

Non-destructive testing — Leak testing — Characterization of mass spectrometer leak detectors

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British Standard

ICS 19.100

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English version

Non-destructive testing — Leak testing — Characterization of mass spectrometer leak detectors

Essais non destructifs — Contrôles d'étanchéité —
Caractérisation des détecteurs de fuite à
spectrométrie de masse

Zerstörungsfreie Prüfung — Dichtheitsprüfung —
Charakterisierung von massenspektrometrischen
Leckdetektoren

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European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 138, Non-destructive testing, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 1998, and conflicting national standards shall be withdrawn at the latest by October 1998.

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1 Scope

This European Standard specifies terms and procedures for the characterization of mass spectrometer leak detectors (MSLD). It is not intended to give a complete set of specifications for an acceptance test but a description of procedures that can be used without particular calibration equipment.

An MSLD has an integral high vacuum system for maintaining the sensing element (mass spectrometer) at low operating pressure and for establishing a partial pressure related to the incoming gas flow. This pressure is measured quantitatively by the mass spectrometer. Such instruments are able to selectively measure the flow of a tracer gas. In most cases the tracer gas will be helium, flowing in/out of an object through a leak.

The methods described in this standard are applicable without restrictions to helium as the tracer gas. For other gases, additional precautions may be necessary.

These methods are applicable to commonly-available MSLD, based on the present level of technology, which may be able to measure leak rates down to 10^{-12} Pa·m³/s.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN 1330-8, *Non-destructive testing — Terminology Part 8: Terms used in testing for leak tightness*.

3 Definitions

For the purposes of this standard, the definitions given in prEN 1330-8 apply together with the following.

3.1 Terms

3.1.1

compression ratio of the counterflow stages of the high vacuum pump for tracer gas

with zero flow, the ratio of partial pressure of tracer gas at the exhaust of the counterflow stages of the high vacuum pump to the partial pressure at the inlet of the mass spectrometer (MS)

3.1.2

display

a device which indicates visually the leakage rate measured. The units in which the leakage rate is expressed may be selectable

NOTE The display may be analog or quasi-analog (continuous scale with definite divisions) or digital (numbers with a definite number of digits) or a combination of both.

3.1.3

inlet pumping speed

the volume rate of flow at the test port of an MSLD when the instrument is operating with the MS below its maximum working pressure

NOTE The inlet pumping speed may be different for different gases and different modes of operation. The inlet pumping speed for the tracer gas determines the response time for the volume under test.

3.1.4

internal leak port

a flange directly behind the inlet valve, used to connect a small leak for zero drift determination

3.1.5

intrinsic pumping speed

in a direct flow leak detector, the volume rate of flow of tracer gas at the inlet of the MS

3.1.6

ion collector

the part of the MS where ions are collected and neutralized producing a current in the collector which is a measure of the number of neutralized ions

3.1.7

sensitivity control

an electrical hardware or software control which may be used to adjust the sensitivity of the instrument so that a calibrated leak is indicated with its true leakage rate

3.1.8

sensitivity of the MS

the ratio of the ion current at the output of the MS to the corresponding partial pressure of tracer gas inside the MS

3.1.9

zero control

an electrical hardware or software control which may be used to shift the output indication of the leak detector to a determined point of the scale range in use, usually zero

3.2 Terms related to the operation of the MSLD

3.2.1

peak (noun)

the trace showing a maximum on the chart recorder when the leak detector is scanned with respect to mass with gas present, usually the tracer gas, to which the detector is tuned

3.2.2

peak (verb)

to set the scanning control (see 3.2.3) of a leak detector so that the output due to a given tracer gas input is maximized. It is a form of tuning (see 3.2.4)