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Vacuum technology — Vocabulary —

Part 3:
Vacuum gauges

Technique du vide — Vocabulaire —

Partie 3: Manomètres à vide

[Revision of first edition (ISO 3529-3:1981)]

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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.

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ISO 3529-3 was prepared by Technical Committee ISO/TC 112, *Vacuum technology*, Subcommittee SC , .

This second/third/... edition cancels and replaces the first/second/... edition (3529 3:1981), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

ISO 3529 consists of the following parts, under the general title *Vacuum technology — Vocabulary*:

— *Part 3: Total and partial pressure vacuum gauges*

— *Part [1]:* General terms used in vacuum technology

— *Part [2]:* Definitions of vacuum pumps and related terms

Introduction

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3529/3 was developed by Technical Committee ISO/TC 112, Vacuum technology, and was circulated to the member bodies in May 1978. It has been approved by the member bodies of the following countries :

Australia India
Belgium Italy
Chile Japan
Czechoslovakia Mexico
France Netherlands
Germany, F. R. Poland
Romania
South Africa, Rep. of
Spain
United Kingdom
USA
Yugoslavia

No member body expressed disapproval of the document.

In 2012 the standard was revised Technical Committee ISO/TC 112, Vacuum technology, in order to include terms of now common vacuum gauges and to adapt terms to new developments and general use of terms in publications.

Vacuum technology — Vocabulary — Part 3: Total and partial pressure vacuum gauges

1 Scope

This part of ISO 3529 gives definitions of total and partial pressure vacuum gauges. It is a continuation of ISO 3529/1, which defines general terms used in vacuum technology, and of ISO 3529/2, which gives definitions of vacuum Pumps and related terms.

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.

3 Terms and definitions

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

3.1 General terms

3.1.1
pressure gauge
instrument for measuring gas or vapour pressures, greater, equal to or less than the prevailing atmospheric pressure.

3.1.2
vacuum gauge
instrument for measuring gas or vapour pressures less than the prevailing atmospheric pressure.

Note 1 to entry: Vacuum gauge is a subset of pressure gauge.

Note 2 to entry: Some types of vacuum gauges commonly in use do not actually measure a pressure (as expressed in terms of a forte acting on a surface), but some other physical quantity related to pressure, under specific conditions.

3.1.2.1
gauge head
of certain types of gauge, the part of the gauge which contains the pressure-sensitive element and which is directly connected to the vacuum system.

3.1.2.1.1
nude gauge
a gauge head without envelope. In this case, the sensitive element is inserted directly into the vacuum system.

3.1.2.2
gauge control unit
of certain types of gauge, the part of the gauge containing the power supply and all electrical circuitry necessary for the operation of the gauge.

3.1.2.2.1
gauge indicating unit
of certain types of gauge, the part of the gauge which indicates the output signal, usually scaled in units of pressure.

3.2 General categories of vacuum gauges

3.2.1
differential vacuum gauge
vacuum gauge which measures the difference of pressures existing simultaneously on either side of a sensitive partition element, for example a flexible diaphragm or a movable separating liquid.

3.2.2
absolute vacuum gauge
vacuum gauge by means of which pressure may be determined in terms of measured physical quantities alone.

3.2.3
total pressure vacuum gauge
vacuum gauge for measuring the total pressure of a gas or a gaseous mixture.

3.2.4
partial pressure vacuum gauge; partial pressure analyzer
vacuum gauge for measuring currents derived from the ionized constituents of a gaseous mixture. These currents represent partial pressures with different proportionality constants for different components.

3.3 Characteristics of vacuum gauges

3.3.1
measurement range of a vacuum gauge
range between minimum and maximum pressure where the reading of the gauge is within the specified measurement uncertainty limits

Note 1 to entry: For certain types of gauge, this range depends on the nature of the gas. In such a case, the pressure range for nitrogen must always be specified.

3.3.2
sensitivity; sensitivity coefficient
for a given pressure, the change in the signal indicated by the vacuum gauge, divided by the corresponding change in pressure and where appropriate divided by parameters not depending on pressure.

Note 1 to entry: For certain types of gauge, the sensitivity depends on the nature of the gas. In such a case, the sensitivity for nitrogen must always be specified.

3.3.3
relative sensitivity factor
of a vacuum gauge for a specified gas, the sensitivity of the gauge for that gas divided by the sensitivity of the gauge for nitrogen, at the same pressure and under the same operating conditions.

3.3.4
ionization sensitivity
for a given gas, the change of ion current divided by the corresponding change in pressure.

3.3.5
equivalent nitrogen pressure
of a gas acting on a vacuum gauge, that pressure of nitrogen which would produce the same gauge reading.

3.3.6
X-ray limit
of an ionization gauge, that pressure of pure nitrogen which would give the same gauge reading, without a X-ray effect, as is produced by the residual current caused by photo-electrons mainly emitted at the ion collector.

Note 1 to entry: For ionization gauges with a discharge by crossed electromagnetic fields, the X-ray limit is normally not significant.

3.4 Total pressure vacuum gauges

3.4.1
Vacuum gauges based on mechanical phenomena

3.4.1.1
liquid level manometer
absolute differential manometer, commonly a U-tube, in which the sensitive element is a movable separating liquid (for example mercury). The pressure difference is obtained by measuring the difference in the liquid levels.

3.4.1.2
elastic element gauges
differential vacuum gauge in which the flexible partition is an elastic element. The pressure difference can be determined by measuring either the displacement of the elastic element (direct method) or the force required to compensate its displacement (zero method). Examples: Bourdon gauge, diaphragm gauge, capacitance diaphragm gauge, etc.

3.4.1.2.1
Bourdon gauge
elastic element gauge where the elastic element is a tube formed into a spiral or a helix.

3.4.1.2.2
diaphragm gauge; membrane gauge
elastic element gauge where the elastic element is a membrane that changes the shape under a pressure difference across it.

Note 1 to entry: An example is a piezoresistive gauge where the force onto the membrane is measured by a piezo element. Another example is the capacitance diaphragm gauge which is defined in 3.4.1.2.3 and the resonant silicon gauge

3.4.1.2.3
capacitance diaphragm gauge
diaphragm gauge where the membrane is part of a capacitor.

Note 1 to entry: capacitance diaphragm gauge is sometimes also termed capacitance manometer.

3.4.1.3
compression gauges
vacuum gauge in which a known volume of the gas at the pressure to be measured is compressed (for example by the movement of a column of liquid – e.g. mercury) in a known ratio and the resulting higher pressure then measured. If the higher pressure is measured by a liquid level manometer, such a gauge is absolute for a gas which satisfies the ideal gas law. An example is the McLeod gauge.

3.4.1.
pressure balance; piston gauge
absolute vacuum gauge in which the pressure to be measured is suitably applied to an accurately matched piston-cylinder assembly of known cross-sectional area, the resulting force being compared with the gravitational force acting on a group of known masses or being measured by a force meter.

