENT BASE CONTACT ADHESIVE. ALL ROOF SURFACES SHALL HAVE ROLLED OVER EDGES TO ENSURE PROPER WATER RUNOFF. MEMBRANE COLOR SHALL BE WHITE.

1.10.2.13. PROVIDE FULL PERIMETER ROOF MOUNTING CURB OF HEAVY GAUGE SHEET METAL AT A MINIMUM OF 24" (610 MM) HIGH COMPLETE WITH WOOD NAILER, NEOPRENE SEALING STRIP, AND FULLY WELDED 2" BAR WITH 1" (25 MM) UPTURN ON INNER PERIMETER TO PROVIDE A COMPLETE SEAL AGAINST THE ELEMENTS. EXTERNAL INSULATION AND FLASHING OF THE ROOF-MOUNTING CURB SHALL BE PROVIDED BY THE ROOFING SUBCONTRACTOR.

2. FANS

2.1. CENTRIFUGAL FANS SHALL BE RATED IN ACCORDANCE WITH AMCA STANDARD TEST CODE BULLETIN 210. FAN MANUFACTURER SHALL BE A MEMBER OF AMCA. ALL FANS AND FAN ASSEMBLIES SHALL BE DYNAMICALLY BALANCED DURING FACTORY TEST RUN. FAN SHAFTS SHALL BE SELECTED FOR STABLE OPERATION AT LEAST 20% BELOW THE FIRST CRITICAL RPM. FAN SHAFTS SHALL BE PROVIDED WITH A RUST INHIBITING COATING.

2.2. SINGLE LOW PRESSURE FORWARD CURVED FANS OF 18" (457 MM) DIAMETER OR SMALLER SHALL BE EQUIPPED WITH PERMANENTLY LUBRICATED CARTRIDGE BALL BEARINGS SUPPORTED BY A THREE POINT "SPIDER" BEARING BRACKET IN THE FAN INLETS.

2.3. SINGLE LOW PRESSURE FORWARD CURVED FANS OF 18" (457 MM) DIAMETER OR SMALLER SHALL BE EQUIPPED WITH GREASEABLE PILLOW BLOCK BEARINGS SUPPORTED ON A RIGID STRUCTURAL STEEL FRAME.

2.4. SINGLE LOW PRESSURE FORWARD CURVED FANS OF 20" (508 MM) DIAMETER OR LARGER SHALL BE EQUIPPED WITH GREASEABLE PILLOW BLOCK BEARINGS SUPPORTED ON A RIGID STRUCTURAL STEEL FRAME.

2.5. BACKWARD INCLINED FANS WITH AIRFOIL OR FLAT BLADE DESIGN SHALL BE EQUIPPED WITH CORRESPONDING BALL OR ROLLER TYPE PILL BLOCK BEARINGS.

2.6. FAN MOTOR SHEAVES SHALL BE ADJUSTABLE WITH MOTORS 7 1/2 HP (5.6 KW) AND SMALLER. ON FANS WITH LARGER MOTORS, FIXED DRIVES SHALL BE PROVIDED. ALL DRIVES SHALL BE PROVIDED WITH A RUST INHIBITING COATING. THE AIR BALANCE SHALL PROVIDE FOR DRIVE CHANGES (IF REQUIRED) DURING THE AIR BALANCE PROCEDURE.

2.7. PROVIDE FULL SECTION RETURN AIR FAN(S) AS SCHEDULED. THE USE OF POWER EXHAUST PROPELLER TYPE ARRANGEMENTS WILL NOT BE CONSIDERED.

2.8. FAN AND MOTOR SHEAVES SHALL BE FACTORY INSTALLED, FAN BALANCED, AND TESTED PRIOR TO SHIPMENT.

3. COILS

3.1. COILS SHALL HAVE 1/2" O.D. DIAMETER TUBES AS MANUFACTURED BY ENGINEERED AIR AND CONSTRUCTED OF COPPER TUBE, ALUMINUM FIN, AND COPPER HEADERS WITH SWEAT CONNECTORS.

