

# ROSA

Today, ROSA is one of the leading manufacturers of outdoor lighting, and our products are located in more than 70 countries around the world. We have now entered the fourth decade of our activity, constantly developing, and employing over 300 employees people working on 38,000 m<sup>2</sup> of space. But it wasn't always this way.

## Beginnings

In 1992, the company founded by Stanisław Rosa employed only a few people. A lot has changed since then, and today, ROSA is one of the leaders in the lighting industry and a thriving company

However, the company grows thanks to the people who work in it. ROSA is a specialised team of engineers, a reliable group of conscientious production and anodising plant employees and the best specialists in the industry in Poland, characterised by an individualised approach to each client.



## Polish production

We are a Polish company that cares about the development of Polish economy. That is why the entire production process – from design, through production, anodising, to research – takes place in Poland, specifically in Tychy (Silesian Province) in the Tychy Subzone of the Katowice Special Economic Zone in 4 production plants:

- at 1 Strefowa Street
- at 16 Cielmicka Street
- at 13 Towarowa Street
- at 54 Towarowa Street

Location of all ROSA branches is a guarantee of supervision at every stage of production, which also affects the high quality of our services and products that we offer. Locating all plants close to each other also allows for a significant improvement and acceleration of work, which means faster delivery time for the customer.



## Innovation is us

We develop our own technical thought – our engineering staff and project teams are constantly developing innovative methods of product manufacturing. Our own ROSA anodising plant guarantees supervision over the entire anodising process and accelerates the execution of the order. The anodising process is fully automated, which allows interference or electrochemical colouring of aluminium elements up to 10 m long including complex shapes and in 10 colours.

In 2019, we completed the construction and commissioned another ZPSO III plant at Towarowa Street. Since then, on more than 10,000 m<sup>2</sup>, thanks to the use of innovative machines, robots, and the creation of a machining centre, we have led to full automation of the production process.

Thanks to this, today it takes us 5 minutes to produce a 5-meter column.

In 2021, in the newly built ROSA office building with a usable area of over 3,000 m<sup>2</sup>, the modern design and development centre and research laboratory were created. Designers constantly test and improve production technology so that our product is unrivalled.



### Research centre of the future

It is a laboratory equipped with modern devices for measuring the quality of anodic coatings. Thanks to the spark spectrometer, we can determine the quantitative composition of alloying additives, based on which, it is possible to qualify aluminium alloys for anodising. The high-class spectrophotometer enables the measurement of the coatings' colour quality, broken down into spectral bands, as well as the intensity of colour and the level of their tarnishing. Both devices guarantee the highest quality of anodising, which affects the unrivalled performance of our products.

#### Research & Development Laboratory

In the research and development laboratory, we conduct research and analyse the impact of different environments on the strength and quality of the materials we use. We do this using:

- climatic chamber, dust chamber, thermal chamber, NSS and CASS salt chambers, aging chambers (xenontest)
- Tensile Testing machine
- test benches: fatigue, glowing wire, photobiological safety, IP

The laboratory is also equipped with:

- Ulbricht integrating sphere for advanced lighting research
- goniophotometer to examine the distribution of light intensity

In the laboratory, we personally analyse the components of our products in terms of heat conduction, corrosion resistance, resistance to UV rays, determination of light distribution and photometric properties of the diodes used.

Thanks to this, we have full control over the production processes – starting from raw materials and ending with final products. Only this guarantees us the high

quality and reliability of the finished product, the service life of which reaches 50 years.

### Design with awards

We know how important it is to stand out, which is why we are open to new ideas and are constantly looking for innovative solutions, that simply look beautiful in the chosen place. Thanks to this, our creative approach to lighting has been repeatedly distinguished by both Polish and foreign specialists:

- DROP LED lighting set, which was awarded in the international Red Dot Award
- SNAKE LED lighting set was honoured with a prestigious award in the national Good Design competition

### ROSA – and it's all (b)right now!

Cooperation with ROSA is a guarantee of support and advice of experts, who care about the client. We are guided by a combination of tradition and experience supported by innovative, creative ecological solutions and our own technological thought. These advantages make us recognizable in Poland and in over 70 countries around the world, to which we export our products.



