BS EN IEC 60068-2-17:2023

BSI Standards Publication

Environmental testing

Part 2-17: Tests — Test Q: Sealing

bsi.

Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

National foreword

This British Standard is the UK implementation of EN IEC 60068-2-17:2023. It is identical to IEC 60068-2-17:2023. It supersedes BS EN 60068-2-17:1995, which will be withdrawn on 2 August 2026.

The UK participation in its preparation was entrusted to Technical Committee GEL/104, Environmental conditions, classification and testing.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 539 18958 2

ICS 19.040

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2023.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60068-2-17

September 2023

ICS 19.040

Supersedes EN 60068-2-17:1994

English Version

Environmental testing - Part 2-17: Tests - Test Q: Sealing (IEC 60068-2-17:2023)

Essais d'environnement - Partie 2-17: Essais - Essai Q: Etanchéité
(IEC 60068-2-17:2023)

Umgebungseinflüsse - Teil 2-17: Prüfverfahren - Prüfung Q: Dichtheit
(IEC 60068-2-17:2023)

This European Standard was approved by CENELEC on 2023-08-02. CENELEC 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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

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

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

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

© 2023 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 60068-2-17:2023 E

Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

European foreword

The text of document 104/984/FDIS, future edition 5 of IEC 60068-2-17, prepared by IEC/TC 104 "Environmental conditions, classification and methods of test" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60068-2-17:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-05-02
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-08-02

This document supersedes EN 60068-2-17:1994 and all of its amendments and corrigenda (if any).

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60068-2-17:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60068-1	NOTE	Approved as EN 60068-1
IEC 60068-2-18	NOTE	Approved as EN 60068-2-18

AVA Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

CONTENTS

FOREWORD 6
1 Scope 8
2 Normative references 8
3 Terms and definitions 8
4 General 9
5 Test Qa: Sealing of bushes, spindles and gaskets 11
5.1 Object 11
5.2 Scope of Test Qa 11
5.3 General description of the test 11
5.4 Initial measurements 11
5.5 Conditioning 11
5.6 Final measurements 11
5.7 Information to be given in the relevant specification 11
6 Test Qc: Container sealing, gas leak 12
6.1 Object 12
6.2 Scope of Test Qc 12
6.3 General description of the test 12
6.4 Test Method 1 12
6.5 Test Method 2 13
6.6 Test Method 3 13
6.7 Information to be given in the relevant specification 14
7 Test Qd: Container sealing, seepage of filling liquid 14
7.1 Object 14
7.2 Scope of Test Qd 14
7.3 General description of the test 14
7.4 Severities 14
7.5 Preconditioning 15
7.6 Initial measurements 15
7.7 Conditioning 15
7.8 Final measurements 15
7.9 Information to be given in the relevant specification 15
8 Test Qf: Immersion 15
8.1 Object 15
8.2 General description of the test 15
8.3 Initial measurements 16
8.4 Preconditioning 16
8.5 Conditioning 16
8.6 Recovery 16
8.7 Final measurements 16
8.8 Information to be given in the relevant specification 17
9 Test Qk: Sealing tracer gas method with mass spectrometer 17
9.1 Object 17
9.2 Scope of Test Qk 17
9.3 General description of the test 17
9.4 Test Method 1 18
9.4.1 General 18

