NML R 44:2013

N O R M A D E M E T R O L O G I E L E G A L Ă

Alcoolmetre şi areometre de alcool,termometre utilizate în alcoolmetrie

Ediţie oficială

Chişinău

Alcoolmetre şi areometre de alcool,termometre utilizate în alcoolmetrie

(OIML R 14:1985, IDT)

Alcoholometers and alcohol hydrometers and thermometers for use in alcoholometry

APROBARE	Aprobată prin Ordinul Ministerului Economiei nr. 120 din 02 iulie 2013
DESCRIPTORI	Alcoolmetre, areometre, încercări verificări metrologice

Preambul naţional

Prezenta normă de metrologie legală reprezintă adoptarea recomandării Organizaţiei Internaţionale de Metrologie Legală R44 „Alcoholometers and alcohol hydrometers and thermometers for use in alcoholometry”.

Prezenta recomandare a OIML se completează cu un nou capitol, cu următorul cuprins:

„Capitolul 12 Întocmirea rezultatelor verificării metrologice

12.1 Dacă în baza rezultatelor verificărilor metrologice iniţiale, periodice sau după reparare mijlocul de măsurare este recunoscut ca utilizabil, atunci pe el se aplică marcajul metrologic de verificare şi se eliberează buletin de verificare metrologică de strictă evidenţă. Rezultatele verificării metrologice sînt valabile pe durata intervalului maxim de timp admis între două verificări metrologice periodice, conform Listei Oficiale a mijloacelor de măsurare supuse controlului metrologic legal.

12.2 Dacă în baza rezultatelor verificărilor metrologice iniţiale, periodice sau după reparare mijlocul de măsurare este recunoscut ca inutilizabil atunci se eliberează buletin de inutilizabilitate.”

Titlul prezentei norme de metrologie legală în limba rusă:
Спиртометры, ареометры спиртовые и термометры для использования в алкоголиметрии.

1. Elementele naţionale ale prezentei norme de metrologie legală au fost elaborate de Institutul Naţional de Standardizare şi Metrologie.

2. Modificări după publicare:

Indicativul modificării	Revista „metrologie” nr./an	Punctele modificate

INTERNATIONAL

RECOMMENDATION

OIML R 44

Edition 1985 (E)

Alcoholometers and alcohol hydrometers and thermometers for use in alcoholometry

Alcoomètres et aréomètres pour alcool et thermomètres utilisés en alcoométrie

OIML R 44 Edition 1985 (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 44 (E), edition 1985 – which is under the responsibility of TC 9/SC 4 *Densities*, was sanctionned by the International Conference of Legal Metrology in 1984.

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

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ALCOHOLOMETERS and ALCOHOL HYDROMETERS

and thermometers for use in alcoholometry

1. Scope

This Recommendation applies to alcoholometers and alcohol hydrometers used for the determination of the alcoholic strength of mixtures of water and ethanol, and to thermometers for use in alcoholometry.

It sets out technical and metrological specifications for these instruments, in accordance with International Recommendation No. 22 « International Alcoholometric Tables ».

2. Types of alcoholometers and alcohol hydrometers, and reference conditions

2.1. This Recommendation covers the following instruments :

— glass hydrometers indicating percentage alcoholic strength by mass, referred to as « mass alcoholometers »,

— glass hydrometers indicating percentage alcoholic strength by volume, referred to as « volume alcoholometers », and

— glass hydrometers indicating density in kilogram per cubic metre, referred to as « alcohol hydrometers ».

2.2. These instruments are graduated at a reference temperature of 20 °C, in accordance with the International Alcoholometric Tables published by the International Organization of Legal Metrology.

2.3. These instruments are graduated for readings taken at the level of the free horizontal surface of the liquid.

3. Description

3.1. The alcoholometers and alcohol hydrometers comprise :

— a cylindrical glass body, the bottom of which is conical or hemispherical, so that air bubbles are not trapped,

— a hollow cylindrical stem, fused to the upper part of the body, with its upper end closed.

3.2. The entire external surface of the instrument shall be symmetrical about its main axis.

The cross-section shall not have any abrupt variation.

3.3. The lower part of the body contains the loading material, the purpose of which is to adjust the mass of the instrument.