# Anodised aluminium columns production

## Material

Cooperation with ROSA is a guarantee of support and advice of experts, who care about the client. We are guided by a combination of tradition and experience supported by innovative, creative ecological solutions and our own technological thought. These advantages make us recognizable in Poland and in over 70 countries around the world, to which we export our products.

## Standard columns production technology

Two automatic production lines have six technologically advanced stations each, which, depending on the needs, can work simultaneously or separately. Full automation of the production process of anodised aluminium columns significantly increases efficiency. It allows us to produce 1 meter of aluminium column within 1 minute. As a result, the production of a five-meter ROSA column takes only 5 minutes.

The production lines of ROSA anodised aluminium columns are the only such investments in the world, and the innovative solutions used in them are protected by patents and every stage of the production process is subject to strict control.

## Non-standard columns production technology

Innovative production lines open many possibilities. Therefore, in addition to catalogue projects, we also carry out individual orders, in accordance with original projects.

We offer both minor modifications, based on typical products included in the catalogue, as well as brand new projects, completely different from our standard offer. Experienced engineering staff in the design and technical department performs the design and valuation for every customer inquiry.

Everything is possible when you have an extensive and modern machine park with such devices as a waterjet cutting machine, laser cutting station, CNC machine tools or bending machines for columns, sheets and pipes. These devices allow us to make various details with complex shapes, cut decorative elements for columns and extension arms and bend columns and extension arms to a given radius.



### Column construction – wiring chamber and screws

It is worth knowing that each aluminium lighting column has a wiring chamber, in which connection boxes are installed. At ROSA, the wiring chamber cover is cut with a laser (straight columns) or on a specially designed saw (in the case of columns manufactured outside the technological line) and fixed by bolts. The wiring chambers of aluminium columns, which are laser cut on the technological line, have an ingress protection IP54. The closure of the chamber is equipped with a catch (lock) welded into the cover and chamber, so that the cover additionally transfers the load resulting from the column's operating conditions.



Wiring chamber in anodised aluminium columns

### Bolts for wiring chamber cover

Safety of use is a priority. That is why the wiring chamber door is secured with M8 stainless steel bolts with a special, unusual socket shape, which prevents unwanted persons from opening the chamber. O-ring washers are fitted to each bolt to prevent them falling out during unscrewing. At the customer's request, the column can be equipped with triangular head bolts.

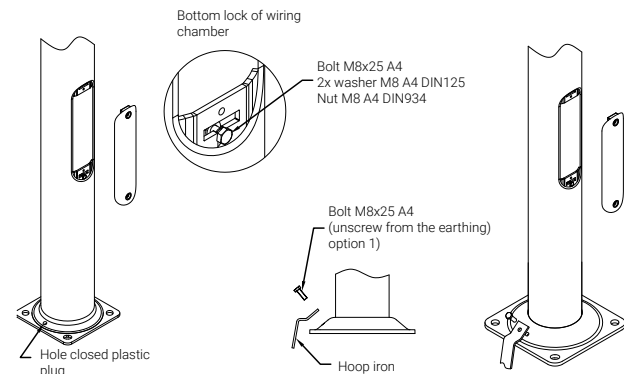


Triangular key and bolt

Hexagonal key and bolt

### Column construction – earthing

Of course, we ensure the earthing of our columns. Therefore, in the hole of the lower wiring chamber lock there is a M8 bolt for screwing the earthing wire. This location allows easy access to the bolt and thus for quick assembly and maintenance. But this is not the only solution. An alternative to the earthing used in the wiring chamber is an additional earthing in the column's base-plate made as standard. This solution can be used especially when earthing columns with a hoop iron. In this case, earthing is carried out on the base of the column. The earthing hoop iron is being screwed to the base-plate of the column using M8 bolt taken from the wiring chamber (option 1) and screwed into the hole made in the base-plate. When using option 1, the hole will remain closed with a plastic plug.



Earthing option 1

Earthing option 2

### Column reinforcement

#### Column reinforcement

Our offer includes columns marked with the „wzm“ index. This means that they have a reinforcement. Reinforcing the column within the base and wiring chamber with an additional tubes or thicker wall allows the use of more luminaires or extension arms, as well as their installation in places exposed to large wind speed.