AVA Documents Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

9.4.2 Severities 18
9.4.3 Preconditioning 20
9.4.4 Initial measurements 20
9.4.5 Test parameters 20
9.4.6 Conditioning 20
9.4.7 Recovery 20
9.4.8 Gross leaks 20
9.4.9 Final measurements 21
9.5 Test Method 2 21
9.5.1 General 21
9.5.2 Preconditioning 21
9.5.3 Initial measurements 21
9.5.4 Conditioning 21
9.5.5 Gross leaks 21
9.5.6 Final measurements 21
9.6 Test Method 3 22
9.6.1 General 22
9.6.2 Preconditioning 22
9.6.3 Initial measurements 22
9.6.4 Conditioning 22
9.6.5 Final measurements 22
9.7 Information to be given in the relevant specification 23
10 Test Ql: Bomb pressure test 23
10.1 Object 23
10.2 Scope of Test Ql 23
10.3 General description of the test 23
10.4 Initial measurements 24
10.5 Conditioning 24
10.6 Recovery 24
10.7 Final measurements 24
10.8 Information to be given in the relevant specification 25
11 Test Qm: Tracer gas sealing test with internal pressurization 25
11.1 Object 25
11.2 Scope of Test Qm 25
11.3 General description of the test 25
11.3.1 Total method and local method 25
11.3.2 Corresponding leak rate 25
11.3.3 Test Method 1: Cumulative test 26
11.3.4 Test Method 2: Probing test 26
11.4 Preconditioning 26
11.5 Conditioning 26
11.5.1 General 26
11.5.2 Test Method 1: Cumulative test 26
11.5.3 Test Method 2: Probing test 27
11.6 Information to be given in the relevant specification 28
12 Test Qy: Pressure rise sealing test 28
12.1 Object 28
12.2 Scope of Test Qy 28
12.3 General description of the test 28

AVA Documents
Document Sharing Hub
Full document details: BS EN IEC 60068-2-17:2023

12.3.1 Test method 28
12.3.2 Test equipment 28
12.3.3 Calculation of the leak rate R 29
12.4 Calibration of the test equipment 30
12.5 Test time 30
12.6 Evaluation of the volume of measurement 30
12.7 Information to be given in the relevant specification 31
13 Information to be given in the test report 31
Annex A (informative) Example of an apparatus for Test Qa: Sealing of bushes, spindles and gaskets 33
A.1 Principle of operation 33
A.2 Operation of example apparatus 34
A.3 Calibration and accuracy 35
Annex B (normative) Further requirements for Test Qc: Container sealing, gas leak 36
B.1 General 36
B.2 Test Method 1 36
B.3 Test Method 2 37
B.4 Test Method 3 37
Annex C (informative) Guidance on Test Qd: Container sealing, seepage of filling liquid 38
Annex D (informative) Interrelation of test parameters for Test Qk: Sealing tracer gas method with mass spectrometer 39
Annex E (informative) Guidance on Test Qk: Sealing tracer gas method with mass spectrometer 42
E.1 General 42
E.2 Choice of the applicable severity 43
Annex F (informative) Guidance on Test Ql: Bomb pressure test 46
Annex G (informative) Guidance on Test Qm: Tracer gas sealing test with internal pressurization 47
G.1 Influence of time 47
G.2 Test Method 1: Cumulative test 47
G.2.1 Sensitivity 47
G.2.2 Specific advantages and drawbacks 47
G.3 Test Method 2: Probing test 47
G.3.1 Sensitivity 47
G.3.2 Specific advantages and drawbacks 48
Annex H (informative) Guidance on Test Qy: Pressure rise sealing test 49
Bibliography 50

Figure 1 – Family tree of all sealing tests 10
Figure 2 – Typical installation for sealing test using the pressure rise test procedure 29
Figure 3 – Pressure of volume of measurement versus time during the sealing test using the pressure rise test procedure 29
Figure A.1 – Chamber for sealing test (Test Qa) 33
Figure A.2 – Example of an apparatus for sealing test (Test Qa) 34
Figure D.1 – Nomogram for determination of test parameters 41

AVA Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

Figure H.1 – Limiting cases of the pressure of volume of measurement versus test time, provided that the dimensions of the test device, the volume of measurement and the evacuation time are constant 49

Table 1 – Test conditions for Test Method 3, Step 1 13

Table 2 – Head-of-water and corresponding pressure differences 16

Table 3 – Severities and test conditions (and corresponding equivalent standard leak rates) 19

Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

ENVIRONMENTAL TESTING –

Part 2-17: Tests – Test Q: Sealing

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60068-2-17 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 1994. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) "Survey of sealing tests" has been deleted and the relevant content moved to a new Clause 4 "General";
b) the Scope has been revised;
c) the figures have been updated for clarification purposes;
d) all non-SI units have been removed;
e) the information to be given in the relevant specification has been revised.

