



**SLOVENSKI STANDARD**  
**SIST EN 15802:2010**

**01-februar-2010**

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ca c Yb'U

Conservation of cultural property - Test methods - Determination of static contact angle

Erhaltung des kulturellen Erbes - Prüfverfahren - Messung des statischen Kontaktwinkels

Conservation des biens culturels - Méthodes d'essai - Détermination de l'angle de  
contact statique

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**ICS:**

97.195 Umetniški in obrtniški izdelki Items of art and handicrafts

**SIST EN 15802:2010**

**en,fr,de**

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EUROPEAN STANDARD

**EN 15802**

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2009

ICS 97.195

English Version

## Conservation of cultural property - Test methods - Determination of static contact angle

Conservation des biens culturels - Méthodes d'essai -  
Détermination de l'angle de contact statique

Erhaltung des kulturellen Erbes - Prüfverfahren - Messung  
des statischen Kontaktwinkels

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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 CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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## Foreword

This document (EN 15802:2009) has been prepared by Technical Committee CEN/TC 346 “Conservation of cultural property”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by June 2010 and conflicting national standards shall be withdrawn at the latest by June 2010.

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

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

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## Introduction

This test method can be applied if it does not change the value of the cultural property and follows relevant ethical codes of conservation practice.

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## 1 Scope

This European Standard specifies a method for the measurement of the static contact angle of a water drop on porous inorganic materials used for and constituting cultural property. The method may be applied to porous inorganic materials either untreated or subjected to any treatment or ageing.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 15898:2009, *Conservation of cultural property — Main general terms and definitions concerning conservation of cultural property*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 15898:2009 and the following apply.

### 3.1

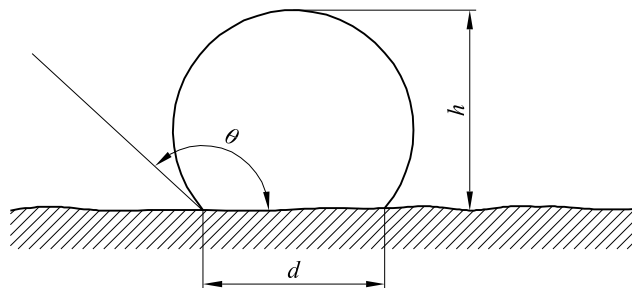
#### porous inorganic materials

materials including natural stones, e.g. sandstone, limestone, marble, as well as artificial materials, such as mortar, plaster, brick and others

### 3.2

#### static contact angle

angle  $\theta$ , in degrees, formed by the surface of the specimen and the tangent to the water drop at the contact point, as shown in Figure 1



#### Key

$d$  diameter of the contact surface, in mm

$h$  height, in mm

$\theta$  static contact angle, in degrees

Figure 1 — Static contact angle at time  $t$

## 4 Principle

Determination of the static contact angle between a water drop and the test surface of the specimen.

## 5 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply:

$d$  diameter of the contact surface, in mm

$h$  height, in mm

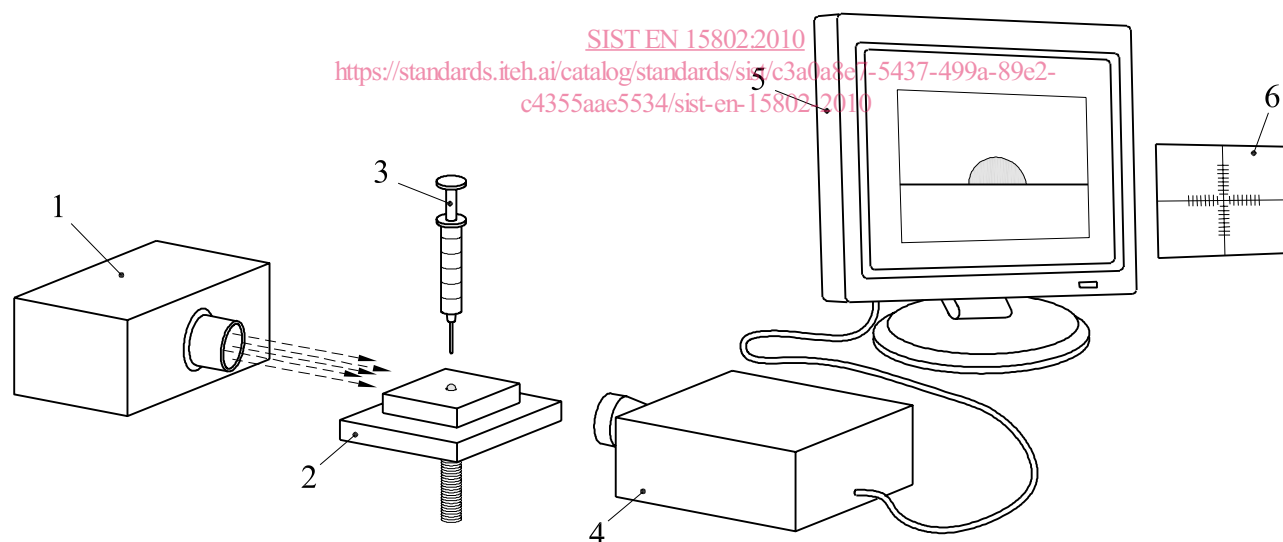
$\theta$  static contact angle, in degrees