### Connection of two-element columns

We provide a permanent connection of two-element anodised aluminium columns thanks to the use of a specially constructed connector made of stainless steel.

The connecting element is secured by using:

- 3 M10 bolts – for two-element SAL type columns,
- 4 M10 bolts – for two-element MAL type masts



Connecting element for two-element SAL type column



Connecting element for two-element MAL type column

### Acceptable column loads

Designing of lighting columns is based on the EN 40 group of standards. Thanks to the company's control system, we have obtained the Certificate of Constancy of Performance, which confirms that the manufacturer meets all the requirements contained in the following standards of the EN 40 group and ensures that they are maintained in continuity.

1. EN 40-1 – Lighting columns – Terms and definitions
2. EN 40-2 – Lighting columns – General requirements and dimensions
3. EN 40-3-1 – Lighting columns – Design and verification – Specification of characteristic loads and referenced EN 1991-1-4. Design basics and impacts on structures.
- 2-4. Wind loads.
4. EN 40-3-2 – Lighting columns – Design and verification – Verification by means of research.
5. EN 40-3-3 – Lighting columns – Design and verification – Verification by means of calculations.
6. EN 40-6 – Aluminium lighting columns – requirements
7. EN 40-5 – Steel lighting columns – Requirements

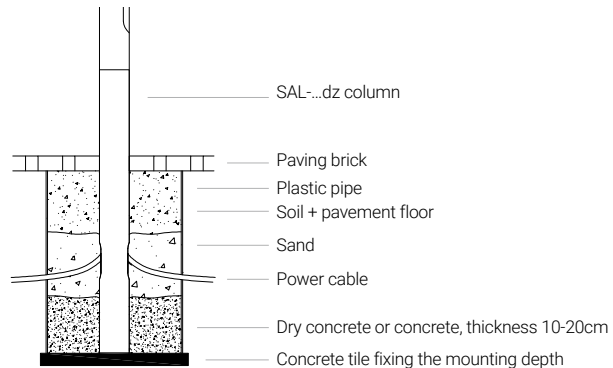
These standards are not just a series of recommendations. They also specify the

method of determining the permissible load of the column structure. When calculating the permissible load of columns, many characteristic parameters are considered, such as: average wind speed, terrain category, horizontal deviation, or shape factor.

### Resistance calculations

Calculations of column's resistance are performed in an original calculation program in accordance with the applicable requirements contained in EN 40 and EN 1991-1-4. Resistance is calculated for columns without a wiring chamber cover.

### Recommendations for SAL-...dz column installation method



1. Dig a hole in the ground at the installation site.
2. At the bottom of the hole, place a concrete tile to fix the depth of installation.
3. Insert a plastic pipe of suitable diameter (at least twice the diameter size of the column) into the hole with the holes prepared on the sides to feed the power cable. The length of the pipe should be long enough so that its edge does not interfere with the subsequent installation of paving bricks.
4. Cover the outside of the pipe with soil, so that the groundworks can be completed with laying paving bricks.
5. Unscrew the wiring chamber cover.
6. Place the column in the hole manually while inserting the power cables to the holes in the underground part of the column, so that their ends appear in the open wiring chamber of the column.
7. Place the column vertically and/or block the column in this position, if possible, with the help of wedges.
8. Pour dry concrete or concrete into the hole to a depth of approx. 10-20cm. This constitutes the basic stabilisation of the column.
9. Then pour sand into the hole in the amount to cover the power cables along with holes in the column. Sand protects against damage to the cables.
10. Cover the rest of the hole with soil and compress. Fill in the missing part of the pavement around the column.
11. After completing these steps, proceed to the operation of mounting luminaires, extension arms and connection boxes.

Warning! On the columns up to 5m, where luminaires with mounting directly at the end of the column are used, it is possible to put them on before starting the mounting to the ground, eliminating the need to rent a car with a lift.

### Passive safety

Aware of the safety requirements expected from the producers of lighting columns, to minimise the danger resulting from road accidents we have carried out passive safety tests on our products according to standard EN 12767:2019 "Passive safety of support structures for road equipment. Requirements and test methods."

