NVN

NATURAL VENTILATION NEWS

Natural ventilation news for the building industry.

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GOING DUTCH

- *a successful application of natural ventilation*

NatVent has published the results of monitoring work carried out on the naturally ventilated Enschede Tax Office in the Netherlands. They demonstrate that an integrated approach using natural ventilation, effective solar shading, daylight control and the use of thermal mass for heat accumulation can lead to the successful application of natural ventilation.

The tax office is situated in the centre of Enschede. The wedge-shaped building has long facades on the north and south sides and a central atrium. On each floor, veranda-style corridors give access to the 5m deep offices that surround the atrium.

The building is of high mass construction with a concrete floor. On each storey, there is a double row of horizontal strip windows. The top row of windows is used for 'day-lighting'. The lower row of windows comprises manually openable, tilting windows with adjustable external blinds to reduce solar heat gain.

The building is wholly naturally ventilated. In each room, air supply is through two constant-flow trickle ventilators located between the day-lighting windows and the ceiling. The ventilators are about 0.3m wide and 0. 1m high with a constant flow rate of 50m³/hr for driving forces of between 1 and 25Pa.The units have five positions that can be selected by the users. It is recommended that one unit is used under normal circumstances and both units for night cooling. During warm summer periods, users are advised to open both ventilators before leaving their rooms at the end of the working day.

Acoustically isolated ducts remove exhaust air from the rooms to the atrium. At the top of the atrium, vents can be opened so that the stack effect will give the under-pressure needed for air supply. Exhaust fans on the chimneys are switched on at low wind speeds (below 2m/s) to help initiate the stack effect.

The passive ventilation system uses the Coanda effect in which cold, incoming air 'sticks' to the ceiling, mixes with hot room air and then falls into the 'living' zone. This provides a measure of pre-conditioning to minimise the probability of cold draughts.

The monitoring programme consisted of measuring temperature and CO^2 in selected rooms on both sides of the building. The Coanda effect was also investigated. Questionnaires were sent out to ascertain the building occupants' perceptions of the building environment and their ability to control it.

The results of the monitoring showed that, in most rooms, the minimum fresh air supply in winter was close to the desired level (100m³/h). At normalised outside conditions, there was no draught and the room air was well mixed.

The ventilation rate for cooling was also close to the desired level. However, although the indoor climate generally fulfiled the comfort criteria given in ISO 7330, the questionnaires showed that many occupants thought the temperatures in summer were too hot.

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