
Vacuum technology — Valves — Leak test

Technique du vide — Vannes à vide — Essai d'étanchéité des vannes à vide



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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 27895 was prepared by Technical Committee ISO/TC 112, *Vacuum technology*.

Introduction

Vacuum valves are the most common parts in vacuum systems. Valve manufacturers provide technical data for vacuum valves based on their own test methods and end users use these data to select valves. However, until the time of publication, there has been no International Standard specifying leak test methods for vacuum valves even though leak rate data are among the most fundamental. For example, the leak rate of the valve may vary in the time interval between gas filling and leak testing.

There are three different types of leak: a) real leaks, i.e. macroscopic cracks or holes allowing gases to pass through; b) virtual leaks, caused by outgassing of volatile material inside a vacuum system or trapped volume; c) permeation leaks, i.e. microscopic holes of diameter comparable to that of an atom, which occur throughout the construction material, e.g. in elastomers.

Virtual leaks are not measurable by the leak test method specified in this International Standard. Valve design and the materials used should therefore be chosen to minimize the risk of virtual leaks occurring.

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Vacuum technology — Valves — Leak test

1 Scope

This International Standard specifies methods for the leak testing of vacuum valves used for control of gas flow or vacuum pressure in a vacuum system. It is applicable to vacuum valves that can be closed to leak rates less than $1 \times 10^{-5} \text{ Pa m}^3/\text{s}$ for trace gas. The methods employ a sealing arrangement for the valve body, which is also specified in this International Standard. The methods are suitable for the verification of valve specifications.

A valve leak rate less than the nominal leak rate specified by the manufacturer during and after the operation enables the specification of such valve operating conditions as operating pressure range, permissible pressure difference between ports, bake-out temperature or operating temperature, and life cycle.

NOTE 1 The data for large valves and valves without a valve body can vary from those obtained during delivery inspection depending on the accuracy of the attachment surface of the vacuum device.

NOTE 2 The data obtained from this procedure is based on the testing conducted on an individual unit of a vacuum valve and they can be different from those obtained during delivery inspection if the test is performed with the valve incorporated into the equipment.

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 3530, *Vacuum technology — Mass-spectrometer-type leak detector calibration*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

leak rate

q

(vacuum valve technology) throughput of a trace gas, which passes through a crack, hole or gap in the wall, seat or sealing material of a valve under specific conditions

NOTE 1 Adapted from ISO 3530:1979, 2.5.1.

NOTE 2 The leak rate is expressed in pascal cubic metres per second.

NOTE 3 The leak rate of the trace gas can be measured using a mass spectrometer-type leak detector. The leak rate depends on type of gas, pressure difference, and temperature.

NOTE 4 The definitions **standard air leak rate** (3.2) and **equivalent standard air leak rate** (3.3) are more specific.