
**Vacuum technology — Standard methods
for measuring vacuum-pump
performance — General description**

*Technique du vide — Méthodes normalisées pour mesurer les
performances des pompes à vide — Description générale*



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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 21360 was prepared by Technical Committee ISO/TC 112, *Vacuum technology*.

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Introduction

This International Standard is a basic standard for measuring the performance data of vacuum pumps. The methods described here are well known from existing national and international standards. In developing this International Standard, the aim was to provide one single document containing the measurements of performance data of vacuum pumps and to simplify the future development of specific vacuum pump standards.

Specific vacuum pump standards will contain a suitable selection of measurement methods from this basic standard in order to determine the performance data, limiting values and specific operational conditions on the basis of the specific properties of the particular kind of pump. Whenever a discrepancy exists between the basic standard and the specific standard, it is the specific standard which is valid.

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Vacuum technology — Standard methods for measuring vacuum-pump performance — General description

1 Scope

This International Standard is a basic standard which defines three different methods for measuring the volume flow rate and one method each for measuring the base pressure, the compression ratio and the critical backing pressure of a vacuum pump.

The first method for measuring the volume flow rate (the throughput method) is the basic concept, in which a steady gas flow is injected into the pump while the inlet pressure is measured. In practice, the measurement of gas throughput may be complicated or inexact. For this reason, two other methods are described which avoid the direct measurement of throughput.

The second method for measuring the volume flow rate (the orifice method) is used when there is very small throughput occurring at very small inlet pressures (in the high and ultra-high vacuum). It is based on measuring the ratio of pressures in a two-chamber test dome where the two chambers are separated by a wall with a circular orifice.

The third method for measuring the volume flow rate (the pump-down method) is well-suited for automated measurement. It is based on the evacuation of a large vessel. The volume flow rate is calculated from two pressures, before and after a pumping interval, and from the volume of the test dome. Different effects, such as leak and desorption rates, gas cooling by nearly isentropic expansion during the pumping interval and increasing flow resistance in the connection line between test dome and pump caused by molecular flow at low pressures, influence the results of the pressure measurement and the resulting volume flow rate.

The choice of the required measurement methods depends on the properties of the specific kinds of vacuum pump, e.g. the measurement of the critical backing pressure is only necessary for vacuum pumps which need a backing pump. All data that is measured on a vacuum pump but not described in this International Standard (e.g. measurement of power consumption) is defined in the specific pump standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3529-1, *Vacuum technology — Vocabulary — Part 1: General terms*

ISO 3529-2, *Vacuum technology — Vocabulary — Part 2: Vacuum pumps and related terms*