3.2. FINS CONSTRUCTED OF ALUMINUM OR COPPER SHALL BE CORRUGATED FOR MAXIMUM HEAT TRANSFER AND SHALL BE MECHANICALLY BONDED TO THE TUBES BY MECHANICAL EXPANSION OF THE TUBES. THE COILS SHALL HAVE A GALVANIZED STEEL CASING. ALL HYDRONIC AND DX REFRIGERANT COILS SHALL BE FACTORY TESTED WITH AIR AT 300 PSIG (2068 KPA) WHILE IMMERSED IN AN ILLUMINATED WATER TANK. ALL CONDENSER REFRIGERANT COILS SHALL BE FACTORY TESTED WITH AIR AT 650 PSIG (4482 KPA) WHILE IMMERSED IN AN ILLUMINATED WATER TANK.

4. GAS HEAT SECTION (DXJ, DJS, DUE) - INDIRECT FIRED

4.1. GENERAL

4.1.1. HEATING UNITS SHALL BE INDIRECT NATURAL GAS FIRED APPROVED FOR BOTH SEA LEVEL AND HIGH ALTITUDE ELEVATIONS. THE ENTIRE PACKAGE INCLUDING DAMPER CONTROLS, FAN CONTROLS, AND ALL OTHER MISCELLANEOUS CONTROLS AND ACCESSORIES SHALL BE PRE-WIRED AND FACTORY CERTIFIED BY AN APPROVED TESTING AGENCY SUCH AS ETL, UL OR CSA FOR THE DESTINATION.

4.1.2. OPERATING NATURAL GAS PRESSURE UNITS SHALL BE 7" WC (1750 PA)

4.1.3. GAS MANIFOLDS SHALL BE PROVIDED IN PERM STANDARDS.

4.1.4. GAS FIRED UNITS SHALL BE APPROVED FOR OPERATION IN -40°F (-40°C) LOCATIONS.

4.1.5. INSTALLATION AND VENTING PROVISIONS MUST BE IN ACCORDANCE WITH INSTALLATION CODE CAN/CSA B149-1, ANSI Z223.1-NFPA54 AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION.

4.2. HEAT EXCHANGER/BURNER ASSEMBLY SHALL BE A PRIMARY DRUM AND MULTI-TUBE SECONDARY ASSEMBLY CONSTRUCTED OF TITANIUM STAINLESS STEEL WITH MULTI-PLANE METAL TURBULATORS AND SHALL BE OF A FLOATING STRESS RELIEF DESIGN. HEAT EXCHANGER SHALL BE PROVIDED WITH CONDENSATE DRAIN CONNECTION. THE HEAT EXCHANGER CASING SHALL HAVE 1" (25 MM) OF INSULATION BETWEEN THE OUTER CABINET AND INNER HEAT REFLECTIVE SATIN COAT GALVANIZED STEEL LINER. BLOWER LOCATION SHALL BE ENGINEERED TO OPTIMIZE THE REQUIRED AIR FLOW PATTERN AROUND THE HEAT EXCHANGER. DUCT TYPE FURNACES WITH CLOSED COUPLED BLOWERS ARE NOT ACCEPTABLE.

4.2.2. UNITS WITH HIGH EFFICIENCY HEAT EXCHANGERS SHALL BE TESTED AND CERTIFIED TO THE NATIONAL ENERGY CODE OF CANADA AND LOCAL AUTHORITIES HAVING JURISDICTION. A MINIMUM OF 80% EFFICIENCY SHALL BE PROVIDED THROUGHOUT THE ENTIRE OPERATING RANGE OF THE HEAT EXCHANGER. THE MANUFACTURER SHALL BE ROUTINELY ENGAGED IN THE MANUFACTURE OF THIS TYPE OF HIGH EFFICIENCY EQUIPMENT.

