INTERNATIONAL

RECOMMENDATION

OIML R 96

Edition 1990 (E)

Measuring container bottles

Bouteilles récipients-mesures

OIML R 96 Edition 1990 (E)

ORGANISATION INTERNATIONALE
DE MÉTROLOGIE LÉGALE

INTERNATIONAL ORGANIZATION
OF LEGAL METROLOGY

Foreword

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organization whose primary aim is to harmonize the regulations and metrological controls applied by the national metrological services, or related organizations, of its Member States.

The two main categories of OIML publications are:

- **International Recommendations (OIML R)**, which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity; the OIML Member States shall implement these Recommendations to the greatest possible extent;
- **International Documents (OIML D)**, which are informative in nature and intended to improve the work of the metrological services.

OIML Draft Recommendations and Documents are developed by technical committees or subcommittees which are formed by the Member States. Certain international and regional institutions also participate on a consultation basis.

Cooperative agreements are established between OIML and certain institutions, such as ISO and IEC, with the objective of avoiding contradictory requirements; consequently, manufacturers and users of measuring instruments, test laboratories, etc. may apply simultaneously OIML publications and those of other institutions.

International Recommendations and International Documents are published in French (F) and English (E) and are subject to periodic revision.

This publication – reference OIML R 96 (E), edition 1990 – which is under the responsibility of TC 8 *Measurement of quantities of fluids*, was approved by the International Committee of Legal Metrology in 1989 for final publication and sanctionned by the International Conference of Legal Metrology in 1992.

OIML publications may be obtained from the Organization's headquarters:

Bureau International de Métrologie Légale
11, rue Turgot - 75009 Paris - France
Telephone: 33 (0)1 48 78 12 82 and 42 85 27 11
Fax: 33 (0)1 42 82 17 27
E-mail: biml@oiml.org
Internet: www.oiml.org

MEASURING CONTAINER BOTTLES

1. Scope

This Recommendation applies to containers, commonly called bottles, made of glass, or of any other material that is rigid and stable enough to give metrological results that are as good as those obtained with glass, when they:

— being stoppered or designed to be stoppered, are intended for the storage, transport or delivery of liquids,

— have a nominal capacity of between 0.05 litre and 5 litres inclusive,

— have metrological characteristics (design characteristics and uniformity of manufacture) such that they can be used as measuring containers, i.e., they may be filled with sufficient accuracy without the need to measure independently the quantity of liquid that is put in them.

These containers are called measuring container bottles.

2. Capacities

Measuring container bottles are characterized by the following capacities, which are always specified for a temperature of 20 °C.

2.1. The nominal capacity (V_n) of a bottle is the volume of liquid that it is meant to contain when filled under the conditions for which it is intended. The nominal capacity shall always be marked on the bottle (see point 7.1.1). National regulations may specify the nominal capacities of bottles intended for particular categories of liquids.

2.2. The brim capacity (V_r) of a bottle is the volume of liquid that it is meant to contain when filled to the brim. The brim capacity may be indicated on the bottle under the conditions laid down in points 7.2.1 and 7.2.2.

2.3. The actual capacity of a bottle is the volume of liquid it in fact contains when filled either to the level which is supposed to correspond to the nominal capacity, or to the brim.

3. Uniformity of manufacture

Measuring container bottles are, in general, intended to be filled according to one of two methods:

— filling to a constant level,

— filling to a constant ullage.

The manufacturer shall ensure uniformity of his production so that the distance between the filling level that is supposed to correspond to the nominal capacity, and the brim, or the difference between the brim capacity and the nominal capacity, known as the ullage or head space, is perceived to be constant for all bottles of the same pattern.

4. Maximum permissible errors

4.1. The maximum permissible error in the nominal capacity or brim capacity of a measuring container bottle is the greatest permitted difference, positive or negative, between its nominal capacity or its brim capacity and the corresponding actual capacity, at a temperature of 20 °C.

4.2. The maximum permissible errors are as in the Table below.

Nominal capacity V_n or brim capacity V_r in millilitres	Maximum permissible errors	
	in % of V_n or V_r	in millilitres
from 50 to 100		3
from 100 to 200	3	—
from 200 to 300	—	6
from 300 to 500	2	—
from 500 to 1 000	—	10
from 1 000 to 5 000	1	—

4.3. The systematic exploitation of tolerances is prohibited.

5. Determination of actual capacity

In practice, the actual capacity of a measuring container bottle is checked by determining the volume of water at 20 °C which the bottle actually contains when filled to the level that is supposed to correspond to the nominal capacity, or to the brim, according to the process of filling for which the bottle is intended. It may also be checked indirectly by any other method of equivalent accuracy.

