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Testing the airtightness of large or mutliple-storey-buildings in an EU-regulation context

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Abstract

The importance of an airtight building envelope will, with growing awareness of energy efficiency in all European countries, continue to increase. Experience with testing small detached or two-unit houses is available in most countries. An English-language literature source on 'Measuring the airtightness of buildings' has been compiled by ATTMA (Technical Standard)[1] and BSRIA BG 11/2004.2 [2].
Measurement of large buildings [2] (BG 4/2006) involves more work on installing the fans and more organisational tasks in preparing for the test – that such tests can be carried out perfectly is shown by hundreds of measurements taken with more than two and up to ten fans. Evaluation software is in Germany also available that facilitates the summation of the various volume streams of the single fans and presenting this as a totalled result.
Questions arise when we seek guidelines for calculating the energy efficiency of a building and when discrete parts of a property (single apartments in a multiple-occupancy house) have to be measured.
In this case, current discussion in Germany FLiB, (approximate ATTMA) foresees that at least 20%, up to 12 apartments in a building, should be tested, of which at least one should be on the attic storey, one on an intermediate floor and one on the lowest floor From the results in the separate apartments, a weighted mean value must be calculated and compared with the limit value. A single apartment may exceed the limit by up to 30% (Germany) or 10% less (ATTMA). If an apartment exceeds the limit value, leaks must be sealed and leaks to adjoining apartments can also be taped over until readings fall below the limit value. It is also possible, by making a 'guard zone measurement' in the neighbouring rooms/zones, to neutralise leaks.

Limit values for the building envelope are defined in many countries at an air change rate of 50 pascals. This magnitude is, for an energy efficiency assessment of ventilation losses through leaks (postulation of the EPBD of transparency), sensible, but the worst imaginable for documenting the quality of a building envelope. The lower the surface/volume ratio, the lower the limit value for n50 must be defined. Airtightness of larger buildings would be better described with a q50 value.
Those countries whose requirements are based on the q50 value have recognised that the guideline value is far too high for small properties. These countries must lower their guideline values to support the EPBD regulations to set energy efficiency steps for the construction sector. Standardisation of the requirements across all EU countries is, then, urgently needed.