

A.12: Ventilation System for Indus-2 Power Conditioning System

Four numbers of Rotary type Power Conditioning System (PCS) are installed and commissioned in PCS building to cater to the load requirement of the Indus-2 sub-systems. These units require dust free and cool ambient conditions for smooth operation. Ambient conditions requirements of the supplied air for the Rotary UPS units are as follows:

- Dry bulb temperature : 0°–30°C (Average \leq 30°C)
- Relative Humidity(RH) : <95% (non-condensing nature)
- Filtration level : 95% Filtration efficiency down to dust particle of 5 μ m

In order to meet the ventilation requirements, an evaporative cooling system with filtration units was designed. Ventilation scheme is as follows:

From the preliminary design estimates, 80,000-m³/hr airflow was required for the Evaporative Cooling ventilation scheme. This air was planned to be supplied through two numbers of air washer units (cell type) of 40000-m³/hr capacity each. In each air washer unit, fresh air is drawn through fresh air intake louvers and then made to pass through a battery of pre filters (90% filtration efficiency, down to dust particle of 15 μ m). This filtered air is then further passed through a battery of fine filters, where it gets filtered up to 95% filtration efficiency down to dust particle of 5 μ m. This fresh and filtered air is then passed through air washer section (cell type) and loses its heat to water and in turn gets cooled. Fresh, filtered and cooled air is supplied to power conditioner room by centrifugal blowers through air conveyance GI ducting and supplied air grilles. Figure A.12.1 shows the layout of the air washer room with components. This air then removes equipment heat load and maintains desired ambient conditions in the equipments. The power conditioners units are having inbuilt ventilation system for cooling the semiconductors in the various converters, and the magnetic components. The axial fans mounted on the top of the cabinet of the PCS units creating force draught, draw the air. Hot air is then exhausted from power conditioner room through conveyance ducting and exhaust louvers.

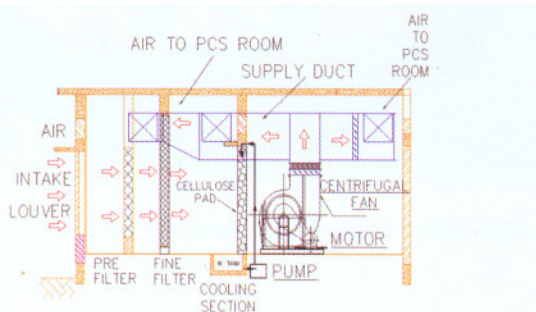


Fig. A.12.1: Air washer room with components layout.



Fig. A.12. 2: A view of Control Panel in the UPS room, Indus-2.

Cooling section has water re-circulation arrangement and PVC water mist eliminator. In the Cell type Air washer units, humidification media is honeycomb structured fill pack blocks made of cellulose paper impregnated with chemicals and anti-soluble salts. The principle of evaporative cooling is relatively simple. Air moving past water will cause the water to evaporate. The heat necessary to cause evaporation is drawn out of the passing air stream and hence the air is cooled. With direct evaporative cooling, outside air is blown through a water-saturated medium (usually cellulose) and cooled by evaporation.

Evaporative cooling has various advantages over a refrigerated system like lower initial capital costs, lower peak energy usage, lower running costs, lower energy usage and less greenhouse gas production as evaporative cooling does not use chlorofluorocarbons (CFCs) or HFCs, it does not contribute to ozone depletion. Evaporative cooling action has two effects; it cools and also cleans the air. A Motor Control Center (MCC) is provided in each air washer room for controlling the operation of the motors of centrifugal fan and re-circulating pump.

Necessary instrumentation /control is provided to ensure the required parameters of the air at the UPS units. A control Panel is provided in the PCS room for Control & Monitoring of the Ventilation System. This indicates the operating status of blowers, pumps along with continuous display of vital parameters like dry bulb temp (°C), relative humidity (%), alarms for high/low temperature, RH and filter choking etc. A photograph of control panel is shown in Fig. A.12.2.

Inspection and testing of various components of air washer system were done as per relevant standards before installation. Centrifugal fans were tested as per Standard test code of AMCA 210. Ventilation system was installed and commissioned in February 2011 and since then it is operational on round the clock basis.

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