



**SLOVENSKI STANDARD**  
**SIST EN 542:2003**

**01-julij-2003**

**BUXca Yý U**  
**SIST EN 542:1998**

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**Adhézifs - Détermination de la masse volumique**

Adhesives - Determination of density

Klebstoffe - Bestimmung der Dichte

**Adhésifs - Détermination de la masse volumique**  
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**Ta slovenski standard je istoveten z: EN 542:2003**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 542**

April 2003

ICS 83.180

Supersedes EN 542:1994

English version

## Adhesives - Determination of density

Adhésifs - Détermination de la masse volumique

Klebstoffe - Bestimmung der Dichte

This European Standard was approved by CEN on 14 February 2003.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN 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 CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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## Foreword

This document (EN 542:2003) has been prepared by Technical Committee CEN/TC 193 "Adhesives", the secretariat of which is held by AENOR.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

This document supersedes EN 542:1994.

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

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**EN 542:2003 (E)****1 Scope**

This European Standard defines two methods for the determination of density which are applicable to all adhesives.

One procedure is used for adhesives in liquid form and the other one for solid, very viscous or pasty adhesives.

**2 Normative references**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 923:1998, *Adhesives— Terms and definitions*

EN 1066, *Adhesives— Sampling*

EN 1067, *Adhesives— Examination and preparation of samples for testing*

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### 3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 923:1998 apply.

### 4 Principle

The density (mass of a volume unit) of the sample is measured at 23°C as the ratio of the mass of the given volume of adhesive to the mass of the same volume of a reference liquid having a known density multiplied by its density.

### 5 Safety

Persons using this standard shall be familiar with normal laboratory practice.

This standard does not purport to address all safety problems, if any, associated with its use.

It is the responsibility of the user to establish safety and health practices and to ensure compliance with any European or national regulatory conditions.

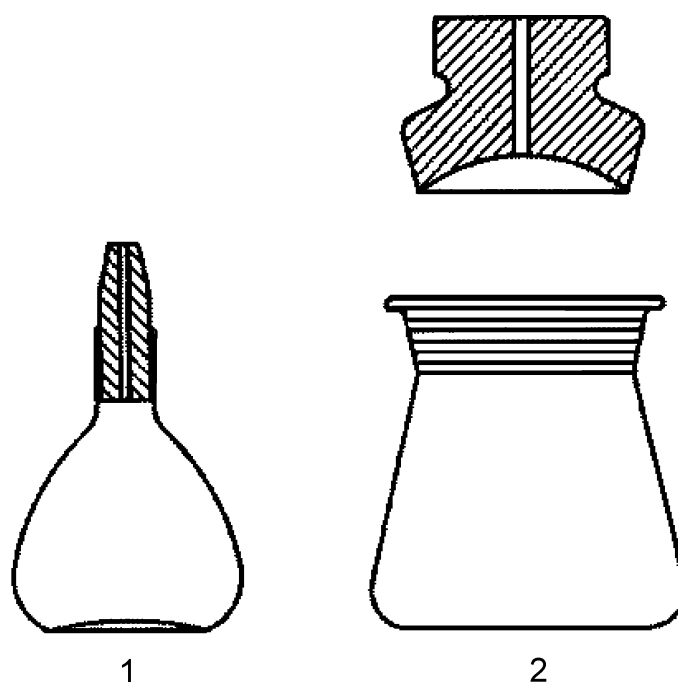
### 6 Apparatus

#### 6.1 General

Usual laboratory apparatus including the following.

**6.2** A glass pyknometer having a volume between 20 ml and 100 ml. Suitable pyknometers are Hubbard or Gay-Lussac types (see Figure 1).

Metal pyknometers may be used as an alternative.



- 1 Gay-Lussac pyknometer;
- 2 Hubbard pyknometer

Figure 1 — Suitable pyknometers

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**6.3** Thermometer graduated in divisions of 0,1°C and accurate to 0,2°C.

**6.4** Constant-temperature water bath capable of maintaining a temperature within  $\pm 0,5^\circ\text{C}$  of the test temperature.

**6.5** Analytical balance accurate to 0,1 mg.

**7 Sampling**

Take a representative sample of the adhesive to be tested in accordance with EN 1066 and examine and prepare it for testing as described in EN 1067.

**8 Procedure for liquid adhesives**

**8.1** Clean the pyknometer (6.2) thoroughly. Rinse it with water and a solvent leaving no residue on evaporation. Dry it.

