
Aeronavtika - Barve in laki - Ugotavljanje toplotne obremenitve

Aerospace series - Paints and varnishes - Determination of the effect of thermal exposure

Luft- und Raumfahrt - Anstrichstoffe - Thermische Belastung

Série aérospatiale - Peintures et vernis - Détermination de l'effet thermique

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Ta slovenski standard je istoveten z: EN 4160:2011

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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
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SIST EN 4160:2011**en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4160

May 2011

ICS 49.040

English Version

**Aerospace series - Paints and varnishes - Determination of the
effect of thermal exposure**

Série aérospatiale - Peintures et vernis - Détermination de
l'effet thermique

Luft- und Raumfahrt - Beschichtungsstoffe - Thermische
Beanspruchung

This European Standard was approved by CEN on 3 March 2011.

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

CEN members are the national standards bodies of 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 United Kingdom.

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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 4160:2011) 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 November 2011, and conflicting national standards shall be withdrawn at the latest by November 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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EN 4160:2011 (E)**1 Scope**

This European Standard specifies the method of test for determining the resistance of paints and varnishes to the effects of heat or cold within the limits of – 50 °C to 200 °C.

The test procedure assesses the resistance of paint coatings, varnishes or related products to changes of gloss, colour, blistering, cracking and/or detachment from the substrate as a result of exposure to elevated or sub-ambient temperature.

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 2744, *Aerospace series — Non metallic materials — Preferred test temperatures*

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

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

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

EN ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85° (ISO 2813:1994, including Technical Corrigendum 1:1997)*

EN ISO 4628-2, *Paints and varnishes — Evaluation of degradation of paint coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering (ISO 4628-2:2003)*

EN ISO 4628-4, *Paints and varnishes — Evaluation of degradation of paint coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 4: Assessment of degree of cracking (ISO 4628-4:2003)*

EN ISO 4628-6, *Paints and varnishes — Evaluation of degradation of paint coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 6: Assessment of degree of chalking by tape method (ISO 4628-6:2007)*

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

ISO 7724 (all parts), *Paints and varnishes — Colorimetry*

3 Terms and definitions

Not applicable.

4 Principle

Specimens comprising of coated test panels are exposed to a specified thermal environment, either elevated or sub-ambient, for a specified period.

Changes in appearance, mechanical or physical properties are then determined.

5 Apparatus

An air circulating temperature controlled chamber capable of maintaining the test specimens within the tolerance limits specified in EN 2744 for the test temperature specified.

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 at the standard temperature and humidity defined in EN 23270 for a minimum of 16 h and a maximum of 72 h prior to testing.

7 Procedure

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Expose the panel for the time and temperature stated in the product standard. Where a continuous performance temperature range is quoted in the standard then the upper and lower limits of the temperature range shall be tested.

Exposure shall be achieved by placing the test panels in the chamber set at the desired test temperature. Panels shall be placed not less than 100 mm from the sides of the chamber and not closer than 20 mm apart.

NOTE The preferred method of maintaining even heating of the test panels is to suspend them by means of fine wire, alternatively, the panels may be supported in a rack made from suitable, heat resistant material which will not damage the coating.

After the completion of the required exposure period, remove the test panels from the chamber. Condition at the standard temperature and humidity defined in EN 23270 for a period of 16 h. Examine the coating for change of gloss, colour or other signs of deterioration when compared with identically prepared but unexposed (reference) panels in accordance with EN ISO 2813, ISO 7724 (all parts), EN ISO 4628-2, EN ISO 4628-4 and EN ISO 4628-6.

Subject the test panels and reference panels to any additional paint performance tests specified in the product standard either immediately following thermal exposure or after the conditioning period, dependant upon the requirements of the performance test. Examine for compliance with the requirements of the product standard.

EN 4160:2011 (E)**8 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.

9 Test report

The test report shall contain at least the following information:

- a) all details necessary to identify the product tested;
- b) reference to this test standard;
- c) reference to the product standard;
- d) items of supplementary information (clause 8);
- e) results of the test work in terms of the stated requirements;
- f) any deviation from the test method specified;
- g) date(s) of the test.

10 Designation

EXAMPLE

Description block	Identity block
DETERMINATION OF THE EFFECT OF THERMAL EXPOSURE	EN 4160
Number of this standard	