4.2.3. THE HEAT EXCHANGER/BURNER ASSEMBLY SHALL BE A BLOW THROUGH POSITIVE PRESSURE TYPE. UNITS INCORPORATING THE NEXTGEN BASE MODULE SHALL HAVE AN INTERRUPTED PILOT IGNITION SYSTEM TO PROVIDE INCREASED SAFETY. UNITS USING CONTINUOUS OR INTERMITTENT PILOTS ARE NOT ACCEPTABLE.

4.2.4. FLAME SURVEILLANCE SHALL BE FROM THE MAIN FLAME AREA AFTER IGNITION NOT THE PILOT FLAME. THE BURNER AND GAS TRAIN SHALL BE IN A CABINET ENCLOSURE. ATMOSPHERIC BURNERS OR BURNERS REQUIRING POWER ASSISTED VENTING ARE NOT ACCEPTABLE.

4.3. FACTORY TESTING OF INDIRECT FIRED GAS HEATING SECTION.

4.3.1. THE MINIMUM TEST REQUIREMENTS FOR ALL CABINET / FAN SIZE / FAN TYPE / FAN ORIENTATION / HEAT EXCHANGER / OUTLET CONFIGURATION COMBINATIONS PREVIOUSLY BUILT ARE LISTED BELOW:

4.3.1.1. TESTS SHALL BE PERFORMED AFTER COMPLETE FINAL UNIT ASSEMBLY JUST PRIOR TO SHIPPING TO JOB SITE. THE TESTS SHALL BE PERFORMED IN ACCORDANCE WITH THE EQUIPMENT STANDARD THAT THE GAS HEATING SECTION IS CERTIFIED.

4.3.1.2. HEAT EXCHANGER SHALL BE CLOCKED WITH A DEDICATED CALIBRATED GAS METER TO ENSURE PROPER SET UP OF THE GAS MANIFOLD.

4.3.1.3. HIGH AND LOW INPUT FLUE GAS COMBUSTION ANALYSIS USING A CALIBRATED COMBUSTION ANALYZER INCLUDING O2 AND CO TO PROVIDE PROPER AIR FUEL RATIO THROUGHOUT THE ENTIRE OPERATING RANGE.

4.4. VENTING

4.4.1. OUTDOOR DUE UNITS PROVIDED WITH WEDGE STYLE VENT.

4.4.2. OUTDOOR DJS UNIT PROVIDED WITH A VERTICAL STYLE DOUBLE WALL INSULATED VENT AND EXTENSION.

4.4.3. OUTDOOR VENTING WHEN INSTALLED CLOSE TO A PARAPET OR WALL:

4.4.4. A WEDGE STYLE VENT (NOT AVAILABLE WITH DJS UNITS FOR WINTER DESIGN CONDITIONS BELOW 20°F (-8.9°C)) SHALL BE USED NEAR A PARAPET OR WALL PROVIDED:

4.4.4.1. THE FLUE GASES DO NOT CAUSE CORROSION OR DAMAGE TO THE PARAPET OR WALL, AND

4.4.4.2. THE POSSIBILITY OF FLUE GASES ENTERING THE EQUIPMENT INTAKE AIRSTREAM DOES NOT EXIST, A VERTICAL STYLE FLUE SHALL BE PROVIDED THAT TERMINATES APPROXIMATELY 6" (150 MM) ABOVE THE UNIT'S ROOF. WHERE FLUE REQUIREMENTS MUST HAVE A TERMINATION THAT IS HIGHER THAN 6" (150 MM) ABOVE THE UNIT'S ROOF, AN ENGINEERED AIR EXTENDED FLUE SHALL BE PROVIDED (6" (2.4 M) MAXIMUM).

4.5. THE HEAT EXCHANGER/BURNER ASSEMBLY SHALL INCLUDE 15:1 TURNDOWN FOR ALL INPUT RANGES. THE HIGH TURN DOWN HEAT EXCHANGER/BURNER ASSEMBLY MINIMUM INPUT SHALL BE CAPABLE OF CONTROLLING DOWN TO 6.7% OF ITS RATED INPUT, EXCLUDING THE PILOT ASSEMBLY, WITHOUT ON/OFF CYCLING AND INCLUDE BUILT IN ELECTRONIC LINEARIZATION OF FUEL AND COMBUSTION AIR. EFFICIENCY SHALL INCREASE FROM HIGH TO LOW FIRE.

