European ventilation standards being developed by CEN TC 156

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The European Union wishes to encourage free trade within the Union and as part of this role created a Construction Products Directive to enable the member countries to harmonise standards. The European Committee for Standardisation (CEN) set up a Technical Committee on Ventilation for buildings (CEN TC 156) in 1989. The scope was 'Standardisation in the field of ventilation and air conditioning systems for buildings subject to human occupancy'. Each country is invited to have a representative on the Technical Committee and the British Standards Institution represents the United Kingdom. The Technical Committee has nine groups of experts who are preparing the draft standards and the technical guidelines. The Groups submit their reports to the Technical Committee for approval.

The nine working groups are

1. Terminology
2. Residential ventilation
3. Ductwork
4. Terminal units and air terminal devices
5. Air handling units
6. Design criteria
7. System performance
8. Installation (including commissioning)
9. Fire and smoke protection (for the ventilation system)

Working Group 6 Design Criteria, convened by Professor Ole Fanger, prepared a draft document in 1993 which the Technical Committee agreed should be developed as a CEN Prestandard prENV 1752. Prestandards are publicly available for three years and then reviewed to determine whether or notthey should beadopted as full standards. In the meantime individuals can choose to usethemt if they wish. This preENV 1752 is in the process of being modified and will be resubmitted to the Technical Committee Meeting in September 1996.

The content of the prestandard is a short main body explaining the philosophy of the criteria in terms of health and comfort giving recommended tabulated values of the main parameters, followed by seven Annexes:-

WG6 Design Criteria for ventilation

Main body
Annex A - Development of design criteria
B - Step by step design method
C - Practical examples
D - Thermal data
E - Summary of World Health Organisation guidelines
F - Ventilation effectiveness
G - Bibliography

The indoor climate is classified into three grades, A, B and C. For example, the ventilation rate for these three grades is given in Fig 1, for landscaped offices together with suggestions for noise limits. The current CIBSE guidelines is 1+3 $l/m^2/s$ minimum for such offices which equates to class B. The proposed ventilation rates for occupants depends upon the % of the occupants who are cigarette smokers. The current CIBSE guidelines suggest values from 8 to 32 litres/p/second. Permissible mean air velocities inside the room are specified too. Thermal comfort is measured in terms of operative temperature and quality is

ranked in relation to the degree of control. Class A conditions permit ± 0+50C in summer and ± 1+00C in winter, Class C are designed for ± 2+5 in summer and ± 3+00C in winter.

Annex A describes the development of the design criteria for thermal comfort, indoor air quality and the acoustic environment. The thermal conditions can be described in the general terms of predicted mean vote (PMV) which depends upon the activity and clothing, and the percentage of the population dissatisfied (PPD). Local conditions include draught, vertical temperature gradients, radiant asymmetrics and floor temperatures. The three quality classes A, B and C represent less than 6% dissatisfied, less than 10% or less than 15% respectively (Fig 1).

The air quality section deals first with health aspects. This is brief and mainly based on chemical criteria because there is little equivalent medical data available. The perceived air quality, odours, is dealt with by the concepts of olf and decipol. An olf is the odour emitted by a seated adult who bathes every 1+4 days. The smells from other objects is said to be equated to that of multiples of people. The decipol is defined as perceived odour (the total smelliness) which results from supplying ten litres of clean air per second to dilute the body odour of one person. Category A air quality is a 1 decipol odour level and this perceived air quality is expected to create dissatisfaction in 15% of the occupants. Dissatisfaction levels in classes B and C are 20% and 30% respectively.

Humidity is not considered a sensitive parameter and the guidelines permit the range 30 - 70% r.h. indoors.

Ventilation effectiveness is assessed on the air quality at the breathing level. It is defined as the ratio of contaminant elevation for the room as a whole compared with that elevation of contamination at breathing level. This is illustrated in Fig 2.

The required ventilation rate for health is calculated using the known contamination sources and the permitted level in the breathing zone (Fig 3). The ventilation rate for comfort is derived similarly, using olfs as the source strength and decipols as the contaminant concentration (Fig 4).

Annex B introduces the design method step by step. The ventilation rate required for health first identifies the pollutant load of critical chemicals, and the permissible indoor concentration from health and safety guidelines and from these calculates the required ventilation rate. The ventilation rate required for comfort requires identification of the number of occupants and the olf burden within the building from the building itself. These two kinds of odour source are then added and the required indoor level of decipol odour level specified. The decipol level of outdoor air is assessed and, from a knowledge of the ventilation effectiveness, the required outdoor ventilation rate is calculated. The design ventilation rate is the higher one of the two, health and comfort.

Annex C gives practical examples for eight kinds of building uses such as a small office, a landscape office, a department store etc. It suggests typical olf values and decipol criteria which would be suitable for each type and illustrates example calculations.

Annex D is an analysis of thermal comfort showing how the activity level and clothing insulation influence the optimum temperature.

Annex E outlines the World Health Organisations guidelines on air quality for Europe. This Annex is particularly valuable in providing information of specific pollutants and their effect on health.

Annex F explains the importance of ventilation effectiveness and lists useful references.

The revised draft document will be submitted to the September 1996 meeting of the CEN 156 Technical Meeting, when national delegates will have the opportunity to vote on whether or not it should be adopted as a prestandard.

[Footnote: The CEN 156 Meeting took place at the British Standards Office in London on the 30' September.The Chairman requested the voting be deferred to a postal vote because not all countries were represented]