TECHNICAL SPECIFICATION FOR PRECISION AIR CONDITIONER

1.0 GENERAL

This section covers the specification of the precision air-conditioning for data centre which requires clean air and well distributed with precisely controlled temperature and humidity for high sensible heat environment.

1.1 PRECISION AIR CONDITIONING UNIT

The environmental precision control unit shall be Visiontec or equal factory assembled unit. Each unit shall be a complete environmental control system factory wired, tested and specifically designed to provide temperature, humidity and dust control for computer room or telecommunications installations. The temperature and RH of the room shall be maintained at 22 ±1°C and 50 ±5% at all time. The precision air-conditioners shall be either floor standing upflow or downflow to suit drawings and construction site limitation. The whole unit maintenance access shall be **fully front accessible.**

1.1.1 FRAME AND CABINET

The unit shall have heliarc welded steel frame which provides for maximum strength and ease of access. Side and front panels shall be easily opened and removed with quarter-turn fasteners allowing full access to all unit components. All panels shall include **25mm thick 1.5 lbs/ft^3 fibreglass** for thermal protection. The cabinet shall be with **double wall/skinned construction** to reduce insulation erosion and enhanced sound attenuation. All internal joints between frame and panel shall have **PE vapour seal** and cold air leakage to reduce condensation. The unit shall be **totally front service accessible**. **The compressors shall be housed in separate compartment** to reduce energy wastage and better noise treatment.

1.1.2 COIL SECTION

The unit shall be of dual coil design with one DX coil connecting to suitably sized outdoor condenser and chilled water coil linking to chilled water system. The unit shall be designed for draw through type with large face areas for low velocity to reduce turbulence and provide greater efficiency in the cooling and dehumidification process. The cooling coils shall consist of staggered rows of seamless copper tubes, mechanically expanded into die-formed aluminum fins. Fins are of **corrugated design** and coated

with **hydrophilic** to improve heat transfer, at **both indoor and outdoor units** which is suitable for corrosive environment and tested under water to 2800kPa with compressed air. The chilled water cooling coil shall be controlled by built in 2 or 3 way control valve via the environmental control unit microprocessor. The drain pan shall be painted stainless steel construction and insulated with PE insulation. **Spot type water detection system (optional)** shall be provided at the drain pan to provide monitoring alert if condensate pan becomes overflow. The coil and its components shall be selected such that its pressure rating is able to withstand the highest expected pressure. The change from chilled water to DX coil operation shall be automatically controlled by the unit microprocessor controller.

1.1.3 FAN SECTION

The fan shall be centrifugal forward curve, double width, double inlet blower configuration for quiet operation. The floor standing unit shall use belt drive system with minimum 2 pulleys / belts for maximum reliability. The blowers shall be AMCA certified and factory certified that it undergo static and dynamic balancing to ISO 1940 and AMCA 204/3-G2.5 standard. It shall be AMCA certified for air and sound performance and class II heavy duty self align pillow block construction with **long life bearing designed for 100,000 operation hours.** The motor shall be of minimum IP54 totally enclosed and mounted on an adjustable slide base. The motor shall be **3-phase induction with efficiency complying with MS1525 EEF 1 in terms of energy efficiency.**

1.1.4 COMPRESSORS

The unit shall be of **twin scroll compressors** type with a high EER/COP, low sound power level, best sound quality due to low discharge pulse and high reliability to meet application requirement. The floor standing precision air-conditioners **shall have dual compressors with independent refrigerant circuit for maximum load flexibility.** The hermetic motor shall be suction gas-cooled with high starting torque and the windings shall be inherently protected from over-loading, single-phasing and under-voltage operation. The compressor shall have a check valve which located directly above the fixed scroll discharge port to prevent the compressor from running backwards after the power has been switched off. The compressor shall have a rotor-lock valve at suction and discharge connection for easy servicing. The motor shall be fitted with a thermostat which protects the compressor if a malfunction occurs. The compressors shall be jacketed in order to prevent heat contribution to the cooled air.

1.1.5 FILTERS

The filter chamber shall be an integral part of the system, designed within the frame and cabinet. The filters shall be disposable type 30% efficient (based on ASHRAE 52-76) or EU4 based on European standards.

