

OCCUPANT INTERACTION WITH VENTILATION SYSTEMS

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POSTER P5

EFFECTS ON VENTILATION BEHAVIOUR OF INHABITANTS IN
RESIDENTIAL BUILDINGS

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SYNOPSIS

The effects on ventilation behaviour of inhabitants in residential buildings have been investigated as a part within a several years' German research programme. The investigations have shown that the ventilation behaviour seems to be dominated by traditional behaviour patterns, e.g. ventilating bedrooms, and subjective impressions. There is only a modest correlation between window opening and needs for indoor air quality and energy conservation. Up to now most of the inhabitants do not assess correctly their own window opening behaviour. Also different ventilating systems did almost not influence the inhabitants' window opening behaviour. The main reasons may be a lack of information and motivation.

1. THE OBJECTS

The investigations had been carried out in the following types of residential buildings

- Solarhouse Freiburg, 12 dwellings, exhaust and exhaust-supply ventilation system with preheating
- Demonstration Project Worms, 3 blocks of flats, 230 dwellings, mechanical and natural ventilation systems, heat recovery
- Demonstration Project Berlin, 9 dwellings, exhaust and supply ventilation systems
- Demonstration Project Duisburg, 24 dwellings and 4 dwellings for comparison, mechanical ventilation system with heat recovery.

As measurement techniques microswitches, observations by observers and photographs, auto-observation as well as questionnaires have been used.

2. MOTIVES FOR WINDOW OPENING

Window opening's frequency and duration is mainly a function of the type of the room. In the kitchen short-ventilation is preferred with a maximum (percentage of windows opened) about noon. In the case of bedrooms the percentage of opened windows over the whole day is highest, compared with all other rooms. There is a maximum in the early morning. Short-ventilation is practised only to some extent, more usual is day-night ventilation.

The maximum for living rooms has been observed in the early morning with a clear tendency to short-ventilation.

As a rule, inhabitants ventilate more during the day than at night, this is also valid for bedrooms. The type of room ventilation reveals that the inhabitants do not necessarily ventilate more often during their presence. Sometimes the windows are also tilted in their absence.

Asked for the reasons of their window opening's behaviour, the preference in the inhabitants answer was the need for "fresh air" without more detailed explanations. On rank 2 the reason "to clean up" followed, especially for bedrooms. On rank 3 "to avoid odour, e.g. tobacco smoke" was quoted.

Therefore it can be assumed that the profile of motives for window opening is based on traditional habits.

3. METEOROLOGICAL EFFECTS

In the Demonstration Project Duisburg, see E. Eshorn this conference, a clear dependence of the duration of the window opening on outdoor temperature and wind speed could be shown. For all types of rooms the window's opening duration increased with increasing outdoor temperature and decreasing wind speed, in good accordance with former investigations of other teams.

In the Demonstration Project Berlin only in the case of temperatures of below 0°C and above 25°C the tendency to ventilate a little less or more was observed. In these investigations the outside temperature affected primarily the opening time of glass doors and casement windows.

It must be suspected that for outside temperatures below 0°C in many dwellings the air exchange may not be sufficient to meet an indoor air quality necessary to avoid problems for hygiene and building physics, if no other ventilation systems are installed and work properly.

4. INFORMATION AND MOTIVATION

The inhabitants' self-assessment with regard to their ventilation behaviour, as the investigations have shown, up to now is not good correlated with the real facts. A

comparison of measured window openings with inquiries of the inhabitants results in inconsistency (figure 1).

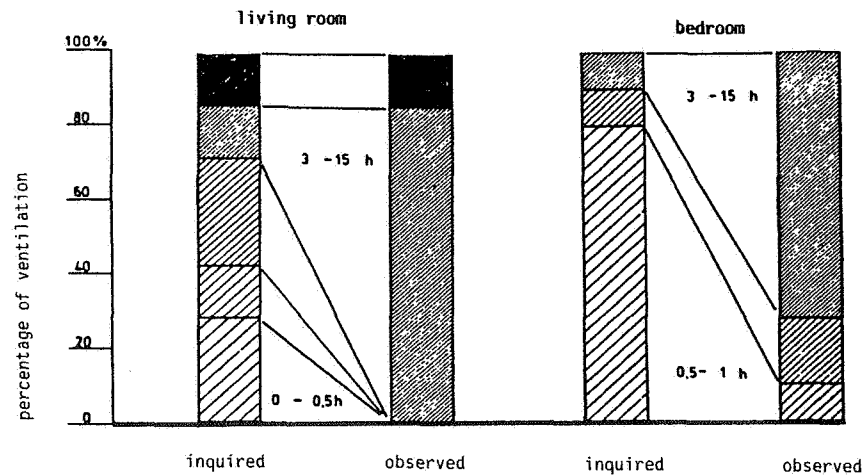


Figure 1: Comparison of inquired and observed window opening durations (results from Demonstration Project Berlin)

The inhabitants tend often to underestimate their real window opening. The necessary window opening or closing remains undone, because of a lack of understanding of the ventilation effects, because of acting in traditional patterns etc. Also if the buildings were equipped with ventilating systems the window opening pattern followed the above mentioned scheme. To link indoor air quality requirements and energy conservation aspects with inhabitants' ventilation behaviour a better information and a higher degree of motivation is needed.