4.6. THE HEAT EXCHANGER/BURNER ASSEMBLY SHALL BE PROVIDED WITH A PRE-SET LOW FLOW (MODULATING FUEL AND COMBUSTION AIR) SHALL BE COMPLETE WITH PROPORTIONAL AND INTEGRAL CONTROL AND DISCHARGE AIR SENSOR TO MAINTAIN SET POINT TEMPERATURE AND PROVIDE RAPID RESPONSE TO INCREMENTAL CHANGES IN THE DISCHARGE AIR TEMPERATURE.

4.6.1. THE CONTROLLER SHALL BE CERTIFIED BY ETL.

4.6.2. THE COMBUSTION AIR MOTOR SPEED SHALL VARY PROPORTIONALLY IN RESPONSE TO THE MODULATING FUEL FLOW RATE TO MAINTAIN SET POINT TEMPERATURE AND EFFICIENCY AT ALL CONDITIONS. THE COMBUSTION BLOWER RPM SHALL BE PROVIDED USING A HALL EFFECT SENSOR. EFFICIENCY OF THE HEAT EXCHANGER SHALL INCREASE AS THE FIRING RATE DECREASES.

4.6.3. THE CONTROLLER SHALL PROVIDE A PRE-PURGE AND POST PURGE CYCLE TO PROVIDE A MINIMUM OF FOUR AIR CHANGES FOR EACH PURGE CYCLE THROUGH THE HEAT EXCHANGER.

4.6.4. THE CONTROLLER SHALL PROVIDE A LOW FIRE START WITH CONTROLLED BURNER STARTUP AND SHUTDOWN.

4.6.5. TO ENSURE LONGEVITY OF THE EQUIPMENT, THE CONTROLLER SHALL PROVIDE HEAT EXCHANGER COOLDOWN TIMING.

4.6.6. FOR MUA APPLICATIONS, THE BLOWER SHALL NOT START UNTIL AFTER THE BURNER PRE-PURGE AND POST PURGE ARE COMPLETE IF THE AMBIENT TEMPERATURE IS MORE THAN 8°F (4.4°C) COOLER THAN THE SETPOINT AND AMBIENT IS BELOW 20°F (-7°C)

5. FILTERS

5.1. FILTER SECTIONS SHALL BE PROVIDED WITH ADEQUATELY SIZED ACCESS DOORS TO ALLOW EASY REMOVAL OF FILTERS. FILTER REMOVAL SHALL BE FROM ONE SIDE OF THE UNIT AS NOTED ON THE DRAWINGS.

5.2. THE FILTERER SHALL BE DESIGNED TO SLIDE OUT OF THE UNIT. SIDE REMOVAL FILTERS SHALL SLIDE INTO A FORMED METAL TRACK SEALING AGAINST METAL SPACERS AT EACH END OF THE TRACK.

5.3. FILTERS SHALL BE INSERTED INTO A FRAME GRID FROM THE UPSTREAM SIDE OF THE FILTER SECTION. AIR FILTER HOLDING FRAMES SHALL BE SATIN COATED GALVANIZED STEEL WITH FILTER SEALS. FLANGE, CENTERING DIMPLES, SEALING GASKET, AND LANCES FOR APPLICABLE SELF-ALIGNING BALL OR FLAT TYPE PILL BLOCK BEARINGS. FAN MOTOR SHEAVES SHALL BE ADJUSTABLE WITH MOTORS 7 1/2 HP (5.6 KW) AND SMALLER. ON FANS WITH LARGER MOTORS, FIXED DRIVES SHALL BE PROVIDED. ALL DRIVES SHALL BE PROVIDED WITH A RUST INHIBITING COATING. THE AIR BALANCE SHALL PROVIDE FOR DRIVE CHANGES (IF REQUIRED) DURING THE AIR BALANCE PROCEDURE.

