

**Paints and varnishes - Determination of
hiding power - Part 1: Kubelka-Munk
method for white and light-coloured
paints**

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light-coloured paints

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 6504-1:2006 sisaldab Euroopa standardi EN ISO 6504-1:2006 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 30.03.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 6504-1:2006 consists of the English text of the European standard EN ISO 6504-1:2006.</p> <p>This document is endorsed on 30.03.2006 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 International Standard specifies a method to be used for determining the hiding power (spreading rate necessary to give a contrast ratio of 98 %) of white or light-coloured paints. It is restricted to paint films having the tri-stimulus value of $Y > 70$. It is not applicable to fluorescent or metallic paints.</p>	<p>Scope:</p> <p>This International Standard specifies a method to be used for determining the hiding power (spreading rate necessary to give a contrast ratio of 98 %) of white or light-coloured paints. It is restricted to paint films having the tri-stimulus value of $Y > 70$. It is not applicable to fluorescent or metallic paints.</p>
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ICS 87.040

Võtmesõnad:

ICS 87.040

English Version

Paints and varnishes - Determination of hiding power - Part 1:
Kubelka-Munk method for white and light-coloured paints (ISO
6504-1:1983)

Peintures et vernis - Détermination du pouvoir masquant -
Partie 1: Méthode de Kubelka-Munk pour les peintures
blanches et les peintures claires (ISO 6504-1:1983)

Beschichtungsstoffe - Bestimmung des Deckvermögens -
Teil 1: Verfahren nach Kubelka-Munk für weiße und helle
Beschichtungsstoffe (ISO 6504-1:1983)

This European Standard was approved by CEN on 16 January 2006.

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Foreword

The text of ISO 6504-1:1983 has been prepared by Technical Committee ISO/TC 35 "Paints and varnishes" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 6504-1:2006 by Technical Committee CEN/TC 139 "Paints and varnishes", 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 August 2006, and conflicting national standards shall be withdrawn at the latest by August 2006.

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Endorsement notice

The text of ISO 6504-1:1983 has been approved by CEN as EN ISO 6504-1:2006 without any modifications.

International Standard



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Paints and varnishes — Determination of hiding power — Part 1 : Kubelka-Munk method for white and light- coloured paints

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6504/1 was developed by Technical Committee ISO/TC 35, *Paints and varnishes*, and was circulated to the member bodies in April 1981.

It has been approved by the member bodies of the following countries :

Australia	Germany, F. R.	Poland
Austria	Hungary	Portugal
Belgium	India	Romania
Brazil	Ireland	Sri Lanka
China	Italy	Sweden
Czechoslovakia	Kenya	Switzerland
Dominican Republic	Netherlands	United Kingdom
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The member bodies of the following countries expressed disapproval of the document on technical grounds :

Canada
France

Paints and varnishes — Determination of hiding power — Part 1: Kubelka-Munk method for white and light-coloured paints

0 Introduction

This International Standard is one of a series of standards dealing with the testing and sampling of paints, varnishes and related products.

ISO 3905 and ISO 3906 specify methods for determining the contrast ratio of paints at a fixed spreading rate, by applying paint films to black and white charts and to polyester film respectively. They depend on the observation that there is a linear relationship between contrast ratio and reciprocal film thickness, at least over a limited range of film thickness.

Hiding power of paints is generally defined as the spreading rate required to give a contrast ratio of 98 %. To determine this by the methods specified in ISO 3905 and ISO 3906 would be time-consuming and require considerable extrapolation which often exceeds the limit of linearity of the relationship between contrast ratio and spreading rate. Therefore, this method for the determination of hiding power, involving the Kubelka-Munk (K-M) equations which relate scattering and absorption coefficients to optical properties, has also been standardized.

1 Scope and field of application

This International Standard specifies a method to be used for determining the hiding power (spreading rate necessary to give a contrast ratio of 98 %) of white or light-coloured paints. It is restricted to paint films having the tri-stimulus value of $Y > 70$. It is not applicable to fluorescent or metallic paints.

2 References

ISO 1512, *Paints and varnishes — Sampling*.

ISO 1513, *Paints and varnishes — Examination and preparation of samples for testing*.

ISO 1515, *Paints and varnishes — Determination of volatile and non-volatile matter*.

ISO 2808, *Paints and varnishes — Determination of film thickness*.¹⁾

ISO 2811, *Paints and varnishes — Determination of density*.

ISO 3905, *Paints and varnishes — Determination of contrast ratio (opacity) of light-coloured paints at a fixed spreading rate (using black and white charts)*.

ISO 3906, *Paints and varnishes — Determination of contrast ratio (opacity) of light-coloured paints at a fixed spreading rate (using polyester film)*.

3 Principle

The method is based on the Kubelka and Munk equations relating the scattering and absorption coefficients of pigmented films to their colour and opacity.

For the determination of hiding power, both the reflectance (R_B) of a paint film of thickness t on a black background and the reflectivity (R_∞) are required for introduction into the Kubelka-Munk equations (clause 4).

4 Kubelka-Munk equations

The Kubelka-Munk (K-M) equations required are

$$a = \frac{1}{2} \left(R_\infty + \frac{1}{R_\infty} \right) \quad \dots (1)$$

$$b = a - R_\infty \quad \dots (2)$$

$$R_B = \frac{1}{a + b \coth bSt} \quad \dots (3)$$

$$R = \frac{1 - R_B(a - b \coth bSt)}{a + b \coth bSt - R_B} \quad \dots (4)$$

where

R_∞ is the reflectivity, i.e. the reflectance of a paint film of such thickness that further increase in thickness gives no further change in reflectance;

R_B is the reflectance of a paint film of thickness t applied over a black background;

R is the reflectance of a paint film of thickness t applied over a white background of defined reflectance R_g (for this method, $R_g = 0,80$);

S is the scattering coefficient per micrometre (μm^{-1});

t is the thickness, in micrometres, of the paint film.

When using equations (1) to (4) with this method, the measured CIE tristimulus values Y divided by 100 are inserted for R , R_B and R_∞ , respectively.

1) At present at the stage of draft. (Revision of ISO 2808-1974.)