**8.2** Condition the clean dry pyknometer at  $(23 \pm 0,5)^\circ\text{C}$  in the water bath (6.4) until equilibrium has been attained, dry the outside of the pyknometer and weigh it ( $m_0$ ). If maximum accuracy is required, the cleaning, drying and weighing shall continue until the difference between two successive weighings does not exceed 0,5 mg.

**8.3** Fill the pyknometer with freshly distilled water at  $(23 \pm 1)^\circ\text{C}$  and place the filled pyknometer in the water bath at  $(23 \pm 0,5)^\circ\text{C}$  to reach equilibrium. Remove the pyknometer from the water bath, dry the outside of the pyknometer and reweigh to the nearest 0,1 mg ( $m_1$ ).

**8.4** Fill the clean dry pyknometer with the adhesive and clean any residue of adhesive from the outside of the pyknometer by wiping with absorbent material moistened with a suitable solvent and thoroughly dry by wiping with clean absorbent material.

**8.5** Place the filled pyknometer in the water bath at  $(23 \pm 0,5)^\circ\text{C}$  for at least half an hour to reach equilibrium. Remove the pyknometer from the water bath and thoroughly dry by wiping with clean absorbent material.

Reweight the pyknometer to the nearest 0,1 mg ( $m_2$ ).

**8.6 Expression of results**

Calculate the density (in grams per cubic centimetre) of the adhesive at the test temperature by means of equation 1:

$$\rho = \frac{m_2 - m_0}{m_1 - m_0} \times \rho_w \quad (1)$$

where:

$\rho$  is the density of the adhesive at the test temperature;

$m_0$  is the mass (in grams) of the empty pyknometer;

$m_1$  is the mass (in grams) of the pyknometer plus the water;

$m_2$  is the mass (in grams) of the pyknometer and test sample;

$\rho_w$  is the density of the water in grams per cubic centimetre at the test temperature.

NOTE The density of water at 23 °C can be taken as 0,9975 g/cm<sup>3</sup>



## 9 Procedure for solid, pasty or very viscous adhesives

**9.1** Clean the pyknometer (6.2) thoroughly. Rinse with water and a solvent leaving no residue on evaporation. Dry it.

**9.2** Condition the clean dry pyknometer at  $(23 \pm 0,5)$  °C in the water bath (6.4) until equilibrium has been attained, dry the outside of the pyknometer and weigh it ( $m_0$ ). If maximum accuracy is required, the cleaning, drying and weighing shall continue until the difference between two successive weighings does not exceed 0,5 mg.

**9.3** Fill the pyknometer with a liquid having a known density ( $\rho_{lv}$ ). The liquid shall react in no way with the adhesive to be tested and shall not dissolve it.

Place the filled pyknometer in the water bath at  $(23 \pm 0,5)$  °C to reach equilibrium. Remove the pyknometer from the water bath, dry the outside of the pyknometer and reweigh to the nearest 0,1 mg ( $m_1$ ).

**9.4** Empty the pyknometer, clean and dry it thoroughly. Place about 5 g of the solid adhesive to be tested into the pyknometer and weigh it ( $m_2$ ).

**9.5** Fill the pyknometer containing the solid sample with the liquid of known density  $\rho_{lv}$ . Place the filled pyknometer in the water bath at  $(23 \pm 0,5)$ °C for at least half an hour to reach the equilibrium. Remove the pyknometer from the water bath and thoroughly dry by wiping with clean absorbent material.

Reweigh the pyknometer to the nearest 0,1 mg ( $m_3$ ).

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### 9.6 Expression of results

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Calculate the density (in grams per cubic centimetre) of the adhesive at the test temperature by means of equation 2:

$$\rho = \frac{m_2 - m_0}{m_2 - m_0 + m_1 - m_3} \times \rho_{lv} \quad (2)$$

where:

$\rho$  is the density of the adhesive at the test temperature;

$m_0$  is the mass (in grams) of the empty pyknometer;

$m_1$  is the mass (in grams) of the pyknometer plus the liquid of density  $\rho_{lv}$  ;

$m_2$  is the mass (in grams) of the pyknometer and the solid test sample;

$m_3$  is the mass (in grams) of the pyknometer filled with the solid test sample and liquid of density  $\rho_{lv}$ ;

$\rho_{lv}$  is the density (in grams per cubic centimetre) of the reference liquid.