

ANSI/ASHRAE Standard 70-2006 (RA 2011)
(Reaffirmation of ANSI/ASHRAE Standard 70-2006)



ASHRAE STANDARD

Method of Testing the Performance of Air Outlets and Air Inlets

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE Web site at www.ashrae.org/technology.

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FOREWORD

This is a reaffirmation of Standard 70-2006. This standard was prepared under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). It may be used, in whole or in part, by an association or government agency with due credit to ASHRAE. Adherence is strictly on a voluntary basis and merely in the interests of obtaining uniform standards throughout the industry.

The changes made for the 2011 reaffirmation were:

- References were updated
- "Appendix" was replaced with "Informative Appendix"
- An entry for an ASME reference was added to Section 6, References
- An entry for ASHRAE Terminology of Heating, Ventilation, Air Conditioning, & Refrigeration was added to Informative Appendix A—Bibliography

1. PURPOSE

The purpose of this standard is to define laboratory methods of testing air outlets and air inlets used to terminate ducted and unducted systems for distribution and return of building air.

2. SCOPE

2.1 This standard includes the specifications for test instruments, facilities, installations, and procedures and methods of calculation for determining aerodynamic performance and sound generation of air outlets and air inlets.

2.2 The test methods in this standard apply to both isothermal and non-isothermal conditions.

3. DEFINITIONS

The following terms are defined as they are used in this standard. For definitions of all other terms, refer to *ASHRAE Terminology of Heating, Ventilation, Air Conditioning, & Refrigeration*.

air inlet: a device through which air is removed or returned from a conditioned space. Grilles, registers, diffusers, and slots may be used as air inlets.

air outlet: a device or opening through which air is discharged into a conditioned space. In this standard, all accessories, connecting duct adapters, or other mounting airways may be considered part of the outlet device being tested and, when they are so considered, shall be reported as a unit or assembly. Some specific outlet designations are defined as follows.

grille: a louvered or perforated face over an opening.

register: a combination grille and damper assembly.

diffuser: an outlet designed to distribute air in varying directions and planes.

slot: a long, narrow air outlet, generally one for which the aspect ratio is greater than 10:1.

airflow rate (Q): the volume of standard air per unit of time that moves past a given plane, expressed in cubic feet per minute (cfm) or liters per second (L/s).

airstream patterns: airstream patterns are characterized by the following terms:

drop (D): the maximum distance, in ft (m), that the vertical isovel of a horizontally projected (non-isothermal) airstream drops below the centerline of the outlet for the terminal velocity of interest (see Figure 1a).

envelope: the boundary surface of points of equal terminal velocity that describe the air diffusion profile. Envelope is also referred to as *isovel* (see Figure 1b).

rise: the maximum distance, in ft (m), that the vertical isovel of a horizontally projected (non-isothermal) airstream rises above the centerline of the outlet for the terminal velocity of interest (see Figure 1c).

spread: the distance, in ft (m), measured parallel or perpendicular to the mounting plane of the outlet between the extremes of the terminal velocity envelope (see Figure 1d).

terminal velocity (V_t): an arbitrarily specified air velocity that is the highest sustained velocity in the mixed airstream from an air outlet.

throw: the distance, in ft (m), from the center of the outlet perpendicular to a point in the mixed airstream where the velocity has been reduced to a specified terminal velocity (see Figure 1b).

area factor (A_k): a calculated area, in ft² (m²), of an air outlet or air inlet determined from the airflow rate (Q) divided by the discharge or intake velocity (V_k):

$$A_k = \frac{Q}{V_k} \quad (3-1)$$

aspect ratio: the ratio of the nominal length to width of a rectangular outlet.

core area: the area of a register or grille pertaining to its frame or border, whichever is less (see Figure 1e).

discharge or intake velocity (V_k): the air velocity, in fpm (m/s), determined from measurements taken with a specified instrument at specified locations and with a specified orientation on the air outlet or air inlet.

equivalent diameter (D_e): the diameter of a circular-duct equivalent that will have a cross-sectional area that is equal to that of a particular square or rectangular duct. The equivalent diameter is calculated by the following equation:

$$D_e = \sqrt{\frac{4 \times A}{\pi}} \quad (3-2)$$