5.4. CARTRIDGE OR BAG FILTERS SHALL SLIDE INTO AN EXTRUDED ALUMINUM TRACK AGAINST A GASKETED SEALER STRIP. ASSOCIATED 2" (50 MM) PRE-FILTERS SHALL SLIDE INTO AN INTEGRAL TRACK IN THE ALUMINUM EXTRUSION.

5.5. THE FILTERS SHALL BE LIFT OUT FROM AN ACCESS PLENUM UPSTREAM OF THE FILTERS. LIFT OUT FILTERS SHALL FIT INTO A HORIZONTAL TRACK FROM WHICH THEY ARE LIFTED UP AND OUT.

5.6. 2" (50 MM) EXTENDED MEDIA (PLEATED) DISPOSABLE FILTERS: FILTERS SHALL BE EXTENDED SURFACE PLEATED COMPLETE WITH 100% SYNTHETIC MEDIA THAT DOES NOT SUPPORT MICROBIAL GROWTH. FRAME SHALL BE A HIGH WET STRENGTH BEVERAGE FOAM WITH A CROSS HATCH REINFORCING MAT. FACTORY DESIGN WITH 30% FACTOR OF BREACHING. FRAME SHALL BE RECYCLABLE. FILTERS SHALL HAVE AN EXPANDED METAL SUPPORT GRID BONDED TO THE AIR-EXITING SIDE OF THE FILTER TO MAINTAIN PLAT UNIFORMITY AND PREVENT FLUTTERING. METAL SUPPORT GRID SHALL BE RECYCLABLE.

THE FILTERERS SHALL BE MERV 8 ASHRAE 52.2. AND RATED U.L. 900 CLASS II. A PERMANENT RE-USABLE METAL ENCLOSING FRAME SHALL BE PROVIDED FOR SIDE LOADED APPLICATIONS.

5.7. WHERE THE FILTERERS ARE PROVIDED IN AIR HANDLING UNITS FOR MAKE-UP AIR APPLICATIONS AND WHERE A HOAR FROST MAY OCCUR, ONLY STEEL FRAME FILTERS ARE ACCEPTABLE. WHERE INDICATED, UNITS SHALL HAVE BOTH SUMMER (UPSTREAM OF HEATING COIL OR GAS HEAT EXCHANGER) AND WINTER (DOWNSTREAM OF HEATING COIL OR GAS HEAT EXCHANGER) FILTER SECTIONS. ONLY ONE SET OF FILTERS SHALL BE INSTALLED IN EITHER THE SUMMER OR WINTER FILTER SECTION DEPENDENT UPON AMBIENT CONDITIONS.

6. DAMPERS

6.1. EXTRUDED ALUMINUM (6063-T5) DAMPER FRAME SHALL NOT BE LESS THAN 0.080" (2.03 MM) IN THICKNESS. DAMPER FRAME SHALL BE 4" (101.6 MM) DEEP X 1" (25.4 MM), WITH DUCT MOUNTING FLANGES ON BOTH SIDES OF FRAME. DAMPER FRAME SHALL HAVE A 2" (50.8 MM) MOUNTING FLANGE ON THE REAR OF THE DAMPER, WHEN INSTALLED AS EXTENDED REAR FLANGE INSTALL. TYPE. FRAME TO BE ASSEMBLED USING ZINC-PLATED STEEL MOUNTING FASTENERS. WELDED FRAMES SHALL NOT BE ACCEPTABLE.

6.2. BLADES SHALL BE MAXIMUM 6" (152.4 MM) DEEP EXTRUDED ALUMINUM (6063-T5) AIR-FOIL PROFILES WITH A MINIMUM WALL THICKNESS OF 0.06" (1.52MM). BLADES SHALL BE INTERNALLY INSULATED WITH EXPANDED POLYURETHANE FOAM AND SHALL BE THERMALLY BROKEN. COMPLETE BLADE SHALL HAVE AN INSULATING FACTOR OF R-2.29.

