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Anodizing of aluminium and its alloys — Terms and definitions

Anodisation de l'aluminium et de ses alliages — Termes et définitions

[Revision of first edition (ISO 7583:1986)]

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

ISO 7583 was prepared by Technical Committee ISO/TC 79, *TC Light metals and their alloys*, Subcommittee SC 2, *Organic and anodic oxidation coatings on aluminium*.

This second edition cancels and replaces the first edition (ISO 7583:1986). The title has been changed and it is now presented in the English language only.

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Anodizing of aluminium and its alloys — Terms and definitions

1 Scope

This International Standard defines terms concerning anodized aluminium.

2 Terms and definitions

2.1 Anodized aluminium products

2.1.1

anodized aluminium

aluminium with an anodic oxidation coating produced by an electrolytic oxidation process in which the surface of the aluminium is converted to a layer, mainly of oxide, having protective, decorative or functional properties

2.1.2

architectural anodizing

anodizing to produce an architectural finish to be used in permanent, exterior and static situations where both appearance and long life are important

2.1.3

batch anodizing

anodizing aluminium parts by racking them together, passing them through a succession of processes including anodizing, and unracking

2.1.4

bright anodized aluminium

anodized aluminium with high specular reflectance as its primary characteristic

2.1.5

clear anodized aluminium

anodized aluminium with a substantially colourless, translucent anodic oxidation coating

2.1.6

coil anodizing

strip anodizing

continuous anodizing (deprecated)

anodizing aluminium coils in a continuous process comprising unwinding, passing through a succession of processes including anodizing, and rewinding

Note 1 to entry: The term "continuous anodizing" is deprecated in this usage because it can also be applied to a method of anodizing extrusions.

2.1.7

colour-anodized aluminium

anodized aluminium coloured either during anodizing or by a subsequent colouring process or processes

2.1.8

combination-coloured anodized aluminium

anodized aluminium coloured by electrolytic colouring or produced by integral colour anodizing either followed by absorption dyeing

2.1.9

combined coating

combined coating of an electrophoretic organic coating and an anodic oxidation coating on aluminium

Note 1 to entry: The electrophoretic organic coating is deposited onto anodized aluminium.

2.1.10

decorative anodizing

anodizing to produce a decorative finish with a uniform or aesthetically pleasing appearance as the primary characteristic

2.1.11

dyed anodized aluminium

anodized aluminium coloured by absorption of dyestuffs or pigments into the pores

2.1.12

electrolytically coloured anodized aluminium

anodized aluminium coloured by the electrolytic deposition of metal or metal oxide into the pores

2.1.13

hard anodized aluminium

type III anodized aluminium

anodized aluminium where the anodic oxidation coating has been produced with wear and/or abrasion resistance as its primary characteristic

2.1.14

hard coat

anodic oxidation coating of hard anodized aluminium

2.1.15

integral-colour anodized aluminium

self-colour anodized aluminium

architectural hard coat

aluminium anodized using an appropriate (usually organic acid based) electrolyte which produces a coloured finish during the anodizing process itself

2.1.16

interference-coloured anodized aluminium

multi-coloured anodized aluminium

electrolytically coloured anodized aluminium exhibiting colours attributed to optical interference effects

Note 1 to entry: The optical mechanisms are not fully understood

2.1.17

natural anodized aluminium

clear or integral-colour anodized aluminium

2.1.18

preanodized aluminium

aluminium anodized before a forming process is applied

2.1.19**protective anodizing**

anodizing to produce a finish where protection against corrosion or wear is the primary characteristic and appearance is secondary or of no importance

2.1.20**two-step process**

process that produces electrolytically coloured anodized aluminium

2.1.21**type I anodized aluminium**

anodized aluminium produced by chromic acid anodizing

2.1.22**type II anodized aluminium**

anodized aluminium produced by sulfuric acid anodizing

2.2 Finishes**2.2.1****finish**

characteristic of the surface of a product

2.2.2**matt finish**

diffuse finish typically produced by etching, blasting, rolling or brushing the aluminium before anodizing

2.2.3**satin finish**

fine-textured matt finish generally produced by etching or by rolling with specially ground rolls

2.2.4**scratch-brushed finish**

matt or satin finish produced by abrasion with rotating wire brushes

2.2.5**texture**

<finish> characteristic of the appearance of the surface of a product

2.3 Pretreatments**2.3.1****bright dipping**

brief immersion in a solution used to produce a bright surface

2.3.2**brightening**

production of a bright surface by chemical or electrochemical polishing

2.3.3**chemical brightening**

chemical treatment to improve the specular reflectivity of a surface

2.3.4**chemical polishing**

polishing of an aluminium surface by immersion in a solution of chemical reagents

**2.3.5
cleaning**

removal of substances including oxide, pick-up, oil and grease from the surface of aluminium, which can negatively affect a subsequent surface treatment

EXAMPLE The cleaning of aluminium coils is often carried out in an acid solution.

