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COOLING WITHOUT AIR CONDITIONING

The Torrent Research Centre, Ahmedabad, India

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ABSTRACT

This paper presents results from the first year of monitoring the performance of a laboratory building in the new 14,000m^2 Torrent Research Centre in Ahmedabad, India. The capital and running costs of air conditioning of non-domestic buildings in northern India are very substantial, while building costs (compared with northern Europe) are low. A cooling technique which maximises reliance on the building fabric and minimises reliance on mechanical equipment is therefore likely to be cost effective. Passive Downdraught Evaporative Cooling (PDEC) represents such a technique.

At the Torrent Pharmaceuticals Research Centre in Ahmedabad, PDEC is used to service a number of laboratories and offices within the complex. A central open concourse on three levels allows evaporatively cooled air to be introduced to laboratories and offices at each level and exhausted via perimeter stacks. In the first completed laboratory building the PDEC system has now been working for 12 months. Results from the first summer indicate that internal temperatures are 10-15°C below the peak external air temperature. good air movement is being achieved, and no complaints of discomfort have been received from the staff. The paper describes and illustrates the key features of the building and reports on monitoring undertaken during April - December 1997.

THE PROJECT

The project comprises a research and development centre for the Torrent Pharmaceutical Company. The laboratories provide facilities for a range of different disciplines including Molecular Biology, Cell Biology and Tissue Culture, Histology, Biochemical analysis, and the development of disease models for screening of new compounds. The approximate size of the new complex is 14,000^2, varying from "unclean" areas like chemical synthesis labs, to "very clean" areas like tissue culture, molecular biology lab and drug design areas.

Conventional wisdom would suggest that over 50% of the volume of such a new laboratory building would require refrigerant based air conditioning, in order to meet the environmental requirements within the laboratories. This project has sought to minimise dependence on conventional air conditioning, without compromising occupant thermal comfort, in the predominantly hot dry climate of Gujarat.

The design of the buildings in the Torrent Research Centre was aimed at integrating spaces requiring highly controlled conditions with those requiring less controlled conditions, while minimising the presence of dust in the internal environment. Typically, laboratories and offices are arranged on three levels either side of an

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