



DPC: 24/30498660 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 14 November 2024

Origin: European

Latest date for receipt of comments: 07 January 2025

Project No. 2024/02260

Responsible committee: WEE/46/6 Leak Testing

Interested committees:

Title: Draft BS EN 1518 BS Non-destructive testing - Leak testing - Characterization of mass spectrometer leak detectors.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 07 January 2025

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Responsible Committee Secretary: Ms Takiyah Williams (BSI)

Direct tel: 02089967442

E-mail: takiyah.williams@bsigroup.com

Full document details: 24/30498660 DC

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 138.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword	4
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions	5
3.1 Terms	5
3.1.1 Terms related to the MSLD	5
3.1.2 Terms related to the operation of the MSLD	6
3.1.3 Terms related to the specification of the MSLD	7
3.1.4 Terms relating to the tracer gas background signal	7
3.1.5 Terms relating to the detection limit.....	7
3.1.6 Terms relating to the display resolution.....	7
4 Description of an MSLD.....	8
4.1 General.....	8
4.2 Main parts of an MSLD.....	8
4.3 Operating principles of MSLD.....	9
4.3.1 Direct flow leak detectors.....	9
4.3.2 Counterflow leak detectors	9
4.4 MSLD specification	9
5 Apparatus for methods of characterization	10
5.1 Leaks.....	10
5.1.1 General.....	10
5.1.2 Small tracer gas leaks.....	10
5.1.3 Large air leak.....	10
5.2 Leak isolation valve.....	10
5.3 Test vessel	11
5.4 Arrangement for test	12
5.4.1 Auxiliary pumping system.....	12
5.4.2 Materials	13
5.5 Preparation for test.....	13
5.5.1 Power supply	13
5.5.2 Warming up	13
5.5.3 Adjustment.....	13
5.5.4 Constant pumping speed.....	13
5.5.5 Constant compression ratio of the high vacuum pump	13
6 Reference conditions for characterization.....	13
6.1 Reference temperature	13
6.2 Reference pressure	13
6.3 Reference humidity.....	13
7 Test procedures.....	14
7.1 General.....	14
7.2 Minimum detectable leakage rate	14
7.2.1 Background drift and noise.....	14
7.2.2 Auxiliary pumping system background.....	14
7.2.3 Sensitivity	14

7.2.4	Time constant	15
7.3	Minimum detectable concentration	15
7.3.1	General	15
7.3.2	Background drift and noise	17
7.3.3	Background signal.....	17
7.3.4	Sensitivity	17
7.4	Inlet pumping speed for tracer gas	18
8	Results	18
8.1	Minimum detectable leakage rate.....	18
8.1.1	Evaluation.....	18
8.1.2	Expression of minimum detectable leakage rate.....	20
8.2	Minimum detectable concentration	20
8.2.1	Evaluation.....	20
8.2.2	Expression of minimum detectable concentration	21
8.3	Inlet pumping speed.....	21
8.3.1	Evaluation.....	21
8.3.2	Expression of inlet pumping speed	22
9	Test report	22
	Bibliography	24

European foreword

This document (prEN 1518:2024) has been prepared by Technical Committee CEN/TC 138 “Non-destructive testing”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1518:1998.

prEN 1518:2024 includes the following significant technical changes with respect to EN 1518:1998:

- a) normative references have been updated;
- b) clause “Terms and definitions” has been revised;
- c) new Subclause 4.1, General, has been added;
- d) Clause 5.2 has been updated;
- e) in Clause 6.1, the ambient temperature has been adapted;
- f) Clause 7 and 8 have been revised;
- g) the test report has been revised;
- h) the figures have been integrated in the text.

1 Scope

This document 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.

The methods described in this document 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 leakage rates down to 10^{-12} Pa·m³/s.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN ISO 20484:2017, *Non-destructive testing — Leak testing — Vocabulary (ISO 20484:2017)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 20484:2017 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 Terms

3.1.1 Terms related to the MSLD

3.1.1.1

compression ratio

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

3.1.1.2

display

device which indicates visually the leakage rate measured

Note 1 to entry: The units in which the leakage rate is expressed can be selectable.

Note 2 to entry: The display can be analogue or quasi-analogue (continuous scale with definite divisions) or digital (numbers with a definite number of digits) or a combination of both.

3.1.1.3

inlet pumping speed

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 1 to entry: The inlet pumping speed can 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.

3.1.1.4

internal leak port

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

3.1.1.5

intrinsic pumping speed

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

3.1.1.6

ion collector

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

3.1.1.7

sensitivity control

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

3.1.1.8

sensitivity

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

3.1.1.9

zero control

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

3.1.2 Terms related to the operation of the MSLD

3.1.2.1

peak

<noun> trace showing a maximum when the leak detector is scanned with respect to mass with gas present, usually the tracer gas, to which the detector is tuned

3.1.2.2

peak

<verb> to set the scanning control (see 3.1.2.3) of a leak detector so that the output due to a given tracer gas input is maximized

Note 1 to entry: It is a form of tuning (see 3.1.2.4).

3.1.2.3

scan

<verb> to adjust the accelerating voltage (or other equivalent operating parameter) of a leak detector, particularly across that range of voltage which includes the voltage necessary to produce a tracer gas peak

3.1.2.4

tune

<verb> in leak detection, to adjust one or more of the controls of a leak detector so that its response to a tracer gas is maximized

Note 1 to entry: Tuning by means of the scanning control only is called “peaking” (see 3.1.2.2).