1.1.6 ELECTRICAL REHEAT

The unit shall have multi-stage stainless steel finned tubular reheat coils capable of providing ample capacity to maintain room dry bulb conditions during a system call for dehumidification. The reheat shall be installed on the air discharge side of the cooling coil and shall have **three (3) stages** to provide more accurate controlled response to the requirements of the computer room. Single stage heater is not acceptable. The heating elements shall be protected by thermal and air flow status safety switches.

1.1.7 STAINLESS STEEL DRAIN PAN

The condensate drain pan shall be fabricated with painted stainless steel with surfaces insulated with fire retardant PE foam for long life and minimum contamination.

2.0 CONDENSING SECTION

The casing of the condensing section shall be heavy gauge steel panels, insulated with ½" thick x 1 ½ ib per cu. Ft mat faced linacoustic fiberglass, tightly fitted with gasket on rigid frame, to guard against leaks of conditioned air. All steel parts shall be coated with oven-baked epoxy paint, which gives excellent finishing, weather ability and salt-spray test of minimum 840 hours. Oven-baked epoxy paint shall provide the best painting system, which even can coat the inaccessible places of part like the edges, the joints or interior surface of hollow sections.

The condenser coils shall be of seamless copper tubes mechanically bonded to aluminum fins for heat rejection performance enhancement as well as corrosion resistance and tested under water to 2800 kPa with compressed air. The fins shall be **hydrophilic** coated.

Fans shall be propeller type direct driven by weatherproof electric induction motors. Fan motor has class F insulation and IP55 enclosure.

The condenser fan blades shall be made of durable alloy material and manufactured with toothed tail-end for higher efficiency and reduced fan noise.

The motor shall be suitable for operation with 415/3/50 electric supply with +10% or –15% voltage fluctuation. The motor shall be of 6 poles running at 950rpm.

3.0 MONITORING AND CONTROLLING SYSTEM

The PEC air-conditioners shall have in-built advance state-of-art microprocessor based programmable controller which incorporates all necessary safety and protection features to ensure energy efficient, reliable and uninterrupted operation of the unit, for 24 hours per day and 7 days a week.

The unit shall have **8 rows, 22 columns backlit LCD displays with 6 operation buttons.** It shall display data centre's temperature, humidity, airflow status, cleanliness and shall be able to provide component run times, alarm history, an automatic self-test of the microprocessor on system start-up. The microprocessor controller shall be of 16 bits type with flash memory to stored customised application programming data. All of these messages shall be spelled out in full English Language on the LED display. Multiple alarms shall be able to be displayed sequentially in order of occurrence. The controllers of each unit shall be able to be linked in a **network up to 8 units to provide duty/standby and lead-lag control.** It shall be **Modem, GSM and SMS ready** for alarm reporting. It shall have option of **Modbus, SNMP, Bacnet and Metasys protocol** to allow remote monitoring by building management system. It shall also able to linked to third party building management system (i.e. Bacnet, Lonwork, SNMP) via Gateway or communication card.

The user-friendly menu selection switch shall permit step-by-step programming and display of the following functions:

- Temperature set point 18 ^{o}C to 29 ^{o}C (65 ^{o}F to 85 ^{o}F)
- Temperature sensitivity 0.5 ^{o}C to 2.7 ^{o}C (1^{o}F to 5 ^{o}F)
- Humidity set point 40% to 60% RH
- Humidity sensitivity 1% to 10% RH
- Temperature alarm points
- Humidity alarm points
- Unit start time delay
- Current temperature (^{o}C or ^{o}F)
- Current humidity (%RH)
- Cooling stages 1, 2 as applicable
- Heating stages 1,2,3
- Humidification
- Dehumidification
- Current % of capacity and the average % of capacity for the last hour of operation for compressors, humidification, dehumidification, reheat and chilled water.

The unit shall have standard alarm system as follows:

- Compressor high(manual reset) and low pressure(auto reset)

- High and low temperature
- High and low humidity
- No air flow
- Change filter
- Humidifier failure
- Manual override
- Power failure restart
- Compressor short cycle
- Temperature sensor error
- Humidity sensor error
- Firestat tripped
- Local alarm (programmable)
- Maintenance due

In order to facilitate maintenance and service, component run times for fan motor, compressor operation, reheat stages, humidification and dehumidification, the unit shall be able to recall and display on the LCD. The historical data base shall be maintained by battery back-up should power fail.

The unit control shall have built-in fire relay which will receive fire stop signal and stop the unit operation during fire mode but the **control display shall be still operational** and give fire alarm.