ANSI/AMCA Standard 230-12

Laboratory Methods of Testing Air Circulating Fans for Rating and Certification

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AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

The International Authority on Air System Components

ANSI/AMCA Standard 230-12

Laboratory Methods of Testing Air Circulating Fans for Rating and Certification

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Authority

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Related AMCA Documents

Related Publications	AMCA Publication 11	*Certified Ratings Program Operating Manual*
	AMCA Publication 211	*Certified Ratings Program Product Rating Manual for Fan Air Performance*
	AMCA Publication 311	*Certified Ratings Program Product Rating Manual for Fan Sound Performance*
Related Standards	ANSI/AMCA Standard 300	*Reverberant Room Method for Sound Testing of Fans*

Contents

1. Purpose

The purpose of this standard is to establish uniform methods for laboratory testing of air circulating fans to determine performance in terms of thrust for rating, certification or guarantee purposes.

2. Scope

This standard may be used as the basis for testing air circulating fan heads, ceiling fans (less than 1.8 m (6 ft) in diameter), box fans, table fans, portable personnel coolers, or other air circulating devices when air is used as the test gas.

Blowers, exhausters, compressors, positive displacement machines, and positive pressure ventilators are not within the scope of this standard.

The parties to a test for guarantee purposes may agree on exceptions to this standard in writing prior to the test. However, only tests which do not violate any mandatory requirements of this standard shall be designated as tests conducted in accordance with this standard.

3. Units of Measurement

3.1 System of units

SI units (The International System of Units (Le Systéme International d'Unités) [1]) are the primary units employed in this standard, with IP units given as the secondary reference. SI units are based on the fundamental values of the International Bureau of Weights and Measures [1], and IP values are based on the values of the National Institute of Standards and Technology which are, in turn, based on the values of the International Bureau.

3.2 Basic units

The unit of length is the meter (m) or millimeter (mm); IP units are the foot (ft) or inch (in.). The unit of mass is the kilogram (kg); the IP unit is the pound-mass (lbm). The unit of time is either the minute (min) or the second (s). The unit of temperature is either the Kelvin (K) or the degree Celsius (°C); the IP unit is the degree Rankine (°R) or the degree Fahrenheit (°F). The unit of force is the newton (N); the IP unit is the pound-force (lbf).

3.3 Velocity

The unit of velocity is the meter per second (m/s); the IP unit is the foot per minute (fpm).

3.4 Thrust

The unit of thrust is Newtons (N); the IP unit is the pound force (lbf).

3.5 Pressure

For all pressures other than barometric pressure, the unit is the Pascal (Pa); the IP unit is the inch water gauge (in. wg). The in. wg shall be based on a one inch column of distilled water at 68 °F under standard gravity and a gas column balancing effect based on standard air. The unit of barometric pressure is the millimeter of mercury (mm Hg); The IP unit is the inch mercury column (in. Hg). The mm Hg shall be based on a one millimeter column of mercury at 0 °C under standard gravity in vacuo; The in. Hg shall be based on a one inch column of mercury at 32 °F under standard gravity in vacuo.

3.6 Power

The unit of input power is the Watt (W).

3.7 Speed

The unit of rotational speed is the revolution per minute (rpm).

3.8 Gas properties

The unit of density is the kilogram per cubic meter (kg/m^3); the IP unit is the pound-mass per cubic foot (lbm/ft^3). The unit of gas constant is the Joule per kilogram-Kelvin (J/(kg•K)); the IP unit is the foot-pound per pound mass-degree Rankine (ft-lb/(lbm•°R)).

3.9 Dimensionless groups

Various dimensionless quantities appear in the text. Any consistent system of units may be employed to evaluate these quantities unless a numerical factor is included, in which case units must be as specified.

3.10 Physical constants

The value of standard gravitational acceleration shall be taken as 9.80665 m/s^2, which corresponds to mean sea level at 45° latitude; the IP value is 32.1740 ft/s^2, which corresponds to mean sea level at 45° latitude [2]. The density of distilled water at saturation pressure shall be taken as 998.278 kg/m^3 at 20°C; the IP value is 62.3205 lbm/ft^3 at 68 °F [3]. The density of mercury at saturation pressure shall be taken as 13595.1 kg/m^3 at 0 °C; the IP value is 848.714 lbm/ft^3 at 32°F [3]. The specific weights in kg/m^3 (lbm/ft^3) of these fluids in vacuo under standard gravity are numerically equal to their densities at corresponding temperatures.