3.4. The stem carries a scale marked on a cylindrical support, which is permanently fixed to the inside of the stem.

4. Principles of construction

4.1. The glass used for the manufacture of the alcoholometers and alcohol hydrometers shall be transparent, and free from any defect liable to interfere with the reading of the indications.

The glass shall have a coefficient of cubic expansion of $(25 \pm 2)\ 10^{-6}\ °C^{-1}$.

4.2. The loading material shall be fixed in the bottom of the body.

If the loading material is solid, it shall not soften when raised to a temperature of 80 °C.

There shall be no loose material in the other parts of the instrument.

4.3. The instrument shall float with its stem in an approximately vertical position. The maximum permissible angle between the stem and the vertical is 1.5°.

5. Scale

5.1. The alcoholometers and alcohol hydrometers shall have only one hydrometric scale.

5.2. The scale and the inscriptions shall be marked on a support having a smooth matt surface.

This support shall be held rigidly in place in the stem, and means shall be provided to indicate any displacement of the scale and the scale support with respect to the stem.

The support, scale and inscriptions shall show no trace of distorsion, discolouration or charring, when maintained at a temperature of 70 °C for 24 hours.

5.3. The scale marks shall be lines :
— situated in planes perpendicular to the axis of the instrument,
— black (*), and marked clearly and indelibly,
— fine, clear-cut and of a uniform thickness, not exceeding 0.2 mm.

5.4. The length of the short lines on the scale shall be at least one fifth of the stem circumference. The length of medium lines shall be at least one third of the stem circumference, and that of the long lines, at least half of the stem circumference.

5.5. The nominal scale range for a mass or volume alcoholometer shall not exceed 10 %. The scale interval shall be 0.1 %.

Each scale shall have from 5 to 10 additional divisions beyond its upper and lower nominal range limits.

5.6. The nominal scale range for an alcohol hydrometer shall not exceed 20 kg/m^3. The scale interval shall be 0.2 kg/m^3.

Each scale shall have from 5 to 10 additional divisions beyond its upper and lower nominal range limits. However, the scale need not extend beyond 1 000 kg/m^3.

(*) Note : outside the nominal range of the scale, the lines may be of a different colour.

6. Graduation and numbering

6.1. On alcoholometers, every tenth scale mark, counting from one end of the nominal scale, shall be a long line.

There shall be a medium line between two consecutive long lines, and four short lines between a long line and a medium line.

Only the long lines shall be numbered.

6.2. On alcohol hydrometers, every fifth line, counting from one end of the nominal scale, shall be a long line.

There shall be four short lines between two consecutive long lines.

Only every fifth or tenth long line shall be numbered.

6.3. The lines indicating the limits of the nominal scale shall be numbered in full. On alcohol hydrometers, the other numbers may be abbreviated.

7. Classification and principal dimensions

The alcoholometers and alcohol hydrometers belong to one of the accuracy classes, class I, class II or class III for which the maximum permissible errors are specified in point 9.1.

7.1. For class I instruments :

— the mean scale spacing shall not be less than 1.5 mm,

— the outside stem diameter shall not be less than 3 mm.

Instruments in this class shall not incorporate a thermometer.

7.2. For class II instruments :

— the mean scale spacing shall not be less than 1.05 mm,

— the outside stem diameter shall not be less than 3 mm.

Instruments in this class may incorporate a thermometer.

7.3. For class III instruments :

— the mean scale spacing shall not be less than 0.85 mm,

— the outside stem diameter shall not be less than 2.5 mm.

Instruments in this class may incorporate a thermometer.

7.4. The external diameter of the body of any instrument shall be between 19 and 40 mm. The stem shall extend at least 15 mm above the highest scale mark. The cross-section of the stem shall be uniform for at least 5 mm below the lowest scale mark.

8. Inscriptions

8.1. The following inscriptions shall be legibly and indelibly marked inside the alcoholometers and alcohol hydrometers :

— « class I » or « class II » or « class III »,

— « kg/m^3 » or « % vol » or « % mass »,

— « 20 °C »,

— « ethanol »,

— name or identification mark of the manufacturer,

— identification number of the instrument,

— pattern approval sign (when appropriate).