As a result of the tests, we identified class of passive safety for aluminium columns in heights from 2 to 12 m:

- SAL and MAL from  $\varnothing 114$  to  $\varnothing 225$  mm rooted, which have been classified:

**100-NE-C-S-SE-MD-0; 70-NE-C-S-SE-MD-0; 50-NE-C-S-SE-MD-0**

- SAL from  $\varnothing 114$  to  $\varnothing 180$  mm with base-plate, which have been classified:

**100-NE-B-S-SE-MD-0; 70-NE-B-S-SE-MD-0; 50-NE-B-S-SE-MD-0**

Where:

50, 70, 100 – tested impact speed

NE – non-energy-absorbing construction

B, C – Occupant safety class

S – Backfill type: standard.

SE – Collapse mode: Separation from the foundation

MD – Direction class: multidirectional

0 – Risk of roof deformation: low risk < 102mm

### Categories and parameters

Construction categories in respect of the energy absorption degree:

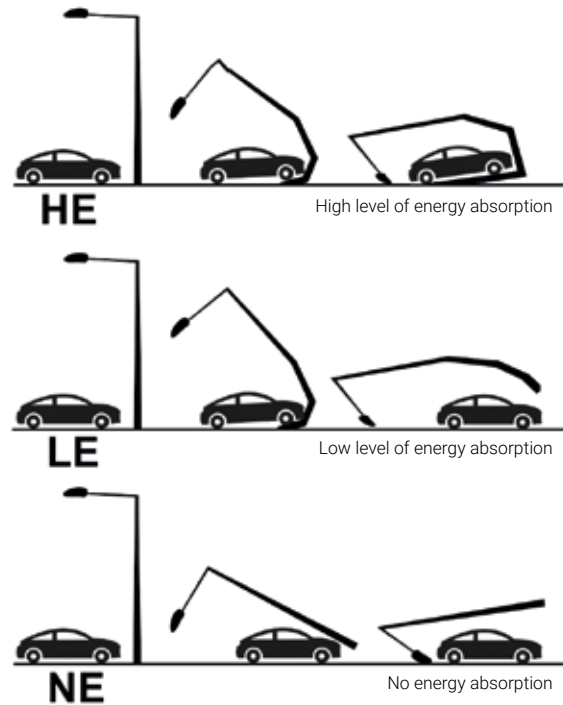
HE – high level of energy absorption

LE – low level of energy absorption

NE – no energy absorption

Class „0“ – passive safety requirements are not met

Levels of energy absorption according to EN 12767



# Anodising process

## ROSA Anodising plant

Since 2009, the anodising plant of aluminium products has been part of ROSA, which today is one of the largest plants of this type in Central and Eastern Europe. Anodising is performed here with electrochemical and interference colouring of aluminium materials, among others: sheets, pipes, profiles, or other structural elements.

Modern interference colouring technology enables the use of a richer than traditional colour palette resistant to external factors, including UV radiation. We anodise products up to 10 m long in 10 unique colours. Because we also carry out individual orders in the anodising plant, we can adapt the shape of the product precisely to the customer's needs.

## Anodising process

Anodising is one of many ways to protect aluminium from dirt and aggressive corrosion and it is second to none, because in addition to protection against adverse weather conditions, it is characterised by high aesthetic values.

## Anodising is used for the following purposes:

- the anti-corrosion and mechanical protection of the metal surface, with particular emphasis on atmospheric corrosion, especially against aggressive environmental factors such as sea water, acid rain, salt etc.,
- decorative – anodised surfaces achieve a smooth, satin finish and additional colouring guarantees exceptional aesthetics of surface finish.

## Quality guaranteed!

In our R&D laboratory we have conducted resistance tests of anodic oxide coatings to UV radiation. Tests were performed in accordance with the recommendation of the standard EN ISO 6581 „Anodising of aluminium and its alloys – Determination of the comparative fastness to ultraviolet light and heat of coloured anodic oxidation coatings“. During 14600 h of the sample's exposure in Q-Sun Xe-3 device, there was no colour change of observed oxide layers. Such exposure

period is equivalent to 20 years of operation in Polish climatic conditions.