**2.3.6
degreasing**

cleaning (deprecated)

removal of substances including oil and grease from the surface of aluminium, which can negatively affect a subsequent surface treatment

EXAMPLE Degreasing is often carried out by the use of an aqueous detergent.

**2.3.7
desmutting**

removal of loosely adhering "smut" from an aluminium surface

EXAMPLE Smut consisting of intermetallic compounds insoluble in alkaline etch solutions can be removed by immersion in suitable acidic solutions such as nitric acid.

**2.3.8
electrobrightening**

electrochemical treatment to improve the specular reflectivity of a surface

**2.3.9
electrograining**

electrochemical treatment of aluminium normally in a hydrochloric or nitric acid solution using an alternating current to etch the surface

EXAMPLE This process is used before anodizing in the production of lithographic plates.

**2.3.10
electrolytic etching**

roughening of an aluminium surface by overall or selective dissolution in an acid or alkaline media with the aid of an electric current

**2.3.11
electropolishing**

polishing of an aluminium surface by making it anodic in an appropriate electrolyte

**2.3.12
etching**

selective dissolution of the surface of aluminium in an aqueous solution to produce the required finish, improve the surface appearance or prepare the surface for further treatment or for inspection

**2.3.13
pickling**

removal of oxides or other compounds from the surface by chemical action

Note 1 to entry: The term is not normally used in the aluminium surface treatment industry except in the aerospace industry

**2.3.14
pretreatment**

surface treatment process or processes carried out before the anodic oxidation process

2.3.15**tunnel etching**

electrochemical treatment of aluminium normally in a hydrochloric acid solution using an alternating current to etch the surface and produce an array of crystallographic tunnels

EXAMPLE This process is used before anodizing in the production of electrolytic capacitors.

2.4 Anodic oxidation processes**2.4.1****a.c. anodizing**

process to produce anodized aluminium using an alternating current

2.4.2**anodizing**

anodic oxidation of aluminium by applying an electric current

2.4.3**barrier film anodizing**

barrier layer anodizing (deprecated)

anodizing process that produces a thin, non-porous anodic oxidation coating on aluminium

EXAMPLE This process is generally used in the production of electrolytic capacitors.

2.4.4**basket anodizing**

barrel anodizing

anodizing of small parts (eg rivets) in a perforated basket

Note 1 to entry: The aluminium parts are pressed into the basket to form the anode and the acid electrolyte circulates between the parts.

2.4.5**chromic acid anodizing**

anodizing in a chromic acid electrolyte

EXAMPLE This process is mainly used for aerospace applications.

Note 1 to entry: The Bengough-Stuart process was the earliest commercial anodizing process using chromic acid as the electrolyte.

2.4.6**constant voltage anodizing**

anodizing at a constant electrical potential

2.4.7**d.c. anodizing**

process to produce anodized aluminium using a direct current

2.4.8**phosphoric acid anodizing**

anodizing in a phosphoric acid electrolyte

EXAMPLE This process is sometimes used as a pretreatment before the application of an organic coating.

2.4.9**plasma anodizing**

plasma electrolytic oxidation

PEO

micro-arc oxidation

MAO

spark anodizing

anodizing where dielectric breakdown constitutes an essential part of the mechanism of coating formation

2.4.10

sulfuric acid anodizing

anodizing in an electrolyte based on sulfuric acid

2.5 Anodic aluminium oxide

2.5.1

anodic aluminium oxide

AAO

anodic oxidation coating either attached to or separated from its aluminium substrate

Note 1 to entry: This term is often used in nanotechnology applications.

2.5.2

anodic oxidation coating

anodic film

anodic coating

coating composed mainly of aluminium oxide formed on the surface of aluminium by anodically polarizing the metal in a suitable electrolyte

2.5.3

barrier layer

non-porous part of the structure of a porous anodic oxidation coating that separates the pores from the aluminium metal and has a thickness proportional to the bath voltage

2.5.4

oxide cell

unit of structure of a porous anodic oxidation coating that contains at its centre a single pore and has a diameter proportional to the bath voltage

2.5.5

pore

unit of structure of a porous anodic oxidation coating that extends through the thickness of the coating and opens at its outer surface

2.5.6

porosity

ratio of the volume of the pores in a given thickness of anodic oxidation coating to the total volume of the coating in that thickness

2.5.7

structure

<anodic oxidation coating> morphology of a porous anodic oxidation coating comprising cells, pores and a barrier layer

2.6 Colouring

2.6.1

bleaching

destruction of a dyestuff or colouring compound in an anodic oxidation coating by a chemical treatment

Note 1 to entry: A solution of nitric acid can be used for this purpose.

2.6.2

bleeding

loss of colour by dissolution from dyed anodic oxidation coatings