
Aluminij in aluminijeve zlitine - Anodizacija - 15. del: Ocenjevanje odpornosti anodizirane plasti proti razpokanju zaradi deformacije

Aluminium and aluminium alloys - Anodizing - Part 15: Assessment of resistance of anodic oxidation coatings to cracking by deformation

Aluminium und Aluminiumlegierungen - Anodisieren - Teil 15: Prüfung der Beständigkeit von anodisch erzeugten Oxidschichten gegen Rißbildung bei Verformung

Aluminium et alliages d'aluminium - Anodisation - Partie 15: Evaluation de la résistance des couches anodiques a la formation de criques par déformation

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EUROPEAN STANDARD

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English version

Aluminium and aluminium alloys - Anodizing - Part 15: Assessment of resistance of anodic oxidation coatings to cracking by deformation

Aluminium et alliages d'aluminium - Anodisation - Partie 15:
Evaluation de la résistance des couches anodiques à la
formation de criques par déformation

Aluminium und Aluminiumlegierungen - Anodisieren - Teil
15: Prüfung der Beständigkeit von anodisch erzeugten
Oxidschichten gegen Ribbildung bei Verformung

This European Standard was approved by CEN on 27 July 2000.

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.

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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of an identical text or by endorsement, at the latest by February 2001, and conflicting national standards shall be withdrawn at the latest by February 2001.

It is based on ISO 3211:1977

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

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- 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

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.

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1 Scope

This part of this European Standard specifies an empirical method for assessing the resistance of anodic oxidation coatings to cracking by deformation.

The method is applicable particularly to sheet material with anodic oxidation coatings of thickness less than 5 μm , and is useful for development purposes.

2 Principle

A test piece is bent along a spiral, graduated with a radius-of-curvature index, using a simple instrument; the radius of curvature corresponding to the region where the first cracks in the oxide layer appear is determined and the percentage elongation of the test piece corresponding to this radius is calculated.

3 Apparatus

Measuring instrument, as shown in Figure 1, which includes

a) **Steel former**, mounted on a suitable base, in the shape of a spiral, graduated in deformation indexes E from 1 to 18. These indexes E correspond to radii of curvature R and are derived from the equation $R = 21 - E$ as shown in Table 1.

b) **Two screws** for clamping the ends of the test piece.

Table 1 — Relationship between radius of curvature R and deformation index E

Deformation index E	Radius of curvature R cm	Deformation index E	Radius of curvature R cm
1	20	10	11
2	19	11	10
3	18	12	9
4	17	13	8
5	16	14	7
6	15	15	6
7	14	16	5
8	13	17	4
9	12	18	3

4 Procedure

4.1 Test piece

Cut a strip of anodized aluminium having approximately the following dimensions :

- length: 25 cm;
- width: 2 cm;
- maximum thickness: 0,5 cm.

4.2 Determination

Clamp one end of the test piece with clamping screw A with the significant surface outwards.

Bend the test piece progressively over the spiral in such a way that the test piece remains in contact with the spiral, and clamp the other end with the clamping screw B.

Beginning from clamping screw B examine the anodic oxidation coating and mark the region where the first cracks appear. (standards.iteh.ai)

NOTE If the cracks are difficult to detect, they can be rendered visible using the procedure described in prEN 12373-16:1996 by removing the bent test piece and immersing it in copper sulfate solution for 5 min, then rinsing and drying it. The test piece is then replaced on the apparatus and the deformation index corresponding to the region where the first cracks appear is marked.

5 Expression of results

Express the elongation A of the anodized metal as a percentage using the equation:

$$A = \frac{100a}{2R + a}$$

where

- a is the thickness, in centimetres, of the test piece;
- R is the radius of curvature, in centimetres, given by the equation $R = 21 - E$ where E is the deformation index corresponding to the region where the first cracks appear.

6 Test report

The test report shall include at least the following information:

- a) the type and identification of the product tested;
- b) a reference to this European Standard;
- c) the results of the test (see clause 5);
- d) anything unusual noticed during the determination;
- e) any operations not included in the procedure described in this European Standard, or considered to be optional;
- f) the date of the test.

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