8.2. Indication of the mass of the instrument is optional. Where this information is given, the mass shall be expressed in milligrams, and marked on the external surface of the body.

9. Maximum permissible errors, verification and marking

9.1. The maximum permissible errors for alcoholometers and alcohol hydrometers, positive or negative, shall be :

— for class I instruments, one half scale interval,

— for class II and class III instruments, one scale interval.

9.2. Verification shall be carried out at a minimum of three different points, distributed over the full nominal scale range.

9.3. A space, for the verification mark, shall be left on the back of alcoholometers and alcohol hydrometers, within the upper third of the body.

10. Thermometers used for the determination of the alcoholic strength

10.1. Thermometers incorporated in the instrument used to determine the alcoholic strength.

If the instrument used for determining the alcoholic strength belongs to class II or III, a thermometer of the liquid-in-glass, mercury filled type, may be incorporated in it.

10.1.1. The thermometer shall be graduated to 0.1 °C, 0.2 °C or 0.5 °C. It need not have a scale mark at 0 °C.

10.1.2. The minimum scale spacing shall be :

0.8 mm for thermometers graduated to 0.1 °C and 0.2 °C,

1.0 mm for thermometers graduated to 0.5 °C.

10.1.3. The thickness of the lines shall not be more than one-fifth of the scale spacing.

10.1.4. The maximum permissible errors, positive or negative, shall be :

0.10 °C if the thermometer is graduated to 0.1 °C,

0.20 °C if the thermometer is graduated to 0.2 °C or 0.5 °C.

10.1.5. During the initial verification, the error of the incorporated thermometer shall be determined at a minimum of three points in the scale range.

10.2. Thermometers not incorporated in the instrument used to determine the alcoholic strength.

10.2.1. If the instrument used for determining the alcoholic strength belongs to class I, the thermometer used with this instrument shall be either :

— of the metallic resistance type, by which the temperature of the water/alcohol mixture can be determined respecting the maximum permissible errors, positive or negative, of 0.10 °C, or

— of liquid-in-glass, mercury filled type, graduated to 0.1 °C or 0.05 °C.

The mercury filled thermometers shall have a scale mark at 0°C, the minimum scale spacing shall be 0.8 mm and the thickness of the lines shall not be more than one-fifth of the scale spacing.

The maximum permissible errors, positive or negative, shall be one scale interval.

10.2.2. If the instrument used for determining the alcoholic strength belongs to class II or III, the thermometer used with this instrument shall be of the liquid-in-glass, mercury filled type.

10.2.2.1. The thermometer shall be graduated to 0.1 °C, 0.2 °C or 0.5 °C.
It shall have a scale mark at 0 °C.

10.2.2.2. The minimum scale spacing shall be :

0.8 mm for thermometers graduated to 0.1 °C or 0.2 °C,

1.0 mm for thermometers graduated to 0.5 °C.

10.2.2.3. The thickness of the lines shall not be more than one-fifth of the scale spacing.

10.2.2.4 The maximum permissible errors, positive or negative, shall be :

0.10 °C if the thermometer is graduated to 0.1 °C,

0.20 °C if the thermometer is graduated to 0.2 °C or 0.5 °C.

11. Conditions of use

11.1. When the alcoholometer or alcohol hydrometer is read, the emergent part of the stem shall be dry, except in the immediate vicinity of the meniscus.

The submerged part of the stem shall be absolutely clean, to ensure correct wetting.

This condition is met if, when the immersion of the instrument is modified slightly with respect to its equilibrium position, the instrument oscillates vertically without any change in the shape of the meniscus.

11.2. The instruments and sample containers shall be carefully cleaned before use.

11.3. Water/alcohol mixtures of low alcohol content (up to at least 25 % vol), have a surface tension which varies according to the cleanliness of the surface. Slight traces of impurity are sufficient to produce large variations in surface tension.

Preferably, a sample container with an overflow should be used for these solutions, so that the surface of the liquid can be cleaned immediately before taking a reading with the instrument.

11.4. If a cylindrical vessel is used to contain the water/alcohol mixture, its inside diameter should exceed the outside diameter of the instrument body by at least 10 mm.

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