

# **ANSI/AMCA Standard 210-16**

# **ASHRAE Standard 51-16**

## **Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating**



## **Air Movement and Control Association International**

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## Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

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## Related AMCA Documents

### Related Publications

AMCA Publication 211

*Certified Ratings Program—Product Rating Manual for Fan Air Performance*

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# Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

## 1. Purpose and Scope

This standard establishes uniform test methods for a laboratory test of a fan or other air moving device to determine its aerodynamic performance in terms of airflow rate, pressure developed, power consumption, air density, speed of rotation and efficiency for rating or guarantee purposes.

This standard applies to a fan or other air moving device when air is used as the test gas, with the following exceptions:

- (a) air circulating fans (ceiling fans, desk fans);
- (b) positive pressure ventilators;
- (c) compressors with interstage cooling;
- (d) positive displacement machines; and
- (e) test procedures to be used for design, production or field testing.

## 2. Normative References

The following standards contain provisions that, through specific reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

IEEE 112-96 *Standard Test Procedure for Polyphase Induction Motors and Generators*, The Institute of Electrical and Electronic Engineers, 445 Hoes Lane, Piscataway, NJ 08855-1331, U.S.A. (AMCA #1149).

## 3. Definitions/Units of Measure/Symbols

### 3.1 Definitions

#### 3.1.1 Fan

A device that uses a power-driven rotating impeller to move air or gas (see note below). The internal energy increase imparted by a fan to air is limited to 25 kJ/kg (10.75 Btu/lbm). This limit is approximately equivalent to a pressure of 30 kPa (120 in. wg) (AMCA 99-0066).

Note: for the purpose of this standard, the term "air" is used in the sense of "gaseous fluid."

#### 3.1.2 Fan inlet and outlet boundaries

The interfaces between a fan and the remainder of the air

system; the respective planes perpendicular to an airstream entering or leaving a fan.

Various appurtenances (inlet boxes, inlet vanes, inlet cones, silencers, screens, rain hoods, dampers, discharge cones, evasés, etc.), may be included as part of a fan between the inlet and outlet boundaries.

#### 3.1.3 Fan input power boundary

The interface between a fan and its drive.

When mechanical input power is reported, it is the interface between a fan and its drive, which in this context is either a dynamometer or calibrated motor. When electrical input power is reported, it is the interface between mains and the drive.

#### 3.1.4 Driven fan

A fan equipped with a drive.

#### 3.1.5 Drive

Components used to power the fan, such as a motor, motor control and transmission. Not all of these components are required to constitute a drive. A calibrated motor used to measure fan input power is generally not considered part of the drive.

#### 3.1.6 Transmission

A system that transmits mechanical power from the motor to the fan shaft. Examples of transmissions are belts/sheaves, couplings and gears.

#### 3.1.7 Fan outlet area

The gross inside area measured in the planes of the outlet openings.

#### 3.1.8 Fan inlet area

The gross inside area measured in the planes of the inlet connections. For converging inlets without connection elements, the inlet area shall be considered to be that where a plane perpendicular to the airstream first meets the mouth of the inlet bell or inlet cone.

#### 3.1.9 Dry-bulb temperature

Air temperature measured by a temperature-sensing device without modification to compensate for the effect of humidity (AMCA 99-0066).

#### 3.1.10 Wet-bulb temperature

The air temperature measured by a temperature sensor