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Application Manual for Airflow Measurement Stations

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

The International Authority on Air System Components

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Related AMCA Documents

Related Publications	AMCA Publication 611	*Certified Ratings Program - Product Rating Manual for Airflow Measurement Stations*
Related Standards	ANSI/AMCA Standard 610	*Labortory Methods of Testing Airflow Measurement Stations for Performance Rating*

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Application Manual for Airflow Measurement Stations

1. Introduction

This publication provides information and important points to be considered when designing or specifying heating, ventilating, and air conditioning (HVAC) and other applications in installations requiring airflow measurement stations (AMS) for use in temperatures from -30 °C to +120 °C (-20 °F to +250 °F), pressures to 250 Pa (10 in. wg) and velocities to 28 m/s (5500 fpm). It is not the intent of this manual to be used for detailed specifications; rather it serves as a guide toward understanding the various types of airflow measurement stations available and items to be considered for their proper use.

2. Purpose and Scope

This application guide is intended to assist designers and users with the proper application, performance considerations, selection, and limitations of airflow measurement stations.

It is common to see an AMS misapplied or poorly installed. Typical problems include incorrect location, inappropriate measurement range, mismatched accompanying instrumentation, AMS incompatible with intended application, and the like.

This guide provides an overview of permanently installed airflow measurement stations and their application, such information not being readily available in current texts on HVAC or ventilation system design. This publication does not address portable devices used to measure airflow in test-and-balance applications.

3. Definitions

3.1 Airflow

A flow of air or an air current, specifically one that passes through a dimensionally defined plane.

3.2 Airflow measurement station (AMS)

An Airflow Measurement Station is a multiple-point sensing device which is used to measure the airflow rate in a duct system. It may consist of a single sensor or an array of sensors in permanent position across the duct system. It may be supplied as a probe to be inserted into a ductwork or supplied in a casing approximating the size of the duct system in which it is installed.

3.3 Static pressure

That portion of the air pressure that exists by virtue of the degree of compression or expansion. If expressed as gauge pressure, it may be negative or positive. (AMCA 99-0066)

3.4 Total pressure

The air pressure that exists by virtue of the degree of compression and rate of motion. It is the algebraic sum of the velocity pressure and the static pressure at a point. Thus if the air is at rest, the total pressure will equal the static pressure. (AMCA 99-0066)

3.5 Airflow measurement station performance variables

3.5.1 Tested AMS airflow rate (Q_{AMS})

The tested device airflow rate calculated according to the manufacturer's instructions. This calculation is based upon the output (pressure, current or voltage) of the tested AMS.

3.5.2 AMS Differential pressure

With regard to the differential pressure type AMS only differential pressure is the observed differential pressure between the high pressure output and the low pressure output.

3.5.3 AMS Electronic output

With regard to an electronic output type AMS only, AMS electronic output is the observed voltage or current that relates directly and proportionately to the velocity of airflow in a duct.

3.5.4 Test AMS face area (A_{FACE})

Test device face area is the unobstructed area of the duct at the inlet (or outlet) of the AMS.

4. Principles of Operation

Proper application requires knowledge of the various types of AMSs and their principles of operation.

The airflow sensing devices used in an AMS include, but are not limited to, Pitot-type, differential pressure type, thermal dispersion, vortex-shedding airflow sensors, or orifices. These devices are classified as follows:

4.1 Types of AMS devices

4.1.1

Pitot-type AMSs operate on the principle of measuring the separate components of total pressure and static pressure that exist within ducted airflow. The measurement process consists of subtracting static pressure from total pressure to obtain velocity pressure, then mathematically converting the