

**Paper and board - Measurement of
specular gloss - 45 gloss with a parallel
beam, DIN method**

Paper and board - Measurement of specular gloss -
45 gloss with a parallel beam, DIN method

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 14086:2003 sisaldab Euroopa standardi EN 14086:2003 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.02.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 14086:2003 consists of the English text of the European standard EN 14086:2003.</p> <p>This document is endorsed on 18.02.2003 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>This European Standard specifies a photometric test method for the assessment of visual gloss by means of a reflectometer value measured at an angle of 45. The European Standard is applicable to plane paper and board surfaces of high gloss, commonly called glossy papers and boards, including optically brightened samples.</p>	<p>Scope:</p> <p>This European Standard specifies a photometric test method for the assessment of visual gloss by means of a reflectometer value measured at an angle of 45. The European Standard is applicable to plane paper and board surfaces of high gloss, commonly called glossy papers and boards, including optically brightened samples.</p>
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ICS 85.060

Võtmesõnad: board (paper), definition, definitions, determination, din, gloss, gloss (of surface), paper, reflectance measurement, reflection, reflection characteristics, reflectometer reading, test equipment, testing, tests

ICS 85.060

English version

**Paper and board - Measurement of specular gloss - 45° gloss
with a parallel beam, DIN method**

Papiers et cartons - Mesurage du brillant spéculaire -
Brillant à 45° avec un faisceau parallèle, méthode DIN

Papier und Pappe - Bestimmung des Glanzes - Messung
mit einem parallelen Strahl bei 45°, DIN-Verfahren

This European Standard was approved by CEN on 9 September 2002.

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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 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.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 14086:2003) has been prepared by Technical Committee CEN /TC 172, "Pulp, paper and board", the secretariat of which is held by DIN.

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 July 2003, and conflicting national standards shall be withdrawn at the latest by July 2003.

This Standard is in relation to EN ISO 8254 respectively ISO 8254 with the following parts

- EN ISO 8254-1 "Paper and board – Measurement of specular gloss – Part 1: 75° gloss with a converging beam, TAPPI method
- EN ISO 8254-2 "Paper and board – Measurement of specular gloss – Part 2: 75° gloss with a parallel beam, DIN method
- ISO/DIS 8254-3 "Paper and board – Measurement of specular gloss – Part 3: 20° gloss

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.

Introduction

Visual gloss is a sensory impression which cannot yet be described completely. Some important physical variables which influence gloss are however known. The sensory perception of gloss under a suitable illumination results from a physical stimulus due to reflection of light from a surface. This reflection is defined by an indicatrix which changes with the angle of incidence. The maximum indicatrix value which is decisive for visual gloss impression is associated with specular reflection, at an angle of reflection which is approximately equal to the angle of incidence. The reflectometer value is determined by averaging the reflection in a defined angular region centered in the specular direction.

NOTE 1 A reflectometer value is a measure of the visual gloss only when the optical conditions of measurement, such as angles and apertures of illumination and observation are similar to the conditions of viewing.

NOTE 2 Because luminance and structure enter to some extent into the reflectometer value of the test piece, only the comparison of test pieces with nearly the same luminance and structure is meaningful. The influence of luminance on the measurement result decreases rapidly with increasing reflectometer value and increasing angle of reflection.

The proportion of specular reflection in the entire reflection increases with increasing angle of incidence. Very matt surfaces generate a noticeable degree of specular reflection and, therefore, a noticeable gloss effect only above a certain minimum angle of incidence. On the other hand, a large angle of incidence reduces the ability to differentiate between surfaces of high gloss.

NOTE 3 Manufacturers of coated papers usually divide their products into two classes, according to their surface gloss: matt coating and gloss coating. However, these classes are only defined approximately. The glossy class has reflectometer values, measured according to this European Standard, above approximately 7, the matt class has reflectometer values lower than this value. As there is no precise correlation between reflectometer values measured with different geometries, it is advisable to compare the reflectometer values only within a single class of papers and using the same measuring geometry.

This European Standard describes measurement at an angle of incidence of 45° using a parallel beam geometry commonly known as the 45° DIN method. A second European Standard describes measurement at an angle of 75° (see EN ISO 8254-2).

1 Scope

This European Standard specifies a photometric test method for the assessment of visual gloss by means of a reflectometer value measured at an angle of 45°. It is applicable to plane paper and board surfaces of high gloss, commonly called glossy papers and boards, having reflectance values, measured according to this European Standard, above approximately 7. Materials containing optical brightening agents may be measured.

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).

CIE-Publication No. 38, *Radiometric and photometric characteristics*.

EN ISO 186, *Paper and board — Sampling to determine average quality (ISO 186:1994)*.

EN 20187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples (ISO 187:1990)*.

ISO 10110-5, *Optic and optical instruments — Preparation of drawings for optical elements and systems — Part 5: Surface form tolerances*.

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1

indicatrix

angular distribution of the reflected light which is measured as illuminance on the receptor.

3.2

reflectometer

instrument for measuring quantities pertaining to reflection of light.

3.3

reflectometer value

measured variable which, for a given angle of incidence, is proportional to the integral of the reflection indicatrix within the solid angle defined by the apertures (see Annex A.2.1) and is equal to 100 times the ratio of the value obtained for the sample to that of a defined specularly reflecting surface (see 5.2.2).

3.4

specular gloss

reflectometer value as defined in 3.3.

NOTE 1 The defined specularly reflecting surface thus has an assigned reflectometer value of 100. Reflectometer values are therefore NOT percentages.

NOTE 2 These definitions are based on definitions in CIE-Publication No. 17.4.

4 Principle

The sample is illuminated with a collimated beam at an angle of 45° to the normal, and the reflectometer value is measured within a solid angle defined by a given aperture at an angle of reflection equal to the angle of incidence. The scale of the reflectometer is calibrated with reference to the reflection from a black glass plate or a quartz wedge with a specific refractive index.

5 Equipment

5.1 Apparatus

The reflectometer shall consist of the following principal components: a collimator, a decollimator, an electric supply for the light source device, a photoelectronic receptor and a sample holder, as described in annex A.

5.2 Gloss standards

The reflectometer is calibrated by means of a zero-gloss standard and a high gloss standard with a reflectometer value between about 80 and 100. This high gloss standard can be either a primary gloss standard or a working gloss standard.

Intermediate gloss standards with assigned reflectometer values are used to check the adjustment of the device.

NOTE As reflectometer values of gloss standards may change due to environmental influences, they should be checked at least once per year.