SLOVENSKI STANDARD
SIST EN 4593:2011

01-december-2011

Aeronavtika - Barve in laki - Ugotavljanje absorpcije sončne svetlobe

Aerospace series - Paints and varnishes - Determination of solar absorptance

Luft- und Raumfahrt - Anstrichstoffe - Bestimmung der Sonnenlichtabsorption

Série aérospatiale - Peintures et vernis - Détermination de l'absorption solaire

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Ta slovenski standard je istoveten z: **EN 4593:2011**

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ICS:

49.040	Prevleke in z njimi povezani postopki, ki se uporabljajo v letalski in vesoljski industriji	Coatings and related processes used in aerospace industry

SIST EN 4593:2011 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4593

June 2011

ICS 49.040

English Version

Aerospace series - Paints and varnishes - Determination of solar absorptance

Série aérospatiale - Peintures et vernis - Détermination de l'absorption solaire

Luft- und Raumfahrt - Beschichtungsstoffe - Bestimmung der Sonnenlichtabsorption

This European Standard was approved by CEN on 19 February 2011.

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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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 4593:2011) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

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of an identical text or by endorsement, at the latest by December 2011, and conflicting national standards shall be withdrawn at the latest by December 2011.

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, Croatia, 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 the United Kingdom.

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1 Scope

This European Standard specifies the method of test for determining the solar absorptance of paints and varnishes.

The test procedure determines the amount of energy reflected by the material in the range of wavelengths at which there is energy from the sun hitting the Earth's surface, and with the aid of a standard solar spectrum it allows a calculation to determine the solar absorptance which can then be used to determine the efficiency of solar heat reflecting paints.

The procedure is applicable to products intended for use in aerospace applications.

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.

EN 23270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing (ISO 3270:1984)*

EN ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling (ISO 15528:2000)*

EN ISO 1513, *Paints and varnishes — Examination and preparation of test samples (ISO 1513:2010)*

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EN ISO 2808, *Paints and varnishes — Determination of film thickness (ISO 2808:2007)*

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CIE publ No 85, *Solar spectral irradiance*

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3 Definitions

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

3.1
solar absorptance
proportion of the energy emitted by the sun which hits the Earth's surface which is absorbed by the material under test

4 Principle

The reflectance of specimens, comprising of coated test panels is measured and summated over the range of solar energy which hits the Earth's surface through two air masses, allows the calculation of solar absorptance.

5 Apparatus

A recording spectrophotometer fitted with an integrating sphere which has the specular component included, a 10°/diffuse measuring geometry and is capable of meeting the following requirements.

Measuring range: 300 nm to 2 300 nm

Wavelength accuracy: ± 5 nm

Measuring accuracy: ± 2 %

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Bandpass: 4 nm

Replace (23 ± 2) °C and (50 ± 5) % relative humidity with EN 23270, where applicable.

6 Specimens

Take a representative sample of the product to be tested or of each component in the case of a multi-coat system as described in EN ISO 15528.

Examine and prepare each sample for testing as described in EN ISO 1513.

The test panels shall be of a size suitable for the performance of the tests identified by this and the product standard.

Coat the test panels with the test product as specified by the product standard.

Dry/cure the coating for the time and under the conditions specified in the product standard.

The coating thickness, when determined using one of the non destructive procedures specified in EN ISO 2808 shall comply with the requirements of the product standard.

Condition the test panels at a temperature and at a relative humidity of EN 23270 for a minimum of 16 h and a maximum of 72 h prior to testing.

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7 Procedure

Measure and record the reflectance spectrum using the reflectance grade barium sulphate as the reflectance standard on the spectrophotometer in the wavelength range 300 nm to 2 300 nm.

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8 Calculation

Unless specified, use the solar spectral irradiance data (CIE publ No 85) through 2 air masses, 0,2 nm optical depth at 50 nm, 0,3 cm ozone and 2,0 cm precipitable water.

Calculate the solar absorptance using the following equation:

$$\alpha(s) = \frac{\sum_{300}^{2300}\left(\frac{100-R_m}{100}\right)\times E_\lambda}{\sum_{300}^{2300} E_\lambda}$$

where

$\alpha(s)$ is the solar absorptance;

R_m is the measured reflectance of paint, as a percentage;

E_λ is the solar irradiance, in watt per square metre.

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9 Supplementary information

In the performance of this test standard there is a requirement for supplementary information to be provided by the product standard for the material under test. This information consists of:

a) substrate type and method of preparation;

b) method of application of the coating including, where applicable, the duration and conditions of drying/curing between coats in the case of multi-coat systems;

c) duration and conditions of drying/curing of the final coat before test;

d) thickness of the dry coating or combination of coatings in micrometres;

e) properties of the coating to be evaluated following exposure;

f) number of air masses to employ for standard solar spectrum.

10 Test report

The test report shall contain at least the following information:

a) all details necessary to identify the product tested;

b) a reference to this test standard;

c) a reference to the product standard;

d) the items of supplementary information (see clause 9);

e) the results of the test work in terms of the stated requirements;

f) any deviation from the test method specified;

g) the date(s) of the test;

h) name of the operator.

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11 Designation

EXAMPLE

Description block	Identity block
DETERMINATION OF SOLAR ABSORPTANCE	EN 4593

Number of this standard