

Aluminium and aluminium alloys — Anodizing —

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

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National foreword

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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

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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of an identical text or by endorsement, at the latest by May 1999, and conflicting national standards shall be withdrawn at the latest by May 1999.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.

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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 12373-9¹⁾).

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 12373-9¹⁾) 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.

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 base 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.

¹⁾ See foreword.