AVA Documents Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

The text of this International Standard is based on the following documents:

Draft	Report on voting
104/984/FDIS	104/1000/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60068 series, published under the general title *Environmental testing*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

ENVIRONMENTAL TESTING –

Part 2-17: Tests – Test Q: Sealing

1 Scope

This part of IEC 60068 deals with seal tests applicable to the external and internal detection in container sealing of gross leaks and fine leaks to determine the effectiveness of seals of specimens. For further tests to verify the ability of enclosures, covers and seals to maintain components and equipment in good working order, IEC 60068-2-18 can be helpful.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology 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
leak rate
quantity of a dry gas at a given temperature that flows through a leak per unit of time and for a known difference of pressure across the leak

3.2
standard leak rate
leak rate under standard conditions of temperature and pressure difference of 25 °C and 10^5 Pa

3.3
measured leak rate
R
leak rate of a given device as measured under specified conditions and employing a specified test gas

Note 1 to entry: Measured leak rates are often determined with helium employed as the test gas under a pressure difference of 10^5 Pa at 25 °C. For the purpose of comparison with leak rates determined by other methods of testing, the leak rates should be converted to equivalent standard leak rates.

3.4
equivalent standard leak rate
L
standard leak rate of a given device with air as the test gas

Note 1 to entry: The equivalent standard leak rate is expressed in Pa · cm^3/s.

AVA Documents
Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

3.5
time constant
θ
<of leak> time required for equalization of the partial pressure difference across a leak if the initial rate of change of that pressure difference were maintained

Note 1 to entry: For the purpose of Test Q, the time constant is equal to the quotient of the internal volume of the specimen and the equivalent standard leak rate.

3.6
gross leak
any leak with an equivalent standard leak rate greater than 1 Pa · cm^3/s

3.7
fine leak
any leak with an equivalent standard leak rate smaller than 1 Pa · cm^3/s

3.8
virtual leak
semblance of a leak caused by slow release of absorbed, adsorbed or occluded gas

3.9
leak meter
<in Test Qm> apparatus consisting of a hand probe for taking a sample of gas mixture and a meter providing a graduated display of the concentration of a predetermined type of gas in the sample

3.10
volume of measurement
V_m
<in Test Qm> volume contained between the gastight sheath collecting the leak and the specimen

3.11
leak detector
<in Test Qm> apparatus consisting of a hand probe for taking a sample of gas mixture and a device sensitive to the presence of a predetermined type of gas and emitting a signal, either acoustic or visual, when the concentration of a predetermined type of gas reaches a pre-set threshold level

3.12
probing
DEPRECATED: sniffing
<in Test Qm> action of slowly moving the probe of a leak detector along a specimen to locate the leaks

4 General

Test Q: Sealing includes several tests which use different conditioning procedures appropriate for different applications.

NOTE Other tests of this category are rain and water tests which are described in IEC 60068-2-18.

The family tree of all sealing tests is shown in Figure 1.

