

# Anodising of aluminium

## High durability and aesthetic value



### PROCESS DESCRIPTION

Anodising is the process of producing an aluminium oxide coating on the surface of small parts and aluminium profiles. The anodic layer is closely connected to the surface of the element, which also can be coloured. 70% of the coating penetrates into the material and 30% grows out.



### RESULT

The coating has a protective function against external factors, even as aggressive as acid rain or sea water. It also has high aesthetic qualities. The coating can be coloured by chemical or electrochemical method, depending on the desired colour.

### SUBJECT TO THE PROCESS

The properties and appearance of the oxide coating predominantly depend on the input material ([type of alloy and the state of aluminium hardening – table](#)), method of manufacturing and preparation of the product surface.

### INDUSTRIES

Aviation, construction, electronics / household appliances, automotive, sports and many others.

### CONSULTING

We advise on the choice of material, so that the final result can meet the expectations of even the most demanding customers. For further advice, contact our consultant.



# Colouring of aluminium

## A wide range of colors

### PROCESS DESCRIPTION

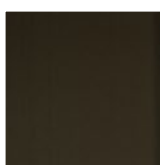
We dye aluminium using two methods: chemical and electrochemical. Chemical colouring of aluminium coatings consists in immersing them in a specific dye for a defined period of time, depending on the desired colour intensity. The dye is absorbed into the oxide layer, creating a deep colour effect on aluminium. Electrochemical dying is much more complicated and requires the use of several technologies.

### EFFECT – ELECTROCHEMICAL DYING

It is the method that enables to achieve colour films with many shades of brown and the colour that imitates appearance of stainless steel. The colours achieved by means of electrochemical process are very resistant to the effect of light. Films applied through electrochemical process are perfectly suitable for outdoor applications, due to their high resistance to corrosion. Available colours:



Light brown (C33)



Dark brown (C34)



Black (C35)



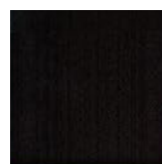
Gold (Z33)



Stainless steel (Inox)

### EFFECT – CHEMICAL DYING

Coatings subjected to colourisation by means of chemical processes perfectly prove themselves in applications, where decorative properties are crucial factors. The applicability of coatings for outdoor applications depends on such factors, as the base material, thickness of the applied film and the selected colour. One has to be aware that shades of final colours may differ for various grades of base aluminium. Available colours:



Black (C35)



Green (G1)



Blue (B1)



Light Gold (Z32)



Orange (O1)



Red (R1)

### EFFECT – COLOURLESS ANODIZING



Silver (C0)



ATTENTION: In mass production, we create custom-made colour. For further information, please contact our sales department.



# Colouring of aluminium

## A wide range of colors

### SUBJECT TO THE PROCESS

The colour of the oxide coating on aluminium depends on the type of input material. The importance lies in the type and content of alloying elements in the input material, as well as the conditions for obtaining the product. We carry out colourization of aluminium products by means of two methods, with regard to the base material and the desired final effect:

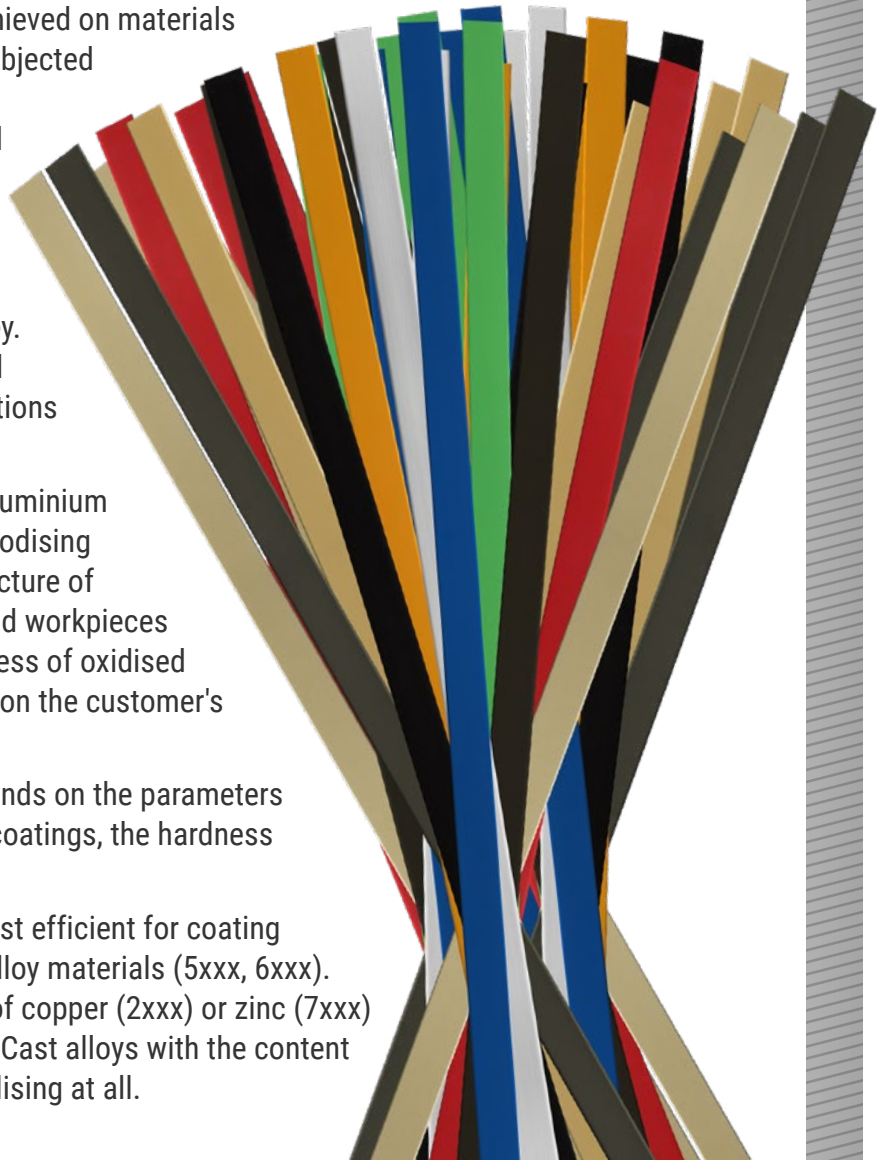
- the most homogenous coatings can be achieved on materials that have been mechanically deformed or subjected to thermal homogenization,
- purely colourless coatings can be achieved only in case when pure aluminium is the base material for anodising.

Use of high-alloy materials as base metals makes the applied coatings more or less grey. Improper homogenization of alloys may lead to formation of stains and various discolorations on the metal surface.

Thickness of oxygen layers formed on the aluminium surface depends on the conditions of the anodising process, as well as on composition and structure of the base material. For low-alloy materials and workpieces made of pure aluminium the possible thickness of oxidised layers may vary from 5 to 25 µm, depending on the customer's needs.

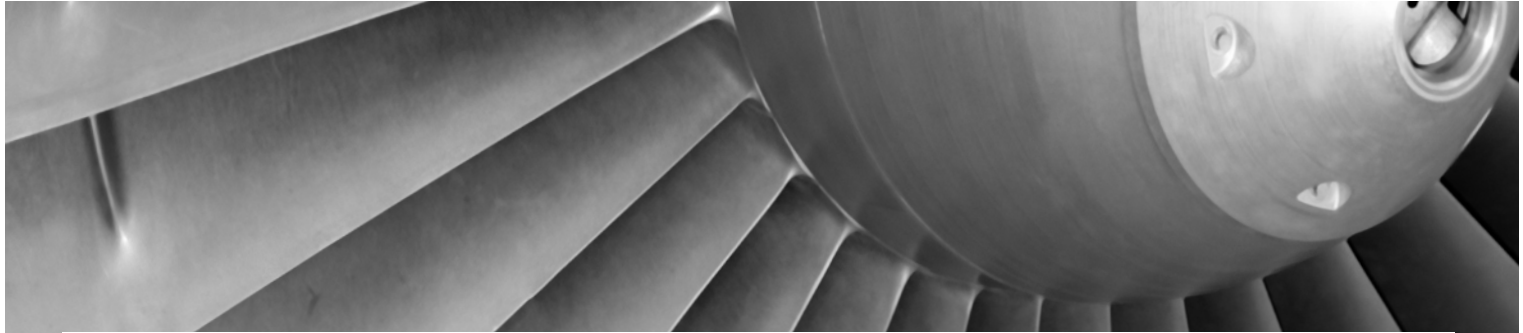
The hardness of coatings substantially depends on the parameters of the anodising process. For conventional coatings, the hardness ranges from 100 to 300 HV 0.05.

