

Australian Standard™

**Industrial fans—Performance testing
using standardized air ways**



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Australian Standard™

**Industrial fans—Performance testing
using standardized airways**

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PREFACE

This Standard was prepared by the Standards Australia Committee ME-013, Industrial Fans, to supersede AS 2936—1987, *SAA Fan Test Code*. It is identical to, and reproduced from ISO 5801:1997, *Industrial fans—Performance testing using standardized airways*.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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ISO	AS
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5168 Measurement of fluid flow—Evaluation of uncertainties	3778.2.4 Measurement of water flow in open channels— General—Estimation of uncertainty of a flow rate measurement
IEC	
34-2 Rotating electrical machines—Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles)	1359.102.1 Rotating electrical machines— General requirements—Methods for determining losses and efficiency—General

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Introduction

This International Standard is the result of almost thirty years of discussion, comparative testing and detailed analyses by leading specialists from the fan industry and research organizations throughout the world.

It was demonstrated many years ago that the codes for fan performance testing established in different countries do not always lead to the same results.

The need for an International Standard has been evident for some time and ISO/TC 117 started its work in 1963. Important progress has been achieved over the years and although the International Standard itself was not yet published, the subsequent revisions of various national standards led to much better agreement among them.

It has now become possible to complete this International Standard by agreement on certain essential points. It must be borne in mind that the test equipment, especially for large fans, is very expensive and it was necessary to include in the present International Standard many set-ups from various national codes in order to authorize their future use. This explains the sheer volume of this document.

Essential features of the present standard are as follows:

a) Types of installation

Since the connection of a duct to a fan outlet and/or inlet modifies its performance, it has been agreed that four standard installation types should be recognized.

These are:

- Type A: free inlet and outlet;
- Type B: free inlet and ducted outlet;
- Type C: ducted inlet and free outlet;
- Type D: ducted inlet and outlet.

A fan adaptable to more than one installation type will have more than one standardized performance characteristic. The user should select the installation type closest to his application.

b) Common parts

The differences obtained by testing the same fan according to various test codes depend chiefly on the flow pattern at the fan outlet and, while often minor, can be of substantial significance. There is general agreement that it is essential that all standardized test airways to be used with fans have

portions in common adjacent to the fan inlet and/or outlet sufficient to ensure consistent determination of fan pressure.

Geometric variations of these common segments are strictly limited.

However, conventional agreement has been achieved for some particular situations:

1) For centrifugal or cross-flow fans without outlet swirling flow, it is possible to use a simplified outlet duct as described in 30.2 f) without straightener when discharging to the atmosphere or to a measuring chamber.

2) For large fans (outlet diameter exceeding 800 mm) it may be difficult to carry out the tests with standardized common airways at the outlet including a straightener. In this case, by mutual agreement between the parties concerned, the fan performance may be measured using the set-up described in 30.2 f) with a duct of length $2D$ on the outlet side. Results obtained in this way may differ to some extent from those obtained using the normal type D installation, especially if the fan produces a large swirl. Establishment of a possible value of differences, is still a subject of research.

c) Calculations

Fan pressure is defined as the difference between the stagnation pressure at the outlet of the fan and the stagnation pressure at the inlet of the fan. The compressibility of air must be taken into account when high accuracy is required. However, simplified methods may be used when the reference Mach number does not exceed 0,15.

A method for calculating the stagnation pressure and the fluid or static pressure in a reference section of the fan, which stemmed from the work of the ad hoc group of Subcommittee 1 of ISO/TC 117, is given in annex C.

Three methods are proposed for calculation of the fan power output and efficiency. All three methods give very similar results (difference of a few parts per thousand for pressure ratios equal to 1,3).

d) Flowrate measurement

Determination of flowrate has been completely separated from the determination of fan pressure. A number of standardized methods may be used.

AUSTRALIAN STANDARD

Industrial fans — Performance testing using standardized airways

1 Scope

This International Standard deals with the determination of the performance of industrial fans of all types except those designed solely for air circulation e.g. ceiling fans and table fans.

Estimates of uncertainty of measurement are provided and rules for the conversion, within specified limits, of test results for changes in speed, gas handled and, in the case of model tests, size are given.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3966:1977, *Measurement of fluid flow in closed conduits — Velocity area method using Pitot static tubes.*

ISO 5167-1:1991, *Measurement of fluid flow by means of pressure differential devices — Part 1: Orifice plates, nozzles and Venturi tubes inserted in circular cross-section conduits running full.*

ISO 5168:—1), *Measurement of fluid flow — Evaluation of uncertainties.*

ISO 5221:1984, *Air distribution and air diffusion — Rules to methods of measuring air flowrate in an air handling duct.*

IEC 34-2:1972, *Rotating electrical machines — Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles).*

IEC 51-2:1984, *Direct acting indicating analogue electrical-measuring instruments and their accessories — Part 2: Special requirements for ammeters and voltmeters.*

IEC 51-3:1984, *Direct acting indicating analogue electrical-measuring instruments and their accessories — Part 3: Special requirements for wattmeters and varmeters.*

IEC 51-4:1984, *Direct acting indicating analogue electrical-measuring instruments and their accessories — Part 4: Special requirements for frequency meters.*

1) To be published. (Revision of ISO 5168:1978)