Documents
Document Sharing Hub
Full document details: BS EN IEC 60068-2-17:2023

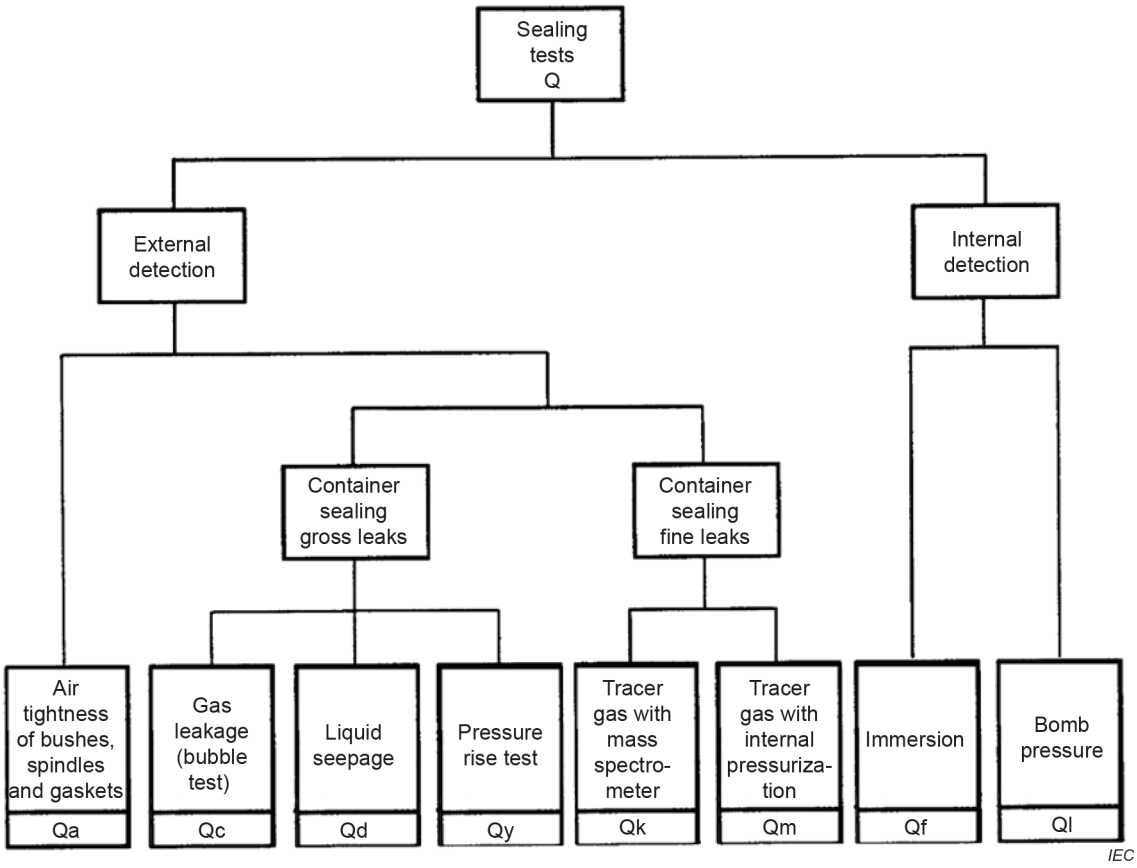

Figure 1 – Family tree of all sealing tests

Test Q can be subdivided in the following two subgroups, distinguished by their detection methods:

– internal detection, which measures changes of electrical characteristics produced by the test medium (liquid or gas) introduced into the specimens through the leak;

– external detection, whereby the escape of the test medium through the leak is observed.

The two tests for internal detection Qf and Ql are very similar. They are very effective for certain components, for example plastic-foil capacitors; they are not recommended, however, for components in which electrical changes become effective only after a long time (for instance, after the test is terminated).

The tests for external detection are further subdivided according to their application. Test Qa is a bubble test which is used to determine the airtightness of bushes, spindles and gaskets. The other tests, Qc, Qd, Qk and Qm, are used to determine leaks in containers (metallic cases, housings, etc.).

Test Qc is a bubble test again including three methods with different sensitivities (leaks not less than 1 Pa · cm^3/s). Test Qd is a liquid seepage test which may be applied to specimens filled during manufacture with a liquid or a product becoming liquid at the test temperature.

Tests Qk and Qm are the most sensitive of this series. Their sensitivity ranges from 1 Pa · cm^3/s to about 10^{-6} Pa · cm^3/s.

Documents
Document Sharing Hub
Full document details: BS EN IEC 60068-2-17:2023

5 Test Qa: Sealing of bushes, spindles and gaskets

5.1 Object

To determine the effectiveness of seals of bushes, spindles and similar features. For this test, two types of seals shall be considered:

– Type A: 100 kPa (10 N/cm^2) to 110 kPa (11 N/cm^2) in the direction specified in the relevant specification.