There is the rule that colourisation is the most efficient for coating applied onto pure aluminium (1xxx) or low-alloy materials (5xxx, 6xxx). On the other hand, alloys with high content of copper (2xxx) or zinc (7xxx) are quite difficult for application of colours. Cast alloys with the content of silicon above 3% are not suitable for anodising at all.



# Hard anodising of aluminium

## Steel strength, lightweight of aluminum



### PROCESS DESCRIPTION

Hard anodised coatings on aluminium and its alloys are formed during the process of electrolytic oxidation in acid electrolytes, under accurately adjusted conditions of temperature and electric current. The coating is formed in such a way, that half of its thickness penetrates into the base material and the other half builds up externally

### RESULT

When compared to conventional anodised films, coatings formed during the process of hard anodising are much thicker, which demonstrate much better resistance to wear. Depending on the type and condition of the base material, the achievable thickness of hard anodised films may range from 25 µm to 250 µm. Colours of hard anodised coatings depend on types of the base material and thickness of the built-up film. Generally, the colours include various shades of brown and grey. With very thick coatings, it is also possible to achieve black colour of the film.



#### PROPERTIES OF HARD ANODISED COATINGS

- Very high resistance to wear and abrasion.
- Perfect resistance to corrosion (1000 to 1500 h in a saline chamber).
- Excellent hardness (380-550 HV 0.025).
- Optimum antifriction properties.
- High resistance to electric breakdown (1500 V at the film thickness of 50 µm).
- Resistance to high temperatures (up to 2000°C at short-term exposure).
- Excellent properties of thermal insulation (1/10 to 1/30 of thermal conductivity demonstrated by the base material).

### SUBJECT TO THE PROCESS

The properties and appearance of the oxide coating mainly depend on the base material ([type of alloy and degree of aluminium hardening – table](#)), the method of manufacturing and preparation of the product surface.

**NOTE:** If the alloy type and condition are incorrectly defined, the components may be damaged.

### SPECIALISED INDUSTRIES

Hard anodising is often used in specialised industries:

- |                                     |                              |                       |
|-------------------------------------|------------------------------|-----------------------|
| • Pneumatic and hydraulic cylinders | • Chirurgical instruments    | • Household equipment |
| • Pistons and injection moulds      | • Toothed transmission gears | • Automotive industry |
| • Valves, nozzles and belt pulleys  | • Heating plates             | • Aviation industry   |

# Electropolishing of aluminium

## Perfect gloss



### PROCESS DESCRIPTION

Electrochemical polishing (electrolyte polishing) is the process that enables finishing of the metal surface, so that a smooth and spectacularly shining surface of the treated metal is achieved. To reach the best possible result, it is recommended to perform abrasive grinding and polishing of the material at first, and then subject the surface to electrolytic treatment.



### RESULT

Following the aforementioned sequence of processing and using an alloy recommended for electropolishing, you will obtain a perfectly shiny surface. Use the following aluminium grades, as base metal guarantees mirror-like shine of the polished surfaces.

EN-AB-1199	EN-AB-1030	EN-AW-5505
EN-AW-5657	EN-AW-5210	EN-AW-5252
EN-AW-6201	EN-AW-6463	EN-AW-6060 (Fe<0.15%)

If any other material shall be used, please contact our Sales department.

