INTERNATIONAL STANDARD

ISO 7458

Second edition
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Glass containers — Internal pressure resistance — Test methods

Récipients en verre — Résistance à la pression interne — Méthodes d'essai

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Foreword

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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 7458 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 63, *Glass containers*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

This second edition cancels and replaces the first edition (ISO 7458:1984), which has been technically revised.

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Foreword

This document (EN ISO 7458:2004) has been prepared by Technical Committee CEN /TC 261, "Packaging", the secretariat of which is held by AFNOR, in collaboration with Technical Committee ISO/TC 63 "Glass containers".

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of an identical text or by endorsement, at the latest by September 2004, and conflicting national standards shall be withdrawn at the latest by September 2004.

Efficient packaging is of great importance for the distribution and the protection of goods and the environment. Insufficient or inappropriate packaging can lead to damage or wastage of the contents of the pack.

This standard is part of a series of standards for "Glass containers - Test methods":

— EN ISO 7458, *Glass containers — Internal pressure resistance — Test methods (ISO 7458:2004)*

— EN ISO 7459, *Glass containers — Thermal shock resistance and thermal shock endurance — Test methods (ISO 7459:2004)*

— prEN ISO 8106, *Glass containers — Determination of capacity by gravimetric method — Test method (ISO/FDIS 8106:2003)*

— EN ISO 8113, *Glass containers — Resistance to vertical load — Test method (ISO 8113:2004)*

— EN 29008, *Glass bottles — Verticality — Test method (ISO 9008:1991)*

— EN 29009, *Glass containers — Height and non-parallelism of finish with reference to container base — Test methods (ISO 9009:1991)*

— EN 29885, *Wide-mouth glass containers — Deviation from flatness of top sealing surface — Test methods (ISO 9885:1991)*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies two test methods for the determination of the internal pressure resistance of glass containers, Method A by application of uniform internal pressure for a predetermined period and Method B by application of internal pressure increasing at a predetermined constant rate.

2 Sampling

The test shall be performed on a predetermined number of containers. The containers used for the test shall not have been subjected to any other mechanical or thermal test which could affect their internal pressure resistance.

3 Test methods

3.1 Test medium

The test medium is tap water.

3.2 Method A

3.2.1 General

Application of uniform internal pressure for a predetermined period.

3.2.2 Apparatus

The apparatus shall comply with the following principles:

a) The container to be tested shall be held in such a manner that it is suspended by the finish.

b) There shall be a resilient seal between the sealing surface and the pressure head in order to retain the pressurizing medium during the test.

c) There shall be a means of applying fluid pressure to a predetermined level, at an initial rate of (10 ± 2) bar · s^{-1} = (1,0 ± 0,2) MPa · s^{-1} and of maintaining that pressure constant during the test.

3.2.3 Procedure

3.2.3.1 Fill the containers with water.

NOTE Where possible it is advisable that the difference in temperature between the container and the water is within the range of ± 5°C to avoid the possibility of extra stress being introduced into the container prior to the test.

3.2.3.2 Use one of the following test procedures, depending on the purpose of the test:

a) Pass test

Apply the internal test pressure to the predetermined level and hold it constant for (60 ± 2) s, or for a different period, provided that the apparatus has the means for correcting the pressure values to those which would be obtained for a 60 s test.

b) Progressive test

Continue the test described in a), by increasing the pressure in increments of 1 bar or 2 bar (0,1 MPa or 0,2 MPa), until 50 % or/and 100 % of containers are broken.

NOTE In some commercially available machines, increments are 1 bar for use up to 18 bar and 2 bar above 18 bar.

3.2.4 Test report

The test report shall include the following:

a) reference to this European Standard,

b) sample size and sampling method,

c) number of containers from each mould included in the sample,

d) type of test, i.e. pass test [3.2.3.2 a)] or progressive test [3.2.3.2 b)],

e) test results:

1) for the pass test, in accordance with 3.2.3.2 a):

— the pressure used and the number of containers that failed in the test, with the respective pressures at which they failed

2) for the progressive test, in accordance with 3.2.3.2 b):

— the pressure at which first failure occurred and the number of containers that failed at that pressure

— the pressure required to break the predetermined percentage of the sample, expressed to the nearest 0,1 bar (0,01 MPa),

— the mean breaking pressure and the standard deviation

f) date of test,

g) location,

h) signature of responsible person.

3.3 Method B

3.3.1 General

Application of internal pressure increasing at a predetermined constant rate.

3.3.2 Apparatus

The apparatus shall comply with the following principles:

a) The container to be tested shall be held in such a manner that it is suspended by the finish.

b) There shall be a resilient seal between the sealing surface and the pressure head in order to retain the pressurizing medium during the test.

c) There shall be a means of applying fluid pressure, increasing at a rate of $(5{,}8 \pm 1)$ bar $\cdot\, s^{-1} = (0{,}58 \pm 0{,}1)$ MPa $\cdot\, s^{-1}$, until the container fails or a predetermined level is reached. The actual rate of increase of pressure shall be reproducible to ± 2 %.

d) The apparatus shall include a means of indicating the pressure level at which the container failed, or the maximum pressure reached during the test.

e) The apparatus shall include a means of indicating the relationship between the constant rate and fixed duration test.

EXAMPLE In case of the "Ramp Pressure Test" apparatus, the relationship between the actual pressure and the 60 s pressure is given by

$$P_R = 1{,}38P_{60} + K \quad (1)$$

Where

P_R is the actual pressure

P_{60} is the "Sixty Second (60 s)" pressure (see 3.2.3.2a)

K = 0,1783 (pressure measured in MPa)

= 1,783 (pressure measured in bar)

= 25,9 (pressure measured in psi)

3.3.3 Procedure

3.3.3.1 Fill the containers with water.

NOTE Where possible it is advisable that the difference in temperature between the container and the water is within the range of ± 5°C to avoid the possibility of extra stress being introduced into the container prior to the test.

3.3.3.2 Use one of the following test procedures, depending on the purpose of the test:

a) Pass test

Increase the internal test pressure at a rate of $(5{,}8 \pm 1)$ bar $\times s^{-1}$ = $(0{,}58 \pm 0{,}1)$ MPa $\times s^{-1}$, until a predetermined level of pressure has been reached.

b) Test to destruction

Increase the internal test pressure at a rate of $(5{,}8 \pm 1)$ bar $\times s^{-1}$ = $(0{,}58 \pm 0{,}1)$ MPa $\times s^{-1}$, until each container breaks.

3.3.4 Test report

The test report shall include the following:

a) reference to this European Standard,

b) sample size and sampling method,

c) number of containers from each mould included in the sample,

d) type of test, i.e. pass test [3.3.3.2 a)] or test to destruction [3.3.3.2 b)],

e) test results:

1) for the pass test, in accordance with 3.3.3.2 a):

— 60 s pressure and the number of containers that failed in the test, with the respective pressures at which they failed

2) for the test to destruction, in accordance with 3.3.3.2 b):

— 60 s pressure at which first failure occurred and the number of containers that failed at that pressure