1.1. GENERAL

1.1.1. The heat recovery devices shall transfer heat between the outgoing and incoming airstreams in a counter flow arrangement, and shall be labeled for direction of airflow, noting inlets and outlets of exhaust and supply.

1.1.2. The heat recovery devices shall be passive devices, requiring no other means for heat transfer, and shall be capable of operating at temperatures ranging from -28^{O}C (-20^{O}F) minimum to 72^{O}C (180^{O}F) maximum.

1.2. HEAT PIPE RECOVERY DEVICES

1.2.1. Air-to-Air Heat Pipe Heat Exchanger:

1.2.1.1. Heat pipes shall be 12mm (½ inch) to 25 mm (1 inch) outer diameter, seamless, internally rifled copper tubes permanently expanded into aluminum fins.

1.2.1.2. The finned tube coils shall have aluminum fins, 0.006" minimum thickness, with enhancement (corrugated wave, sine wave, or louvered) to meet the performance and pressure drop requirements. Fin density shall be 10-12 fins per inch. Heat pipes shall be spaced vertically at up to 32mm (1¼ inches) on center, with the distance between successive rows of 25mm (1 inch) on center.

1.2.1.3. Heat pipes shall be individually processed, individually charged, and hermetically sealed.

1.2.1.4. Tube Construction: Heat pipe tubes must be wicked. The capillary wick of each heat pipe shall be an integral part of the inner wall of the tube to provide a completely welted surface for maximum heat pipe capacity with minimum heat transfer resistance.

1.2.2. Working Fluid:

1.2.2.1. The working fluid refrigerant shall be selected on the basis of heat pipe operating temperature and compatibility with heat pipe tube material. Heat pipe heat exchanger refrigerant used shall be classified as ASHRAE safety group A1.

1.2.3. Protective Heat Pipe Heat Exchanger Enclosure:

1.2.3.1. The heat exchanger frame shall be fabricated from minimum 16-gauge galvanized steel. The frame shall be supplied with a minimum of 38mm (1½

inch) wide flanges on all four sides, both front and back. Intermediate heat pipe supports and lifting points shall be furnished as required.

1.2.3.2. The heat exchanger shall be provided with a partition to isolate the outgoing and incoming airstreams; there shall be no cross contamination. The partition shall be fabricated from a minimum 16-gauge, galvanized steel and shall extend beyond the finned surface with a 75mm (3 inch) mid-seal (equally divided between the two sides).

1.2.3.3. End cover plates shall be provided to protect the heat pipe ends from possible installation damage. End plates shall be fabricated from minimum 16-gauge galvanized steel.

1.2.3.4. Drain pans shall be provided under both coils.

1.2.4. Frost Control

1.2.4.1. Face & Bypass Control: The supply air side of the heat pipe shall be equipped with opposed blade face and bypass dampers with accompanying linkage and operating controls which will act to bypass cold air around the supply side of the coil in order to provide temperature and frost control.

1.3. AIR TO AIR HEAT EXCHANGER

1.3.1. Heat Exchanger

1.3.1.1. The heat recovery section shall incorporate an air to air heat exchanger of aluminum construction. It shall be of the cross flow design and so constructed to prevent any intermixing or cross contamination of the supply air and exhaust air streams.

1.3.1.2. All joints shall be sealed with a sealant that is resistant to high and low temperatures. The standard heat exchanger shall be suitable for normal temperatures up to 100 deg.C (212 deg.F).

1.3.1.3. The heat exchanger section shall be complete with 22 gauge solid liner.

1.3.1.4. A drain shall be provided at the bottom of the cabinet

1.3.2. Structural Support

1.3.2.1. Units shall incorporate structural steel support under a satin coated galvanized steel base designed for 4 or 8 point lift without undue deflection.

Unit casing shall be of minimum of 16 gauge satin coat galvanized sheet metal.

1.3.2.2. Surfaces shall be cleaned with a degreasing solvent to remove oil and metal oxides and primed with a two- part acid based etching primer. Finish coat shall be electrostatically applied enamel, to all exposed surfaces. All unprotected metal and welds shall be factory coated.

1.3.2.3. Units shall be insulated with 50mm (2 in.) of 48 kg/m^3 (3 lbs/cu.ft) density fibre glass insulation, neoprene coated and secured with fire retardant adhesive and welded pins at 400 mm (16 in.) on centers. Access panels shall be located for serviceability and inspection.

1.3.3. Frost Prevention

1.3.3.1. Bypass openings shall be provided with integral face and bypass dampers complete with controller to keep the heat exchanger exhaust air temperature above $0^{O}C$ ($32^{O}F$).