

Hard Anodising

Technical Data Sheet



Why Hard Anodise?

Aluminium because of its light weight, and the fact it can be readily cast, extruded and machined is the material of choice to replace steel as part of the current drive for long lasting lighter components to aid fuel economy and contribute towards a green future.

Suitable Aluminium Alloys

The International Alloy Designation System is the most widely accepted classification scheme for wrought alloys. Each alloy is given a four-digit number, where the first digit indicates the major alloying elements. In general, the purer the aluminium the more readily it will anodise, conversely the higher the content of certain materials, the more difficult anodising may be to accomplish; this will lead to increased costs and changes in some properties of anodised coatings, compared with those of purer grades.

1000 series; essentially pure aluminium with a minimum 99% aluminium content by weight, will anodise very well, some micro crazing may be present, although this is not detrimental to performance.

2000 series; alloyed with copper. Formerly referred to as duralumin, the presence of copper will create difficulties in anodising, a poor surface finish being the most apparent.

3000 series; alloyed with manganese, readily anodised.

4000 series; alloyed with silicon, anodising difficult

5000 series; alloyed with magnesium. Very suitable for anodising with special high finish grades available

6000 series; alloyed with magnesium and silicon, readily anodise, 6082 (H30) and (H20) grades are frequently anodised.

7000 series; alloyed with zinc, can be hardened to the highest of all strengths of aluminium alloy, Will anodise under carefully controlled conditions.

8000 series; alloyed with lithium.

Table of Suitable Cast Aluminium Grades

Aluminium Grade	Hard Anodise	Clear Anodise	Dye or Colour
LM10	Excellent	Excellent	Both
LM2	Fair	Unsuitable	Unsuitable
LM4	Good	Unsuitable	Hard only
LM5	Excellent	Excellent	Both
LM6	Fair	Unsuitable	Hard only
LM9	Fair	Unsuitable	Hard only
LM10	Excellent	Unsuitable	Both
LM12	Fair	Unsuitable	Unsuitable
LM13	Fair	Unsuitable	Unsuitable
LM16	Good	Unsuitable	Hard only
LM18	Good	Unsuitable	Hard only
LM20	Good	Unsuitable	Hard only
LM21	Fair	Unsuitable	Unsuitable
LM24	Fair	Unsuitable	Unsuitable
LM25	Good	Unsuitable	Hard only
LM26	Fair	Unsuitable	Unsuitable
LM27	Good	Unsuitable	Hard only
LM28/28/29	Unsuitable	Unsuitable	Unsuitable

Jigging

It must be remembered that to anodise any component the item must have an electrical connection to a rectifier; it is therefore unrealistic to expect a total all over coating. Jigging points are typically small and can usually be located in areas which are not exposed following installation; hence they will not be visible or affect the performance of the component in use. Customers are requested to seek advice about jigging points on their components from Anotec.

Anodising has good covering capabilities and does not vary greatly in thickness between high and low current density areas. However, deep blind holes, particularly if they are of small diameter will display low thicknesses and, in some cases, areas that are not coated, especially when workpieces can trap air bubbles. It is common practice to bung holes, especially when they are threaded. During anodising, metal is removed, and an oxide layer is deposited. The oxide builds at twice the rate of metal dissolution. Major and minor diameters of threads will decrease at twice the rate of deposit thickness increase.

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Plant Capabilities

Anodising is carried out at Anotec. The automatic plant has a sequence of 16 tanks each capable of holding 400kg of work, and processing components up to 3 metres in length.

Thicknesses of 5 - 80µ on various aluminium alloys can be achieved, the associated pre-treatment and post treatment solutions and reusable titanium jigs, facilitates the anodising of a very wide range of components, including large V8 engine blocks, small intricate valves and piston, and pizza cutters.

In addition, Anotec's specialist spray coating and printing facilities permit a wide range of services to be performed on a single site.

Weight saving is a major feature of aluminium components compared with steel; aluminium being 40% lighter than steel, offering superior corrosion resistance compared with ferrous substrates.

Masking

It is possible to mask areas of workpieces to inhibit anodising, although sealing of joints may be problematic due to solution creep, Masking is frequently time consuming and relatively expensive; customers are invited to discuss their requirements with Anotec.

Typical Properties

- o Hardness 350 to 600 Vickers (depending upon alloy composition).
- o Excellent wear resistance for moving or sealing applications.
- o Corrosion resistance - typically 500 hours neutral salt spray resistance to EN ISO 9227, ASTM B117, on unsealed LM25 anodised aluminium.
- o Good temperature resistance, the melting point of the anodised coating is in the region of 2050°C compared with 658°C for pure aluminium.
- o Cleanliness - anodising does not out gas nor flake off, it is chemically inert and easily cleaned and is, therefore, suitable for environments which require clean room type operations, in the food industry, medical environments or for laboratory conditions.
- o Non-conductive - the good dielectric strength of an aluminium oxide film plus its inherent performance and resistance to damage and temperature changes make it an ideal choice in some electrical applications.
- o Clean coating - anodising is an ideal preparation for further coating; the process leaves the part clean and the micro pores provide a good mechanical purchase for further coatings of wet paints and powders.

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