BS 6161 : Part 11 : 1985

UDC 669.716.915

British Standard Methods of test for

Anodic oxidation coatings on aluminium and its alloys

Part 11. Measurement of total reflectance using a photoelectric reflectometer

Méthodes d'essai des couches anodiques sur aluminium et alliages d'aluminium
Partie 11. Mesure de la réflectivité totale à l'aide d'un réflectomètre photoélectrique

Verfahren zur Prüfung von anodisch erzeugten Oxidschichten auf Aluminium und Aluminiumlegierungen
Teil 11. Messung des Gesamtreflexionsvermögens mit einem photoelektrischen Reflektometer

Foreword

This Part of BS 6161 has been prepared under the direction of the Surface Coatings (other than Paints) Standards Committee. It is based on a draft prepared by subcommittee 2, Anodized aluminium, of Technical Committee 79, Light metals and their alloys, of the International Organization for Standardization (ISO), with the active support and participation of the UK.

The individual Parts of this standard are intended to replace progressively the appendices of BS 1615 : 1972 'Anodic oxidation coatings on aluminium' and, when all the test methods required for the purposes of that standard have been issued as Parts of BS 6161, BS 1615 will be revised accordingly. This Part of BS 6161 is intended to replace appendix P of BS 1615 : 1972.

At present, the following Parts of BS 6161 have been published:

- Part 1 Determination of mass per unit area (surface density) of anodic oxidation coatings (gravimetric method)
- Part 2 Determination of thickness of anodic oxide coatings: non-destructive measurement by split-beam microscope
- Part 3 Assessment of sealing quality by measurement of the loss of mass after immersion in phosphoric-chromic acid solution
- Part 4 Assessment of sealing quality by measurement of the loss of mass after immersion in acid solution
- Part 5 Estimation of loss of absorptive power of sealed coatings: dye spot test with prior acid treatment
- Part 6 Assessment of sealing quality by measurement of admittance or impedance
- Part 7 Accelerated determination of light fastness of coloured anodic oxidation coatings using artificial light
- Part 8 Determination of the fastness to ultraviolet light of coloured anodic oxide coatings
- Part 11 Measurement of total reflectance using a photoelectric reflectometer

The following Parts are currently being prepared:

- Part 9 Measurement of wear index and wear resistance with an abrasive wheel wear test apparatus
- Part 10 Measurement of mean specific abrasion resistance with an abrasive jet test apparatus
- Part 12 Measurement of specular reflectance and specular gloss at angles of 20°, 45°, 60° and 85°
- Part 13 Image clarity test with the Gardam grid
- Part 14 Determination of infra-red reflectance
- Part 15 Determination of electrical breakdown voltage

Further Parts of this standard will be prepared, if required.

This Part describes a method of test only and should not be used or quoted as a specification defining total reflectance. Reference to this Part should state that the method of test used is in accordance with BS 6161 : Part 11.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

1 Scope

This Part of BS 6161 describes a method of measuring the total reflectance of flat surfaces of anodized aluminium using a photoelectric reflectometer.

The method is applicable to achromatic (non-coloured) surfaces of any texture or lightness. It is regarded as an approximate method and is most suitable for production control purposes.

NOTE. The titles of the publications referred to in this standard are listed on the inside back page.

2 Apparatus

2.1 *Reflectometer,* illustrated in figure 1, consisting essentially of an annular photosensor of about 45 mm diameter with a central hole of 8 mm to 9 mm diameter. The photosensor is held in an electrically insulated black plastics housing so that the sensitive surface is parallel to and about 5 mm above the plane base of the housing, which in turn rests on the surface under test. The surface of the ring separating the cell and test surface is black in colour with a very low reflectance. The circular aperture is covered with a glass diffusing screen and is illuminated by means of a filament lamp (about 3 W), energized by a constant voltage source, and enclosed in a ventilated metal lamphouse.

The photoelectric cell is connected either

(a) to an amplifier and a suitable meter which is capable of giving a reading, proportional to the light flux falling on the photosensor, within 1 % of the full-scale reading; or

(b) to a galvanometer, fitted with a variable shunt.

NOTE 1. Option (a) is preferred. Option (b) does not give a linear scale relationship.

NOTE 2. No requirements are specified for the spectral composition of the light source or receptor characteristics, since the method is intended for achromatic surfaces.

NOTE 3. In commercial instruments, which are designed to perform additional functions, various colour filters can be interposed between the light and the diffusing screen by means of a rotatable wheel. These are not used for the total reflectance measurement, which requires no filter, but a neutral grey filter may be used for very bright surfaces. The instrument may also be provided with a metal cap over the base with a small central hole to reduce the measurement aperture.

3 Standards

3.1 Primary standard

The primary standard shall be a freshly scraped flat surface of a pure barium sulphate block to which is assigned a value of 100 % total reflectance on the meter or galvanometer scale. The block shall be large enough to cover completely the 45 mm diameter aperture.

3.2 Secondary standards or working standards

The working standard may be any flat surface large enough to cover the aperture of the reflectometer, and which has been calibrated against the primary standard. Suitable standards are a white ceramic tile, a white vitreous enamel panel or an anodized aluminium panel. The working standards shall give consistent scale readings over their surfaces and shall be stable when checked periodically by comparison with the primary standard.

4 Procedure

4.1 Calibration

Adjust the reflectometer (**2.1**) setting to zero and switch on the lamp.

Calibrate in accordance with either (a) or (b) as follows.

(a) Place the reflectometer on the primary standard (**3.1**), taking care to remove any protective mask from the photosensor and to see that the whole aperture is covered. Adjust the sensitivity of the meter or galvanometer until it registers 100 on the scale.

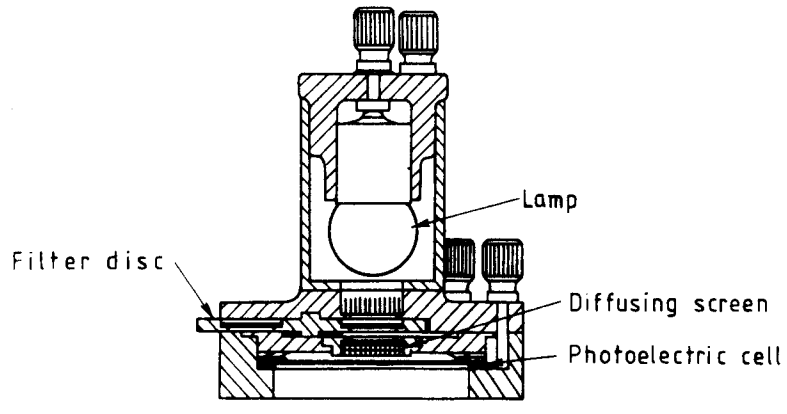

Figure 1. Reflectometer