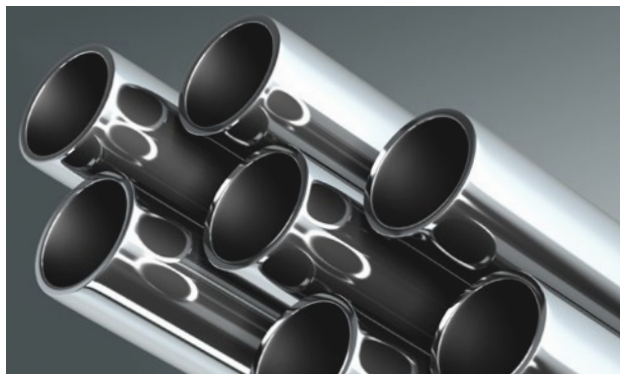
### SUBJECT TO THE PROCESS

The effect of electrochemical polishing depends on: the composition and structure of the processed material ([table with alloys](#)), the degree of hardening of the material, prior surface preparation. We polish profiles and small elements.

### INDUSTRIES

Electropolishing is often used in specialised industries:

- Automotive industry
- Shower cabins
- Components for packing of cosmetics
- Reflectors for lamps and electronic components
- Furniture accessories
- Components for casings of electronic equipment





# Mechanical surface treatment of steel and aluminium

## PROCESS DESCRIPTION

We treat the surface of aluminum and steel using three methods, depending on the result. We offer a brushing method, glass bead blasting and mechanical polishing.

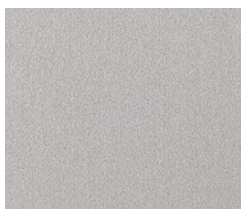
## RESULT

Mechanical treatment is used to cover material defects (even quite deep scratches and scores) left after production processes, and to obtain an interesting finish with high aesthetic values. We use different methods of mechanical treatment.



### BRUSHING METHOD (E2)

We perform surface brushing in various variants (Med., Hard, P120 and P80). We process flat elements and pipes using this method. Maximum brushing width on a flat surface: 170 mm. Maximum brushing diameter for pipes: 180 mm.



### GLASS BEAD BLASTING (S1)

To achieve matt appearance of finished surfaces, we offer the perfect solution that consists in pressurised shotblasting of surfaces with use of glass balls (SZK. 200 and KOR). Dimensions of the shotblasting chamber: 800x870x640 mm



### MECHANICAL POLISHING (POL)

To achieve shining surfaces, in particular before electrochemical polishing, we suggest preliminary polishing (POL).



### CUTTING ALUMINUM PROFILES

Maximum cross-section 140x100 mm  
Cutting at the angle of 90°  
Minimum length of sections: 50 mm  
Accuracy:  $L_{-1}^{+1}$

**Note! All services are carried out to order, according to individual customer's needs.**

# Appearance of stainless steel, advantages of aluminum

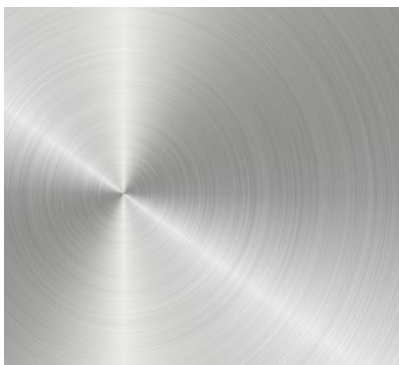


## PROCESS DESCRIPTION

INOX technology, meaning anodising aluminium to the colour of stainless steel, is a two-stage process. The anodising process is followed by electro-dyeing. The obtained coating, especially on previously polished or brushed surfaces, gives the appearance of stainless steel.

## RESULT

The coating made using the INOX method shows very high resistance to UV radiation and temperature (up to 130°C). It is also characterised by very high corrosion resistance, while not conducting electricity. **Aluminium is a metal almost three times lighter than stainless steel**, therefore, in many industries, the use of aluminium coloured like stainless steel will be a more advantageous solution than just stainless steel.



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## SUBJECT TO THE PROCESS

This process applies to 1000, 5000 and 6000 series aluminum alloys.

## INDUSTRIES

Aluminium coloured like stainless steel (INOX) can be used in construction: as building facades, bathroom or kitchen fittings. It can also be used in widely understood household appliances, as well as in the furniture and electronics industries.