6.3. ALL SIDES SHALL BE METRICALLY PIVOTED.

6.4. BLADE SEALS SHALL BE EXTRUDED EPDM, SECURED IN AN INTEGRAL SLOT WITHIN THE ALUMINUM BLADE EXTRUSIONS AND SHALL BE MECHANICALLY FASTENED TO PREVENT SHRINKAGE AND MOVEMENT OVER THE LIFE OF THE DAMPER. ADHESIVE OR CLIP-ON TYPE BLADE SEALS WILL NOT BE APPROVED.

6.5. FRAME SEALS SHALL BE EXTRUDED SILICONE, SECURED IN AN INTEGRAL SLOT WITHIN THE ALUMINUM BLADE EXTRUSIONS AND SHALL BE MECHANICALLY FASTENED TO PREVENT SHRINKAGE AND MOVEMENT OVER THE LIFE OF THE DAMPER. METALLIC COMPRESSION TYPE JAMB SEALS WILL NOT BE APPROVED.

6.6. BEARINGS SHALL BE A DUAL BEARING SYSTEM COMPOSED OF A CELCON INNER BEARING (FIXED AROUND A 7/16" (11.11 MM) ALUMINUM HEXAGON BLADE PIVOT PIN), ROTATING WITHIN A POLYCARBONATE OUTER BEARING INSERTED IN THE FRAME. SINGLE AXLE BEARINGS, ROTATING IN AN EXTRUDED OR PUNCHED HOLE SHALL NOT BE ACCEPTABLE.

6.7. BEARINGS ARE TO BE MAINTENANCE-FREE, REQUIRING NO LUBRICATION.

6.8. HEXAGONAL CONTROL SHAFT SHALL BE 7/16" (11.11 MM). IT SHALL HAVE AN ADJUSTABLE LENGTH AND SHALL BE AN INTEGRAL PART OF THE BLADE AXLE. A FIELD-APPLIED CONTROL SHAFT SHALL NOT BE ACCEPTABLE. ALL PARTS SHALL BE ZINC-PLATED STEEL. LINKAGE HARDWARE SHALL BE ALUMINUM AND CORROSION-RESISTANT ZINC-PLATED STEEL. OUTER CABINET AND INNER HEAT REFLECTIVE SATIN COAT GALVANIZED STEEL LINER. BLOWER LOCATION SHALL BE ENGINEERED TO OPTIMIZE THE REQUIRED AIR FLOW PATTERN AROUND THE HEAT EXCHANGER. DUCT TYPE FURNACES WITH CLOSED COUPLED BLOWERS ARE NOT ACCEPTABLE.

6.9. METAL RUBBING METAL WILL NOT BE APPROVED.

6.10. DAMPERS SHALL BE DESIGNED FOR OPERATION IN TEMPERATURES RANGING FROM -40°F (-40°C) TO 140°F (60°C).

6.11. DAMPERS SHALL BE AMCA RATED FOR LEAKAGE CLASS 1A AT 1 IN W.G. (0.25 KPA) STATIC PRESSURE DIFFERENTIAL. STANDARD AIR LEAKAGE DATA TO BE CERTIFIED UNDER THE AMCA CERTIFIED RATINGS PROGRAM.

6.12. DAMPERS SHALL BE CUSTOM MADE TO REQUIRED SIZE, WITH BLADE STOPS NOT EXCEEDING 1/4" (31.7 MM) IN HEIGHT. THE BLADE STOP SHALL BE A CONTINUOUS AND INTERLOCKED TO THAT WHEN THE UNIT IS SHUT DOWN, OR ON A POWER FAILURE, THE DAMPER SHALL RETURN TO THE CLOSED POSITION.

6.13. MAKEUP AIR INLET DAMPER CONTROL SHALL BE COMPLETE WITH A TWO POSITION, NORMALLY CLOSED ELECTRIC DAMPER OPERATOR. THIS DAMPER OPERATOR SHALL BE INTERLOCKED SO THAT WHEN THE UNIT IS SHUT DOWN, OR ON A POWER FAILURE, THE DAMPER SHALL RETURN TO THE CLOSED POSITION.

