

ASAE D272.3 MAR1996 (R2016)

Resistance to Airflow of Grains, Seeds, Other Agricultural Products, and Perforated Metal Sheets



American Society of Agricultural and Biological Engineers

STANDARD

ASABE is a professional and technical organization, of members worldwide, who are dedicated to advancement of engineering applicable to agricultural, food, and biological systems. ASABE Standards are consensus documents developed and adopted by the American Society of Agricultural and Biological Engineers to meet standardization needs within the scope of the Society; principally agricultural field equipment, farmstead equipment, structures, soil and water resource management, turf and landscape equipment, forest engineering, food and process engineering, electric power applications, plant and animal environment, and waste management.

NOTE: ASABE Standards, Engineering Practices, and Data are informational and advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. The ASABE assumes no responsibility for results attributable to the application of ASABE Standards, Engineering Practices, and Data. Conformity does not ensure compliance with applicable ordinances, laws and regulations. Prospective users are responsible for protecting themselves against liability for infringement of patents.

ASABE Standards, Engineering Practices, and Data initially approved prior to the society name change in July of 2005 are designated as "ASAE", regardless of the revision approval date. Newly developed Standards, Engineering Practices and Data approved after July of 2005 are designated as "ASABE".

Standards designated as "ANSI" are American National Standards as are all ISO adoptions published by ASABE. Adoption as an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by ASABE.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

CAUTION NOTICE: ASABE and ANSI standards may be revised or withdrawn at any time. Additionally, procedures of ASABE require that action be taken periodically to reaffirm, revise, or withdraw each standard.

Copyright American Society of Agricultural and Biological Engineers. All rights reserved.

ASABE, 2950 Niles Road, St. Joseph, MI 49085-9659, USA, phone 269-429-0300, fax 269-429-3852, hq@asabe.org

Resistance to Airflow of Grains, Seeds, Other Agricultural Products, and Perforated Metal Sheets

Approved by the ASAE Committee on Technical Data; adopted by ASAE 1948; revised 1954, 1962; reconfirmed by the ASAE Electric Power and Processing Division Technical Committee December 1968, December 1973, December 1978, December 1979; revised December 1980; reconfirmed December 1985; revised by the Grain and Feed Processing and Storage Committee; approved by the Food and Process Engineering Institute Standards Committee March 1987; reconfirmed December 1991; reaffirmed December 1992, December 1993, December 1994, December 1995; revised March 1996; reaffirmed December 2001, January 2007, December 2011, October 2016.

Keywords: Airflow, Drying, Grains, Seeds

1 Purpose and scope

1.1 These data can be used to estimate the resistance to airflow of beds of grain, seeds, and other agricultural products, and of perforated metal sheets. An estimate of this airflow resistance is the basis for the design of systems to dry or aerate agricultural products.