6. Control

If a country exercises state control over the conformity of measuring container bottles to the requirements of this Recommendation by means of sampling on the manufacturer's premises or, for imported bottles, at the importer's premises maintained in the country concerned, the method of the Annex is recommended.

7. Markings

A measuring container bottle shall bear the following markings, which shall be indelible and easily seen and read.

7.1. On the side wall, on the bottom rim or on the bottom:

7.1.1. a statement of the nominal capacity in litres, centilitres or millilitres and shown in figures of a minimum height of:
— 6 mm, for a nominal capacity greater than 100 cl,
— 4 mm, for a nominal capacity between 100 cl included and 20 cl excluded,

— 3 mm, for a nominal capacity equal to or less than 20 cl,
followed by either the abbreviation of the legal unit used or its name in full,

7.1.2. the manufacturer's identification mark,

7.1.3. marks indicating conformity with national regulations, as those regulations may require.

7.2. One of the following marks, either on the lower rim or on the bottom, in figures of the same height as specified for the indication of the nominal capacity:

7.2.1. when the bottle is intended for filling to constant ullage, a number standing alone, not followed by the symbol cl or ml, being the number of centilitres or of millilitres that is equal to the brim capacity,

7.2.2. when the bottle is intended for filling to a constant level, the distance, expressed as the number of millimetres followed by the symbol mm, from the plane of the brim to the filling level that is supposed to correspond to the nominal capacity.

This mark may be supplemented, without metrological guarantee, by an indication of the brim capacity in the form specified in point 7.2.1.

A bottle may bear other indications, provided that they cannot be confused with the mandatory markings.

ANNEX

This Annex lays down the procedures for statistical control of measuring container bottles by the competent authorities.

A.I. Statistical aspects of manufacture

The manufacture of measuring container bottles shall be so organized as to produce populations that are sufficiently homogeneous to justify statistical control by sampling.

The manufacturer shall control the mean and the dispersion of the actual capacities of the bottles by means of an internal inspection procedure and manufacturing controls that are recognized by the competent authorities.

The method of control set out in this Annex and applied by the competent authorities assumes moreover that the distribution of actual capacities of the bottles in a batch submitted for inspection is near to being a normal distribution.

A.2. Sampling

A sample of 35 measuring container bottles of the same pattern and manufacture shall be taken at random in one or several batches so that the sample is as representative as possible of the production.

If the result of a control made by the competent authority is unsatisfactory, that authority may, in order not to reject erroneously one or more of the lots examined because the sample is unrepresentative:

— sample the same batch or batches, or another batch or set of batches, varying, if necessary, the sampling procedure

and/or

— inspect the manufacturer's inspection records.

The sampling procedure shall conform as much as possible to sampling theory and be adapted to the manufacturing procedures of the producer or to the conditions in which batches are presented by the importer.

A.3. Measurement of the actual capacity of the measuring container bottles constituting the sample

The measuring container bottles shall be weighed empty.

The bottles shall be filled with water at 20 °C of a known density, up to either:

— the brim, when the bottles are intended for filling to constant ullage,

— the level defined in point 7.2.2 when they are intended for filling to a constant level.

The bottles shall then be weighed full.

The control shall be carried out by means of a legal measuring instrument suitable for the task.

The error in measuring the capacity shall be considered as negligible if it is not greater than one-fifth of the maximum permissible error specified for the nominal capacity or brim capacity of the measuring container bottle.

A.4. Application of the results

The following sampling procedure is taken from the International Standard ISO 3951, 1981, letter code J, AQL = 2.5, normal control, unknown standard deviation.

A.4.1. Calculate:

A.4.1.1. the mean $\bar{x}$ of the actual capacities x_i of the bottles in the sample:

$$\bar{x} = \frac{\Sigma x_i}{35} \qquad (i = 1, 2,..., 35)$$

A.4.1.2. the experimental standard deviation s of the actual capacities x_i of the bottles in the batch:

$$s = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{34}} \qquad (i = 1, 2,\ldots, 35)$$

A.4.2 Calculate:

A.4.2.1. the specified upper limit T_s, the sum of the capacity to be verified and of the maximum permissible error for this capacity,

A.4.2.2. the specified lower limit T_i, the difference between the capacity to be verified and the maximum permissible error for this capacity.

A.4.3. Acceptance criteria

The batch shall be accepted if the values of $\bar{x}$ and s satisfy simultaneously the following three inequalities:

$$\bar{x} + ks \leq T_s$$
$$\bar{x} - ks \geq T_i$$
$$s \leq F\,(T_s - T_i)$$

where k = 1.57 and F = 0.266.

Contents