Narara Ecovillage

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BEAST SOLUTIONS

Reverse Cycle Air Source Heat Pump / Energy Recovery – Specification Sheet

Standards

- National Construction Code (Building Code of Australia)
- AS/NZS 3000 Electrical Wiring Rules
- AS 1677 Refrigerating Systems –Safety Requirements for Fixed Applications
- AS/NZS 3823 Performance of electrical appliances - Air conditioners and heat pumps

Requirement

Provide air cooled, reverse cycle split type multi-unit heat pump system, consisting of a singular condensing unit connected to multiple fan coil units, each having the capability of individual set point control, centred on one refrigerant circuit.

Warranty

Provide 5-year factory warranty.

Efficiency

Energy efficiency ratio cooling = 2.8 (at 35 ^{O}C and 50% RH ambient conditions).

Energy efficiency ratio heating = 3.2 (at 5 ^{O}C and 80% RH ambient conditions).

Energy efficiency ratio energy recovery = 6.7 (at 35 ^{O}C and 50% RH ambient conditions).

Ambient Conditions

Indoor and outdoor (condensing) units shall be capable of operating within a wide range of ambient temperatures. Select condensing units to provide cooling within an ambient range of -5°C DB to 43°C DB, and heating in the range -10°C DB to 15°C DB. Achieve this by automatic control of compressor motor frequency, head pressure control (by varying fan speeds) and hot gas bypass.

Heat Recovery System

Utilise a heat recovery system such that individual indoor units may cool or heat independently of other indoor units connected to the same system and that waste heat can be directed to an independent heat exchanger for domestic hot water heating.

Indoor Fan Coil Units

Provide indoor units with the following:

Electronic Expansion Valve: Fit each fan coil unit with an electronic proportional expansion valve which controls the refrigerant flow in response to the load variations in the room. The electronic proportional expansion valve is to be controlled via a computerised PID control sensing the return air temperature,

refrigerant inlet and outlet temperatures. During the cooling operation the electronic expansion valve linearly controls the refrigerant superheat degree at the evaporator.

Indoor Unit Fans: Direct driven of the DWDI multi-blade type, statically and dynamically balanced to ensure low noise and vibration free operation.

Coils: Direct expansion, constructed from copper tubes expanded into aluminium fins to form a mechanical bond.

Supply Air Discharge Louvres: Provide auto swing of the supply air louvres for cassette and under ceiling type fan coil units capable of providing continuous swing operation or fixed in any direction as required.

Radiant Heat Control: Incorporated as standard for cassette and under ceiling type and capable of automatically raising the thermostat set point during the heating mode on detection of radiated cold from walls, windows and floors, to ensure stable and even heat distribution in the rooms.

Unit Control Board: Include in the fan coil unit a printed circuit board complete with power input fusing, address switches for a variety of operation controls, emergency operation switch and fault/operation indication LED's. Thermally protect fan motors.

Unit Casing: Fully insulate the fan coil unit casing (ceiling mounted units) and seal to prevent condensation.

Condensate Drain: Install a 25mm condensate drain pipe from each fan coil unit to the nearest waste. Insulate condensate pipes.

Unit Control: In case of individual and group control, set the addresses of each fan coil unit automatically by the system to minimise commissioning time. In case of centralised control, set the addresses by the liquid crystal remote controller. Dip and rotary switches are not acceptable.

Condensing Units

Provide fully weatherproofed, factory assembled and pre-wired with all necessary electronic and refrigerant controls. Construct the casing from mild steel panels coated with a baked enamel finish. Provide the condenser coil with a corrosion resistant finish.

Sound Pressure Level: Not to exceed 57 dBA measured horizontally one metre away from the unit and 1.5m above ground level.

Modular Design: Allow for side by side installation, by the modular design of the condensing units.

Fan Motor Speed Control: Provide multiple speed control to fan motors operation to maintain constant head pressure control in all ambient temperatures and modes of operation. Use fan motors of high static resistance type of 30Pa as standard.

Drain Tray (Field Installed): Provide each outdoor unit with a field supplied condensate tray of galvanised sheet steel construction. Connect the condensate tray with the nearest floor waste with a 25mm (min.) drain.

