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ANSI/ASHRAE Standard 111-2008
Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems

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NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at http://www.ashrae.org.

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1. PURPOSE

To provide uniform procedures for measurement, testing, adjusting, balancing, evaluating, and reporting the performance of building heating, ventilating, and air-conditioning systems in the field.

2. SCOPE

2.1 This standard applies to building heating, ventilating, and air-conditioning (HVAC) systems of the air-moving and hydronic types and their associated heat transfer, distribution, refrigeration, electrical power, and control subsystems.

2.2 This standard includes

a. methods for determining thermodynamic, hydraulic, hydronic, mechanical, and electrical conditions;
b. methods for determining room air-change rates, room pressurization, and cross contamination of spaces;
c. procedures for measuring and adjusting outdoor ventilation rates to meet specified requirements; and
d. methods for validating collected data while considering system effects.

2.3 This standard establishes

a. minimum system configuration requirements to ensure that the system can be field tested and balanced;
b. minimum instrumentation required for field measurements;
c. procedures for obtaining field measurements in HVAC testing and balancing and equipment testing; and
d. formats for recording and reporting results.

2.4 The field data collected and reported under this standard are intended for use by building designers, operators, and users, and by manufacturers and installers of HVAC systems.

3. DEFINITIONS AND SYMBOLS

The following terms are used in this standard as they are defined below. For definitions of other technical terms, refer to the ASHRAE Terminology of Heating, Ventilation, Air Conditioning, and Refrigeration.

**A_k factor:** the effective area of an air terminal, which is equal to the measured airflow rate divided by the velocity reading of a particular instrument used in a prescribed manner.

**fan velocity pressure:** the velocity pressure corresponding to the average velocity through the fan outlet; the kinetic energy per unit volume of air exiting the fan.

**(PD):** abbreviation for pressure difference and ΔP.

**sensitivity (instrument):** a measure of the smallest incremental change to which an instrument can respond.

**static discharge head:** the static pressure of a fluid at the outlet of the pumping device, expressed in terms of the height of a column of the fluid or of the height of some manometric fluid that it would support.