– Type B: 100 kPa (10 N/cm^2) to 110 kPa (11 N/cm^2) in each direction.

5.2 Scope of Test Qa

This test can be used for the detection of gross leaks.

5.3 General description of the test

The specimen is mounted on the lid at a pressurized test chamber which is submerged in a liquid. If the specimen leaks, the air escaping is collected. The amount of air collected per time is a measure of the air leak. A suitable test apparatus is described in Annex A.

5.4 Initial measurements

There are no initial measurements required for Test Qa.

5.5 Conditioning

An air pressure difference, as specified below, shall be applied across each seal or simultaneously across a group of seals forming an assembly, if not specified otherwise.

– Type A: 100 kPa (10 N/cm^2) to 110 kPa (11 N/cm^2) in the direction specified in the relevant specification.

– Type B: 100 kPa (10 N/cm^2) to 110 kPa (11 N/cm^2) in each direction.

Where a higher pressure is required, it shall be 340 kPa (34 N/cm^2) to 360 kPa (36 N/cm^2).

NOTE It is possible that the test apparatus described in Annex A will not be suitable for these higher pressures.

Type B seals shall be tested both in a static condition and while being mechanically operated as required by the relevant specification.

5.6 Final measurements

The rate of leak shall be measured. The limit shall be specified in the relevant specification.

5.7 Information to be given in the relevant specification

When Test Qa is included in the relevant specification, the following details shall be given as far as they are applicable:

	Subclause
a) Requirements for pressure	5.5
b) Direction of application of pressure difference	5.5
c) Mechanical operation during conditioning	5.5
d) Requirements for leak rate	5.6

AVA Documents Document Sharing Hub

Full document details: BS EN IEC 60068-2-17:2023

6 Test Qc: Container sealing, gas leak

6.1 Object

To determine the effectiveness of seals of specimens having an included gas-filled space (e.g. specimens not completely filled with impregnant).

6.2 Scope of Test Qc

This test can be used for the detection of leak rates greater than (100, 10 or 1) Pa · cm^3/s according to the method chosen.

Test Methods 1 and 3 are applicable only to specimens that are able to withstand full decompression and the compression necessary for the impregnation without suffering distortion or permanent physical damage.

Test Method 2 is applicable to all specimens subject to a significant thermally generated pressure differential being achieved at the maximum ambient temperature of operation of the specimen.

Guidance on Test Qc is given in Annex B.

6.3 General description of the test

The detection of gross leaks is achieved by submerging the test specimen in a suitable liquid, under controlled conditions and by observing bubbles emanating from the specimen surface.

A positive internal pressure within the test specimen is generated by one of the following test methods:

a) Test Method 1

   Conducting the test in a vacuum environment, thereby increasing the pressure differential across the seals of the test specimen.

b) Test Method 2

   Through immersion in a test liquid maintained at an elevated temperature.

c) Test Method 3

   Through immersion in a test liquid, following impregnation with another liquid having a boiling point below the test temperature.

6.4 Test Method 1

The test chamber containing the bath required for this test shall be capable of being evacuated, and the bath shall contain sufficient liquid to enable the specimens to be immersed so that the uppermost surface of the specimen enclosure or seal to be tested is at a depth of not less than 10 mm below the surface. The test liquid shall be maintained at a temperature between 15 °C and 35 °C. The bath should be capable of being drained of the liquid or having the specimen removed from the liquid before breaking the vacuum.

Specimens shall be immersed in the test liquid with their seals uppermost. The pressure within the test chamber shall then be reduced within 1 min to a value of 1 kPa or as otherwise specified in the relevant specification. If no failure has been observed this pressure shall be maintained for another minute or any duration specified in the relevant specification.

Specimens possessing seals on more than one surface shall be tested with each surface in the uppermost position.

