SLOVENSKI STANDARD
SIST EN 12373-10:1999

01-november-1999

Aluminij in aluminijeve zlitine - Anodna oksidacija - 10. del: Meritve srednje specifiļ ne obrabne obstojnosti anodnooksidiranih prevlek s peskalno napravo

Aluminium and aluminium alloys - Anodizing - Part 10: Measurement of mean specific abrasion resistance of anodic oxidation coatings using an abrasive jet test apparatus

Aluminium und Aluminiumlegierungen - Anodisieren - Teil 10: Messung der mittleren spezifischen Abriebfestigkeit von anodisch erzeugten Oxidschichten durch Abriebprüfung mit einem Schleifmittelstrahl-Prüfgerät

Aluminium et alliages d'aluminium - Anodisation - Partie 10: Détermination de la résistance spécifique moyenne des couches d'oxyde anodiques a l'abrasion par essai au jet abrasif

Ta slovenski standard je istoveten z: **EN 12373-10:1998**

ICS:

25.220.20	Površinska obdelava	Surface treatment
77.120.10	Aluminij in aluminijeve zlitine	Aluminium and aluminium alloys

SIST EN 12373-10:1999 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12373-10

November 1998

ICS

Descriptors: surface treatment, anodizing, aluminium, aluminium alloys, abrasion tests, determination, abrasion resistance

English version

Aluminium and aluminium alloys - Anodizing - Part 10: Measurement of mean specific abrasion resistance of anodic oxidation coatings using an abrasive jet test apparatus

Aluminium et alliages d'aluminium - Anodisation - Partie 10: Détermination de la résistance spécifique moyenne des couches d'oxyde anodiques à l'abrasion par essai au jet abrasif

Aluminium und Aluminiumlegierungen - Anodisieren - Teil 10: Messung der mittleren spezifischen Abriebfestigkeit von anodisch erzeugten Oxidschichten durch Abriebprüfung mit einem Schleifmittelstrahl-Prüfgerät

This European Standard was approved by CEN on 14 November 1998.

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 Central Secretariat 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 Central Secretariat 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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents Page

Foreword 3

Introduction 5

1 Scope 5

2 Normative references 5

3 Definitions 5

4 Principle 6

5 Apparatus 6

6 Procedure 7

7 Expression of results 9

8 Test report 10

Annex A (informative) Design of abrasive jet test apparatus 11

Annex B (informative) Depth survey of abrasion resistance 15

Annex C (normative) Preparation of standard specimen 17

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 132 "Aluminium and aluminium alloys", the secretariat of which is held by AFNOR.

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 May 1999, and conflicting national standards shall be withdrawn at the latest by May 1999.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

It is based upon ISO 8252 : 1987.

In this standard, annexes A and B are informative and annex C is normative.

EN 12373, Aluminium and aluminium alloys – Anodizing, comprises the following parts:

Part 1: Method for specifying decorative and protective anodic oxidation coatings on aluminium

Part 2: Determination of mass per unit area (surface density) of anodic oxidation coatings – Gravimetric method

Part 3: Determination of thickness of anodic oxidation coatings – Non-destructive measurement by split beam microscope

Part 4: Estimation of loss of absorptive power of anodic oxidation coatings after sealing by dye spot test with prior acid treatment

Part 5: Assessment of quality of sealed anodic oxidation coatings by measurement of admittance

Part 6: Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in phosphoric acid/chromic acid solution without prior acid treatment

Part 7: Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in phosphoric acid/chromic acid solution with prior acid treatment

Part 8: Determination of the comparative fastness to ultra-violet light and heat of coloured anodic oxidation coatings

Part 9: Measurement of wear resistance and wear index of anodic oxidation coatings using an abrasive wheel wear test apparatus

Part 10: Measurement of mean specific abrasion resistance of anodic oxidation coatings using an abrasive jet test apparatus

Part 11: Measurement of specular reflectance and specular gloss of anodic oxidation coatings at angles of 20°, 45°, 60° or 85°

Part 12: Measurement of reflectance characteristics of aluminium surfaces using integrating-sphere instruments

Part 13: Measurement of reflectivity characteristics of aluminium surfaces using a goniophotometer or an abridged goniophotometer

Part 14: Visual determination of image clarity of anodic oxidation coatings – Chart scale method

Part 15: Assessment of resistance of anodic oxidation coatings to cracking by deformation

Part 16: Check for continuity of thin anodic oxidation coatings – Copper sulfate test

Part 17: Determination of electric breakdown potential

Part 18: Rating system for the evaluation of pitting corrosion – Chart method

Part 19: Rating system for the evaluation of pitting corrosion – Grid method

Introduction

The resistance of anodic oxidation coatings to abrasion can be an important property that gives information about the quality of the coating and its potential resistance to erosion or wear.

1 Scope

This Part of this European Standard specifies a method of test for comparing the resistance to abrasion of anodic oxidation coatings on aluminium and its alloys with that of a standard specimen or, alternatively, a reference specimen, by the use of a jet of abrasive particles. The mean specific abrasion resistance of an anodic oxidation coating can be determined by the method described.

NOTE 1: Different batches of the same abrasive are liable to give different results and for this reason the test is a comparative one.