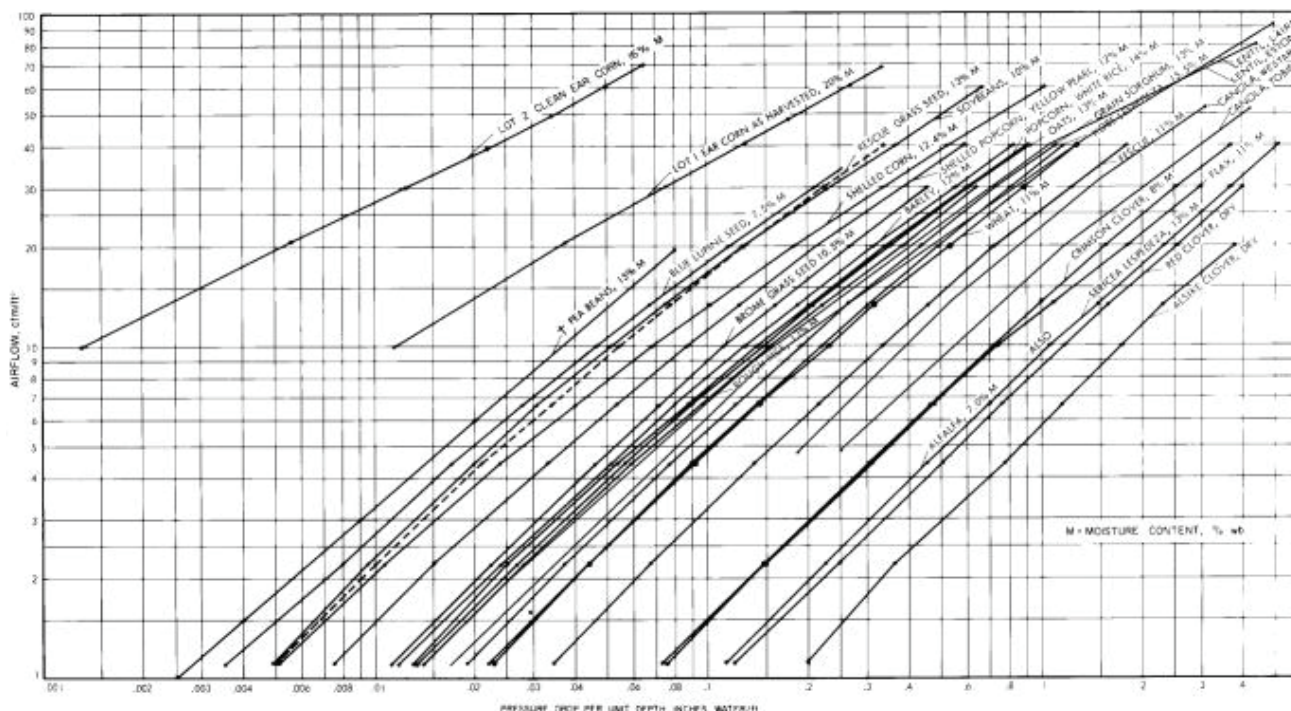
1.2 Data are included for common grains, seeds, other agricultural products, and for perforated metal sheets, over the airflow range common for aeration and drying systems.

11/11/2016 10:11:11 AM



The pressure drop for airflow through bulk grain in the horizontal direction has been measured for wheat and barley (Kumar and Muir, 1986); canola (Jayas et al., 1987); corn (Kay et al., 1989); alfalfa pellets (Sokhansanj et al., 1990); flaxseed (Jayas et al., 1991); and bird's foot trefoil, canary seed, fababeans, lentils, meadow fescue, oats, timothy, and tara peas (Alagusundaram et al., 1992). The pressure drop in the horizontal direction may be 60% to 70% of the pressure drop for airflow in the vertical direction. For some seeds, however, the difference between the pressure drops for the horizontal and vertical airflows may be nonexistent.

Figure 1 – Resistance to airflow of grains and seeds (SI units) (Shedd's data)



NOTE – This chart gives values for a loose fill (not packed) of clean, relatively dry grain. For a loose fill of clean grain having high moisture content (in equilibrium with relative humidities exceeding 85%), use only 80% of the indicated pressure drop for a given rule of air flow. Packing of the grain in a bin may cause 50% higher resistance to air flow than the values shown.

When foreign material is mixed with grain no specific correction can be recommended. However, it should be noted that resistance to air flow is increased if the foreign material is finer than the grain, and resistance to air flow is decreased if the foreign material is coarser than the grain.

The pressure drop for airflow through bulk grain in the horizontal direction has been measured for wheat and barley (Kumar and Muir, 1986); canola (Jayas et al., 1987); corn (Key et al., 1989); alfalfa pellets (Sokhansanj et al., 1990); flaxseed (Jayas et al., 1991); and bird's foot trefoil, canary seed, fababeans, lentils, meadow fescue, oats, timothy, and tara peas (Alagusundaram et al., 1992). The pressure drop in the horizontal direction may be 60% to 70% of the pressure drop for airflow in the vertical direction. For some seeds, however, the difference between the pressure drops for the horizontal and vertical airflows may be nonexistent.

Figure 2 – Resistance to airflow of grains and seeds (Inch-pound units) (Shedd's data)