

MEASUREMENT OF AIR FLOW RATES IN DUCTS BY VELOCITY MEASUREMENTS: AN OVERVIEW

Isabelle Caré¹

*1 CETIAT
Domaine scientifique de la Doua
25 avenue des Arts
69100 Villeurbanne
France*

ABSTRACT

To measure a flow in a closed duct, one of the available methods is to explore the velocity field. The duct is divided in elementary sections in which the velocity is measured. Using these elementary results, a mean velocity is calculated. Knowing the exact section of the duct, the mean flow rate can then be deduced. With this method, the quality of the flow measurement is there very dependent on the number of individual velocity measurements and on the scheme of distribution of these measurements in the duct section.

Recommendation about velocity schemes are proposed in international standards (ISO 3966, ISO 7145, EN 12599, ...) for circular and/or rectangular ducts. These recommendations assume that turbulent flow profile is established. This requires a flow profiler and/or long straight lengths upstream and downstream the measurement section. On site, these recommendations are difficult to apply strictly because conditions of straight lengths are often not available. Moreover, the velocity measurement schemes proposed in standards are time consuming and users prefer sometimes to simplify them. In this case, the estimation of the measurement error is not known.

The different investigation methods are presented in this overview. Additionally, based on the study performed by Caré *et al*, Bonthoux *et al*, the measurement error due to simplified velocity schemes and/or reduces straight lengths is presented.

KEYWORDS

air flow rate, duct, air speed, measurement error

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