MEASUREMENT OF AIR FLOW RATES AT AIR TERMINAL DEVICES: AN OVERVIEW

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ABSTRACT

The measurement of the ventilation air flow rates is necessary for the adjustment of the flow rates in the different rooms, as part of the commissioning. Flow rate measurement is also of primary importance in the context of compliance with the regulation or other requirements. For small and residential applications, the measurement of air flow rates at air terminal devices is a very common measurement method.

The different methods for air flow rate measurement at air terminal devices are presented in this overview, such as van anemometer with a cone, small velocity probe (thermal probe or small vane anemometer), compensation method, etc. Several measurement methods are available on the market at highly variable cost. However some of these methods are suspected to lack reliability.
Some of these measurements methods are not really appropriate for the measurement of flow rates at air terminal devices, with errors up to more than 50% in some cases!
The compensation method with sufficient stabilisation of the flow gives reliable measurements at the air terminal device in all the tested conditions (less than 10% error). This method uses a flow hood and combines a grid for the stabilisation of the flow and an auxiliary fan for the compensation of the pressure drop of the device, mainly due the stabilization grid (zero pressure differential). It has also been shown that the principle of pressure compensation as such is not enough to assure reliable results. The stabilisation grid plays probably also an important role given that another instrument with pressure compensation but without stabilisation grid gives bad results in certain measurement conditions.
For vane anemometer combined with a flow hood, the following conditions can have a dramatic effect on the measurement error: air terminal device with asymmetric flow rate, air terminal device adjusted in nearly closed position, measurement instrument not perfectly centred on the air terminal device, etc. Some new development shows that a stabilisation of the flow is also possible with vane anemometers.
Finally, another problem is the influence of the pressure drop created by the measurement instrument itself. Again, the compensation method presents also the advantage of neutralizing this additional pressure drop.

As a conclusion one can say that more attention should be paid from the commissioner over the choice of the measurement instrument in terms of reliability. As there are only very few reliable instrument on the market, there is a real need for the development of such instruments for the measurement of flow rates at the air terminal device.

KEYWORDS

air flow rate, vane anemometer, compensation method, measurement cone, measurement hood, measurement error

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