Compressors: Provide highly efficient hermetic scroll type compressors. Provide the inverter compressor with electronic controls, capable of changing speed to follow the variations in cooling and/or heating loads, using a HIDECS/R circuit (Hi Inverter Drive and Electronic Control System Recovery). Provide inverter control together with independent multi variable PID (Proportional Integrated Derivative) control for precise monitoring of status of the system. For efficiency and quietness provide IGBT (Insulated Gate Bipolar Transistor) type inverters.

Heat Exchanger: Construct the heat exchanger from HI-X (rifle bore), seamless copper tubes mechanically bonded to aluminium fins to form a cross fin coil. Treat the aluminium fins with an anti-corrosion resin film.

Refrigerant Circuit: Complete the refrigeration circuit of the condensing unit with refrigeration compressors, motors, fans, condenser coils, electronic expansions valve, solenoid valves, 4 way valve, distribution headers,

capillaries, filters, shut off valves, service ports, receivers and accumulators and all other components which are essential for safe and satisfactory operation.

Safety Devices: Provide the following safety devices as a part of the outdoor unit: High pressure switch, fuses, crankcase heater, fusible plug, over current protector for inverter and short re-cycling guard timer.

Oil Recovery: Equip the units with an oil recovery system to ensure stable operation for systems with long refrigerant piping. Operate the oil recovery system after the first hour of operation and then every consecutive eight hours of operation. Also fit high efficiency oil separators to the discharge side of the compressor together with an oil equalisation system.

Selection Switches: Fit the condensing unit printed circuit board (PCB) with selection switches for the length of pipework, ambient range selection, emergency operation switches and service mode switches, together with LED indications for the number of fan coil units connected, frequency status and operation/fault indication.

Control

Use computerised PID control to maintain a correct room temperature. For the fan coil units incorporate an on/off switch, fan speed selector, thermostat setting and liquid crystal display which indicates temperature setting, operational mode, malfunction codes and filter clean reminder.

Fan-Coil Control: Accomplish by the use of individual controllers for each fan coil unit. The individual controllers to be capable of controlling a maximum of 16 fan coil units as a group.

Fault Diagnosis: Equip the system with a self-diagnostic function for quick and easy maintenance and service. Retain the most recent malfunction code for easy maintenance.

Automatic Changeover Cool/Heat: Provide automatic changeover from heating to cooling (and vice versa) of the invertor and heat recovery system as a result of demand from the fan coil units. Provide as part of the systems control logic.

Master Unit Control Cool/Heat: Accomplish changeover of the inverter system by the appointment of a master fan coil unit in each system. This master fan coil unit shall determine the operating mode of that system.

Selector Switch Changeover Cool/Heat: Accomplish changeover of the inverter system by the use of a selector switch for each system.

Multi Function Centralised Controllers

Supply and install a Multi Function Centralised controller as scheduled or indicated on the drawings capable of controlling up to 64 zones or groups (each group consisting of up to 16 fan coil units). Functions available from the centralised controllers include:

- Temperature setting for each zone, group or fan coil unit.
- Group on/off control.
- Indication of operating condition.
- Select one of ten operation codes.

Control Wiring: Wire the controller by a non-polar two wire transmission cable, to a maximum length of 200m.

Refrigerant

Factory assemble and test both the fan coil unit and condensing unit. Charge with refrigerant at the factory. Weigh in additional refrigerant on site. Clearly label each condenser and fan coil unit with appropriate labels and numbering system. The unit shall operate using one of the following refrigerants: R134a / R410a / R407c.

Refrigeration Piping Distance Limits

Refrigerant piping runs up to 40m between the condensing unit and fan coil units with 15m level difference without any oil traps or double risers are permitted.

Branch Selector Unit

Supply and install branch selector unit boxes to the manufacturer's specifications. Utilise the branch selector (BS) units whenever individual simultaneous heating and cooling is required. Select each BS unit for controlling a maximum of six fan coil units.

Solenoid Valve Control: Provide each with two solenoid valves which are opened by a signal to cool or heat from the remote controller. Provide a temperature differential switch to set the heating/cooling set point band between 0-7K, on the branch selector PCB.

Factory Assembly: Provide branch selector units completely pre-wired and pre-piped and internally insulated.