INTERNATIONAL STANDARD

ISO 21360-1

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

Part 1: General description

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

Partie 1: Description générale

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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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 21360-1 was prepared by Technical Committee ISO/TC 112, *Vacuum technology*.

This first edition of ISO 21360-1 cancels and replaces ISO 21360:2007, of which it constitutes a minor revision.

ISO 21360 consists of the following parts, under the general title *Vacuum technology — Standard methods for measuring vacuum-pump performance*:

— *Part 1: General description*

— *Part 2: Positive displacement vacuum pumps*

Introduction

This part of ISO 21360 is a basic standard for measuring the performance data of vacuum pumps. The methods specified here are well known from existing national and International Standards. In developing this part of ISO 21360, the aim has been to provide a 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 part of ISO 21360 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 this part of ISO 21360 and the specific standard, it is the specific standard which is valid.

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

Part 1: General description

1 Scope

This part of ISO 21360 specifies three 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 specified 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 at very small inlet pressures (under a high or ultra-high vacuum). It is based on measuring the ratio of pressures in a two-chamber test dome in which 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 are measured on a vacuum pump, but not specified in this part of ISO 21360 (e.g. measurement of power consumption), are 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 3529-2, *Vacuum technology — Vocabulary — Part 2: Vacuum pumps and related terms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3529-2 and the following apply.