## 6 Test equipment

6.1 Test equipment for the measurement of static contact angle consists of:

- i) an illumination source (1) that will not affect the temperature of the drop/specimen system,
- ii) a flat sample holder (2),
- iii) a drop deposition system, usually consisting of a graduated micro-pipette (3), with a flat head needle, positioned above and perpendicular to the specimen surface and able to deliver reproducible drops,
- iv) an optical system (4) that projects the image of the deposited water drop onto a screen (5) on which the height of the water drop and the diameter of the contact surface can be marked with a ruler (6). This part of the instrument can consist of a camera (4) able to record the image on a screen (5) where the parameters can be measured manually or automatically.

The measurement principle of most commercial instruments available on the market is shown in Figure 2.



### Key

- 1 illumination source
- 2 sample holder
- 3 graduated micro-pipette
- 4 optical system
- 5 screen
- 6 ruler

Figure 2 — Schematic sketch of the measurement system



- 6.2** Sand paper with grain size of 82  $\mu\text{m}$  (corresponding to grit number P180 according to the FEPA<sup>1)</sup> classification).
- 6.3** A soft brush.
- 6.4** Desiccator filled with desiccant such as indicating silica gel or other drying agents.
- 6.5** A ventilated oven which can maintain a temperature of  $(60 \pm 2)$  °C.
- 6.6** An analytical balance with an accuracy of 0,1 mg for sample less than 200g and accuracy of 1 mg for samples more than 200 g.
- 6.7** A chronometer with an accuracy of 1 s.
- 6.8** Deionised or distilled water (with max. conductivity of 6  $\mu\text{S}$ ).

## 7 Preparation of test specimens

### 7.1 Number and dimensions of test specimens

The shape and dimensions of the specimens shall be conformed to the requirements of the chosen test equipment (usually 10 mm to 20 mm of thickness). The test surface shall be flat. Specimens that do not have parallel surfaces can only be tested using apparatus that adjusts for this.

The number and dimensions of specimens are dependent on the heterogeneity of the material. Each series shall consist of at least 3 specimens. All dimensions shall have a  $\pm 0,5$  mm tolerance.

### 7.2 Pre-conditioning of test specimens

The surface chosen for the determination of static contact angle shall be flat and wet or dry polished with sand paper (6.2). After polishing, the specimens shall be washed with water, gently brushed with a soft brush and immersed in deionised water for 30 min. In case of water-sensitive materials, for example gypsum containing materials, only dry polishing and compressed air shall be used. After smoothing and washing, the surface should not to be touched with hands.

The above procedure does not necessary apply to treated specimens or specimens taken from exposed surfaces.

Test specimens shall be dried to constant mass in a ventilated oven at a temperature of  $(60 \pm 2)$  °C until a constant weight is reached, and stored in a desiccator until the test starts. If the material is temperature-sensitive, the pre-conditioning shall be conducted in a desiccator filled with desiccant or in a ventilated oven at a temperature of  $(40 \pm 2)$  °C till constant mass is reached.

Constant mass is reached when the difference between two successive weighings at an interval of 24 h is not greater than 0,1% of the mass of the specimen.

## 8 Test procedure

Fill the micro-pipette with deionised/distilled water taking care that the needle is clean, outside and inside, to prevent air bubbles or drop deformation.

The specimen is mounted on the sample holder in such a way that the test surface is horizontal.

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1) FEPA – Federation of European Producers of Abrasives