

Specification for

Hard anodic oxidation coatings on aluminium and its alloys for engineering purposes

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- Aluminium Federation
- Aluminium Finishing Association
- Aluminium Window Association
- Association of Builders' Hardware Manufacturers
- British Lock Manufacturers' Association
- British Metal Finishing Suppliers' Association
- Institute of Corrosion
- Institute of Metal Finishing
- Metal Finishing Association
- Ministry of Defence

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Foreword

This revision of BS 5599 was prepared under the direction of the Surface Treatments and Coatings Standards Policy Committee. It specifies requirements for hard anodic oxidation coatings on aluminium and its alloys for engineering purposes. It supersedes BS 5599:1978, which is withdrawn.

This revision of BS 5599 differs from the previous edition in that it includes information to be supplied by the purchaser, on the selection of aluminium or aluminium alloy, on thickness of anodic oxidation coating, on special characteristics required and on process qualification and approval.

This revision also includes informative annexes on sampling procedures, packaging and delivery of anodized articles and on some processes used with hard anodic oxidation coatings.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 9 and a back cover.

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Introduction

Hard anodizing is an electrolytic treatment which results in the formation of a hard, and usually thick, coating of alumina used primarily for engineering purposes.

Hard anodizing can be applied to cast or wrought aluminium and aluminium alloys. Alloys containing greater than 5 % copper and/or 8 % silicon and die casting alloys, however, require special anodizing procedures. To obtain optimum microhardness, wear resistance or low surface roughness characteristics, low alloy contents should be selected.

Unless otherwise specified, articles are anodized after all heat treatment, machining, welding, forming and perforating operations are completed. The best results are achieved on machined surfaces. Sharp edges should be machined to a radius of at least 10 times the intended thickness to avoid "burning" and/or spalling.

Hard anodizing will usually result in a dimensional increase on each surface equal to about 50 % of the coating thickness. The dimensions of the component prior to anodizing should allow for this, if necessary.

The coating needed for most thickness applications is generally within the range of 25 µm to 150 µm. Low thickness (up to 25 µm) is used in a variety of applications, such as splines and threads. Normal thickness (typically 50 µm to 80 µm) is sufficient for wear or insulation requirements. High thickness (up to 150 µm) is used for repairing purposes, but thick coatings tend to be softer. Very hard coatings reduce the fatigue strength. This can be minimized by reducing thickness and/or by sealing.

Hard anodic oxidation coatings are mainly used to obtain:

- resistance to wear through abrasion or erosion;
- electrical insulation;
- thermal insulation;
- build-up (repairing of parts out of tolerance on machining or wear);
- resistance to corrosion (when sealed).

The properties and characteristics of hard anodic oxidation coatings are significantly affected by both the alloy and the method of production.

Consequently for the purposes of this standard materials are classified into five alloy groups as follows.

- class 1 : all wrought alloys except those in class 2
- class 2a) : 2 000 series alloys
- class 2b) : 5 000 series alloys containing 2 % or more magnesium and 7 000 series alloys
- class 3a) : casting alloys with less than 2 % copper and/or 8 % silicon
- class 3b) : other casting alloys

1 Scope

This British Standard specifies requirements for hard anodic oxidation coatings on aluminium and its alloys including test methods.

In addition to the definitive requirements, this standard also requires the items detailed in clause 4 to be documented. For compliance with this standard, both the definitive requirements and the documented items have to be satisfied.

2 References

2.1 Normative references

This British Standard incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this British Standard only when incorporated in it by updating or revision.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this British Standard, the following definitions apply.

3.1

lot

articles of the same nominal composition and temper which are processed together

3.2

lot acceptance tests

tests on a production lot to determine the conformity to the requirements of this specification