6.14. MAKEUP AIR INLET DAMPER CONTROL SHALL BE COMPLETE WITH A TWO POSITION, NORMALLY CLOSED ELECTRIC DAMPER OPERATOR. THIS DAMPER OPERATOR SHALL BE INTERLOCKED SO THAT WHEN THE UNIT IS SHUT DOWN, OR ON A POWER FAILURE, THE DAMPER SHALL RETURN TO THE CLOSED POSITION.

6.15. FOR BLOW THROUGH HEAT EXCHANGER MAKE-UP AIR APPLICATIONS (INDIRECT FIRED GAS FIRED UNITS), A FLOW COMPENSATOR DAMPER PACKAGE CONSISTING OF OPPOSED BLADE INLET AIR DAMPERS, THREE POSITION DAMPER OPERATOR, AND AMBIENT SETBACK THERMOSTAT TO COMPENSATE FOR AMBIENT TEMPERATURE VARIATIONS.

7. MECHANICAL COOLING

7.1. MECHANICAL COOLING SHALL BE HERMETIC SCROLL TYPE SET ON RESILIENT NEOPRENE MOUNTS. THE COMPRESSORS SHALL INCORPORATE AN INTERNAL OR EXTERNAL PRESSURE-LIMITING DEVICE TO PROTECT THE COMPRESSOR IN THE EVENT OF OVERPRESSURE. COMPRESSORS SHALL BE PROVIDED WITH A MEANS OF OVERLOAD PROTECTION. EXTERNAL CRANKCASE HEATERS SHALL BE LOCKED OUT DURING COMPLETION OF INSTALLATION.

7.2. AIR COOLED CONDENSER

7.2.1. CONDENSER COILS SHALL BE COPPER TUBE TYPE, MECHANICALLY EXPANDED INTO ALUMINUM FINS. COILS SHALL BE FACTORY PRESSURE TESTED WITH AIR WHILE IMMERSED IN AN ILLUMINATED WATER TANK.

7.2.2. CONDENSER FANS SHALL BE DIRECT DRIVE PROPELLER TYPE ARRANGED FOR VERTICAL DRAW THROUGH AIRFLOW. MOTOR ASSEMBLIES SHALL BE WEATHER RESISTANT TYPE WITH INTEGRAL OVERLOAD PROTECTION AND DESIGNED FOR VERTICAL SHUT CONDENSER FAN APPLICATIONS. FAN AND MOTOR ASSEMBLIES SHALL BE MOUNTED IN A VENTURI FOR OPTIMUM EFFICIENCY WITH MINIMUM NOISE LEVEL.

7.2.3. CONDENSER FANS SHALL BE FULLY HOUSED FAN WITH PROTECTIVE SCREEN AND FLUTED BLADES FOR OPTIMUM EFFICIENCY WITH MINIMUM NOISE LEVEL.

7.3. SPLIT SYSTEM CONDENSING UNITS

7.3.1. THE ENTIRE PACKAGE INCLUDING FAN CONTROLS, HEAD PRESSURE CONTROL, AND ALL OTHER MISCELLANEOUS CONTROLS AND ACCESSORIES SHALL BE PRE-WIRED AND FACTORY CERTIFIED BY AN APPROVED TESTING AGENCY SUCH AS ETL, UL OR CSA FOR THE DESTINATION.

7.3.2. THE SYSTEM SHALL CONFORM TO REGULATIONS SET OUT IN THE CANADIAN ENERGY EFFICIENCY ACT FOR CONDENSING UNITS (1.25 TO 20 TONS). PACKAGED UNITS SHALL BE TESTED TO CSA STANDARD C746-17 AND MUST BEAR AN EEV (ENERGY EFFICIENCY VERIFICATION) LABEL PROVIDED BY CSA.