Documents
Document Sharing Hub
Full document details: BS EN IEC 60068-2-17:2023

Failure criteria for this test shall be the observance of a definite stream of bubbles, or more than two large bubbles, or an attached bubble that grows at any time during the test.

6.5 Test Method 2

The bath required for this test shall contain sufficient liquid to enable the test specimens to be completely immersed to a depth of not less than 10 mm above the uppermost part of the enclosure or seal to be tested.

The liquid shall be maintained at a temperature of 1 K to 5 K above the maximum ambient temperature of operation for the specimen under test or at the temperature required in the relevant specification.

The specimens, which shall be at a temperature between 15 °C and 35 °C, shall be immersed in the test liquid with their seals uppermost for a period of at least 10 min, or as specified in the relevant specification.

Specimens possessing seals on more than one surface shall be tested with each surface in the uppermost position.

Failure criteria for this test shall be the observance of a definite stream of bubbles, or more than two large bubbles, or an attached bubble that grows at any time during the test.

6.6 Test Method 3

Test Method 3 consists of two steps.

a) Step 1

Step 1 shall be performed at ambient temperature.

The specimens shall be enclosed in a vacuum/pressure vessel and the pressure reduced to about 100 Pa for 1 h. After that time, and without breaking the vacuum, an impregnation liquid shall be drawn into the vessel until the specimens are covered by it.

The specimens shall then be pressurized under conditions as shown in Table 1.

Table 1 – Test conditions for Test Method 3, Step 1

Internal cavity volume	Minimum pressure (absolute)	Minimum duration
< 0,1 cm^3	600 kPa	1 h
> 0,1 cm^3	300 kPa	2 h

At the end of this impregnation time, the pressure shall be removed. The specimens shall be removed from the liquid and allowed to dry in air at ambient temperature for (3 ± 1) min or another duration specified in the relevant specification before performing Step 2.

b) Step 2

Test Method 2 shall apply, using a test temperature of (125 ± 5) °C, if not specified otherwise. The specimen shall be observed from the instant of immersion until 30 s after immersion, if not specified otherwise.

WARNING – The use of Test Method 3 can bear the risk of explosion, when a large specimen is likely to be filled with the impregnation liquid, that tends to vaporize rapidly during Step 2.

WARNING – The impregnation liquid can form toxic gases when boiled dry. Any direct contact with heating elements shall be prevented.

Documents
Document Sharing Hub
Full document details: BS EN IEC 60068-2-17:2023

6.7 Information to be given in the relevant specification

When Test Qc is included in a relevant specification, the following details shall be given, as far as they are applicable:

		Clause or subclause
a)	Test method	6.3, 6.4, 6.5, 6.6
b)	Recommended liquid(s)	Annex B
c)	Test Method 1: pressure and time, if different from 6.4	6.4
d)	Test Method 2: liquid temperature, if different from 6.5	6.5
e)	Test Method 2: immersion duration, if different from 6.5	6.5
f)	Drying time if different from 3 min	6.6
g)	Test Method 3: Step 2 temperature	6.6 b)

7 Test Qd: Container sealing, seepage of filling liquid

7.1 Object

To determine the effectiveness of seals of specimens filled with liquid. This test can also be used for specimens having a filling which is solid at room temperature, but which is liquid at the testing temperature.

7.2 Scope of Test Qd

This test can be used for the detection of leak rates corresponding to an air leak rate greater than about 1 Pa · cm^3/s. The sensitivity of the method depends on the kinematic viscosity of the liquid at testing temperature and the technique employed to detect seepage.

Guidance on Test Qd is given in Annex C.

7.3 General description of the test

The specimen is examined for seepage of liquid likely to occur when it is brought up to a temperature slightly higher than its maximum ambient temperature of operation.

7.4 Severities

A severity is defined as the period of time at which the specimen is maintained at the testing temperature. The relevant specification shall state the applicable severity chosen from the following list:

– 10 min;
– 1 h;
– 4 h;
– 24 h;
– 48 h.

Documents
Document Sharing Hub
Full document details: BS EN IEC 60068-2-17:2023