NOTE 2: With suitably designed abrasive jets, and film thickness measuring devices with a small probe, it is possible to conduct a depth survey which indicates how abrasion resistance varies through the coating thickness (see annex B). However, this property is measured preferably using the abrasive wheel wear test method (EN 12373-9[1)]).

The method described is applicable to all anodic oxidation coatings of thickness not less than 5 µm on aluminium or its alloys. It is primarily intended for surfaces which are not flat. If suitable flat test surfaces are available, the abrasive wheel test method (EN 12373-9[1)]) is the preferred method. Production components can be tested without cutting if the apparatus chamber can accommodate these.

NOTE 3: The method is particularly suitable for small test pieces because the individual test area required is only about 2 mm in diameter.

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.

EN ISO 2360 Non-conductive coatings on non-magnetic basis metals – Measurement of coating thickness – Eddy current method (ISO 2360 : 1982)

ISO 565 Test sieves – Metal wire cloth, perforated metal plate and electroformed sheet – Nominal sizes of openings

3 Definitions

For the purpose of this standard, the following definitions apply:

[1)] See foreword.

3.1 test piece: Specimen on which the test is carried out.

3.2 standard specimen: Specially prepared anodized test specimen produced in accordance with annex C.

3.3 reference specimen: Test specimen produced under conditions agreed between the purchaser and the anodizer.

4 Principle

Dry silicon carbide particles are projected in a stream of dry air or inert gas under carefully controlled conditions onto a small area of the surface to be tested. The test is continued until the basis metal is exposed, after which the abrasion resistance of the coating is calculated from either the time taken or the mass of silicon carbide used. The result is compared with that obtained using a standard specimen (see annex C) or another reference specimen.

5 Apparatus

5.1 Abrasion test apparatus (see figures A.1 to A.3)

5.1.1 ***Abrasive jet assembly***, consisting essentially of two glass or metal tubes supported rigidly and coaxially. The outer tube is connected to a supply of clean, dry, compressed air or inert gas, which can be delivered at a carefully regulated flow rate. Dry abrasive particles are supplied to the inner tube, at the exit end of which they mix with the air stream to form an abrasive jet which is directed onto the specimen.

No restriction is placed upon the design of the abrasive jet assembly except that it shall give reproducible results in successive tests, and that it shall allow consistent measurements to be made.

> NOTE: A number of satisfactory designs of jet assembly have been constructed but it has proved difficult in practice to manufacture a series of jets which give identical results, or to make any that are not subject to drift and variations. Designs that have proved satisfactory are given in annex A.

5.1.2 ***Specimen support***, comprising an inclined platform on which the specimen is firmly and rigidly supported such that the angle between the plane of the test area and of the jet axis is in the range 45° to 55°. The jet is usually vertical.

> NOTE: In A.2 is described an apparatus where the angle is 55°; A.3 describes a different form of apparatus where the angle is approximately 45°. The larger angle produces a less elliptical test area, more rapid abrasion, and a sharper end point.

5.1.3 ***Air or inert gas supply***, fed to the outer tube from a compressor or gas cylinder and controlled accurately by means of a regulating valve and a flowmeter or manometer situated near the apparatus. The air or inert gas shall be dry, or have constant low humidity.

NOTE 1: The gas can be conveniently dried by passing it through tubes containing silica gel. Compressed air passed through a holding reservoir where condensed water vapour is collected will have a satisfactory and fairly constant humidity.

NOTE 2: Typical flow rates used in practice are from 40 l/min to 70 l/min, with a pressure typically of about 15 kPa. When the flow rate has been selected for any particular jet assembly, it should, so far as is possible, be maintained throughout the life of the jet nozzle.

5.1.4 ***Hopper***, for storage of the abrading medium and capable of supplying this at a steady rate of (20 ± 1) g/min to (30 ± 1) g/min.

5.2 Abrading medium: Silicon carbide particles of a grade recommended by the manufacturer of the apparatus used. A suitable grade of abrasive is 125 µm mesh size (see ISO 565 : 1990).

The abrading medium shall be free from moisture and shall be dried before use in a shallow tray at 105 °C and passed through a coarse sieve (for example 180 µm or 300 µm nominal aperture size) to ensure freedom from large particles or fibres which might interfere with the rate of abrasive flow. The dried medium may be re-used up to 50 times; after each use the medium should be dried, passed through a coarse sieve and stored in a clean tightly closed container.

NOTE: Ambient humidity has little effect on the test result, but can have a very considerable effect if the medium is re-used without drying.

6 Procedure

6.1 Standard specimen

Prepare the standard specimen using the method specified in annex C.

6.2 Test piece

Cut a suitably sized test piece from the item to be tested without damaging the area to be tested.

6.3 Calibration of apparatus

6.3.1 Select and mark the areas of the standard specimen (see 6.1) to be abraded. Accurately measure the anodic oxidation coating thickness (*d*) in each test area by means of an eddy current meter in accordance with the method specified in EN ISO 2360 : 1995.

6.3.2 Fix the standard specimen in position in the test apparatus (5.1) with the selected test area beneath the jet orifice and at the correct angle to the jet axis.

6.3.3 Fill the hopper (5.1.4) with sufficient silicon carbide (5.2) for the test. If the abrasion resistance is being determined in terms of the mass of abrasive used, weigh the hopper and contents to the nearest 1 g.