7.3.3. CONDENSING UNITS SHALL BE DESIGNED FOR A MINIMUM OF 15°F (8.3°C) LIQUID SUB-COOLING. CONDENSING UNITS SHALL OPERATE DOWN TO 50°F (10°C) FOR MIXED AIR AND 58°F (14.4°C) FOR MAKE-UP-AIR AS APPLICATIONS. WHERE APPLICABLE, MULTIPLE COMPRESSOR/CONDENSER CIRCUITS SHALL BE SEPARATE FROM EACH OTHER. SUCTION AND LIQUID LINES SHALL BE EXTENDED TO THE OUTSIDE OF THE CABINET. SERVICE PORTS FITTED WITH SOHRADER FITTINGS SHALL BE CONNECTED TO THE SUCTION AND DISCHARGE LINES FOR CHARGING OR PRESSURE GAUGE READINGS.

7.3.4. CONTROLS FOR HERMETIC COMPRESSOR UNITS SHALL INCLUDE COMPRESSOR AND CONDENSER FAN MOTOR CONTACTORS, CONTROL CIRCUIT TRANSFORMER, COOLING RELAYS, NON-RECYCLING PUMP DOWN RELAYS, AMBIENT COMPRESSOR LOCKOUT, ANTI SHORT CYCLE AND INTER STAGE TIMERS, MANUAL RESET HIGH PRESSURE CONTROLS, AND AUTOMATIC RESET LOW PRESSURE CONTROLS. HEAD PRESSURE ACTUATED FAN CYCLING CONTROL SHALL BE PROVIDED ON ALL MULTIPLE CONDENSER UNITS.

7.3.5. FREEZE PROTECTION PROVIDE BY HOT GAS BYPASS CONNECTION ON THE LEAD COMPRESSOR.

7.3.6. PROVIDE LOW AMBIENT OPERATION TO 58°F (14.4°C).

7.3.7. PROVIDE SEPARATE COMPRESSOR COMPARTMENT COMPLETE WITH 1" (25 MM), 1-1/2 LB./FT.3 (24 KG/M3) ACOUSTICAL COATED INSULATION AND HINGED ACCESS DOORS.

7.3.8. REFRIGERATION SPECIALTIES SHALL BE PROVIDED SUCH AS SOLID VALVES, ETC. TO BE SUPPLIED AND INSTALLED BY REFRIGERATION CONTRACTOR.

7.3.9. CONDENSING UNIT DESIGNED FOR 30 FT. (9.2 M) OR LESS (STANDARD UNITS).

7.3.10. THE PIPING SYSTEM SHALL BE PURGED AND PRESSURE TESTED WITH DRY NITROGEN, THEN TESTED AGAIN UNDER VACUUM. THE EQUIPMENT PIPING SHALL BE SHIPPED WITH A NITROGEN FILLING CHARGE.

7.4. PACKAGED CONDENSING UNITS

7.4.1. THE ENTIRE PACKAGE INCLUDING FAN CONTROLS, HEAD PRESSURE CONTROL, AND ALL OTHER MISCELLANEOUS CONTROLS AND ACCESSORIES SHALL BE PRE-WIRED AND FACTORY CERTIFIED BY AN APPROVED TESTING AGENCY SUCH AS ETL, UL OR CSA FOR THE DESTINATION.

7.4.2. UNIT MUST CONFORM TO REGULATIONS SET OUT IN THE CANADIAN ENERGY EFFICIENCY ACT FOR LARGE AIR CONDITIONERS. PACKAGED UNITS SHALL BE TESTED TO CSA STANDARD C746-17 AND MUST BEAR AN EEV (ENERGY EFFICIENCY VERIFICATION) LABEL PROVIDED BY CSA.

7.4.3. UNIT MUST CONFORM TO REGULATIONS SET OUT BY THE DEPARTMENT OF ENERGY FOR LARGE AIR CONDITIONERS. PACKAGED UNITS SHALL BE TESTED TO AHRI 340/360-2007 AND MUST BEAR AN EEV (ENERGY EFFICIENCY VERIFICATION) LABEL PROVIDED BY CSA.

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