In order to determine corrosion resistance, the samples of anodised aluminium lighting columns were tested in a salt chamber at a salt concentration of 5% (for comparison, salt concentration in the Baltic Sea is 0.8% and in the North Sea it is 3%).

Exposure of samples in the chamber lasted in total 20 000 h. Despite such long period of test, no corrosion was detected. The test was carried out in accordance with the standard DIN EN ISO 9227, according to the NSS method.

The company received technical approval of The European Association for Surface Treatment on Aluminium QUALANOD with the right to use the Quality Label QUALANOD of Anode Coatings, which confirms the highest quality of services provided by ROSA anodising plant.



## Aluminium Anodising – why is it worth it?

- anodised coatings are integrally connected with the surface, so there is no option of peeling, chipping of or delamination,
- long useful lifetime, with the option of receiving a guarantee up to 20 years,
- high aesthetics for a long time of use,
- high resistance to UV radiation,
- high abrasion resistance due to greater hardness of the coating,
- corrosion-free,
- availability of a wide range of colours,
- decorative surface function.

	Black steel	Galvanised steel	Hot dip galvanised steel	Raw aluminium	Anodised aluminium
Model sample					
Test in salt chamber Standard DIN EN ISO 9227– NSS method Test in neutral salt fog					
Test in salt chamber Standard DIN EN ISO 9227– CASS method Test in acid salt fog with addition of copper					

## Anodising process

The process of anodising is carried out on an automated technological line equipped with 28 tanks. This process can be divided into three stages. Between the essential processes the rinsing operation of the product is performed.



### Stages of the anodising process:

#### 1. Surface preparation

The first step is degreasing, consisting of removing oils, their derivatives, and any impurities from the mechanical processing of details from the aluminium surface.

The second step is alkaline etching (satin finishing), which aims to remove the self-created oxide layer from the surface of the product and give the surface a uniformly matt (or, on the contrary – shiny) look.

The third step is brightening (pickling), the purpose of which is the final removal of thin oxide layers and deposits that may have remained after satin etching or brightening processes, and the removal of which is necessary to achieve a structurally uniform oxide coating.

#### 2. Anodising and colouring:

Anodising is controlled formation of aluminium oxide layer on the aluminium surface during electrochemical process. Anodised coating is formed by electrolysis, in a sulfuric acid solution involving direct current of a certain density. The anodic coating grows in 2/3 of its thickness into the metal surface and grows 1/3 above it. It becomes much thicker than the natural one, so it effectively protects

the aluminium surface from further oxidation i.e., corrosion. Its structure allows permanent colouring of the product by chemical, electrochemical or interference method. Colouring can be:

- **Electrochemical** – based on the treatment of the anodised product in the electrolyte containing tin salt ions. Metal, reduced in a cathode cycle, is deposited on the bottom of the pores of the oxide coating and gives a permanent colouring to the aluminium surface. This results in a range of colours from bright to dark shades of brown and black.

- **Interferential** – preceded by anodic layer's pore shape modification. Then, the surface of the aluminium is permanently coloured in baths based on tin salts, widening the palette of colours obtained in electrochemical colouring with new shades of grey and green. This method uses the phenomenon of interference, that is, the overlapping of reflected light waves, leading to the increase or decrease of the resultant wave amplitude. Modifying this amplitude through the appropriate controlled variation of the pore shape in the anode layer allows to obtain the appropriate optical effect (colour).

#### 3. Sealing

This is the process by which a porous structure is closed. We use two-stage cold-hot sealing, consisting in immersing the product in a solution of a cold sealing bath. Its purpose is to deposit nickel salt on the inner part of the pores. Then, after proper rinsing of the surface, there is a hot sealing stage, in which the process of accelerated closure of the anode pores takes place. This process makes the surface of the anodised element tight and smooth, thanks to which the oxide coating is resistant to atmospheric corrosion factors and reduces the tendency to settle contaminants on the product's surface.

ROSA anodising plant can perform 2 types of finish of anodised surfaces:

- **Brightened**

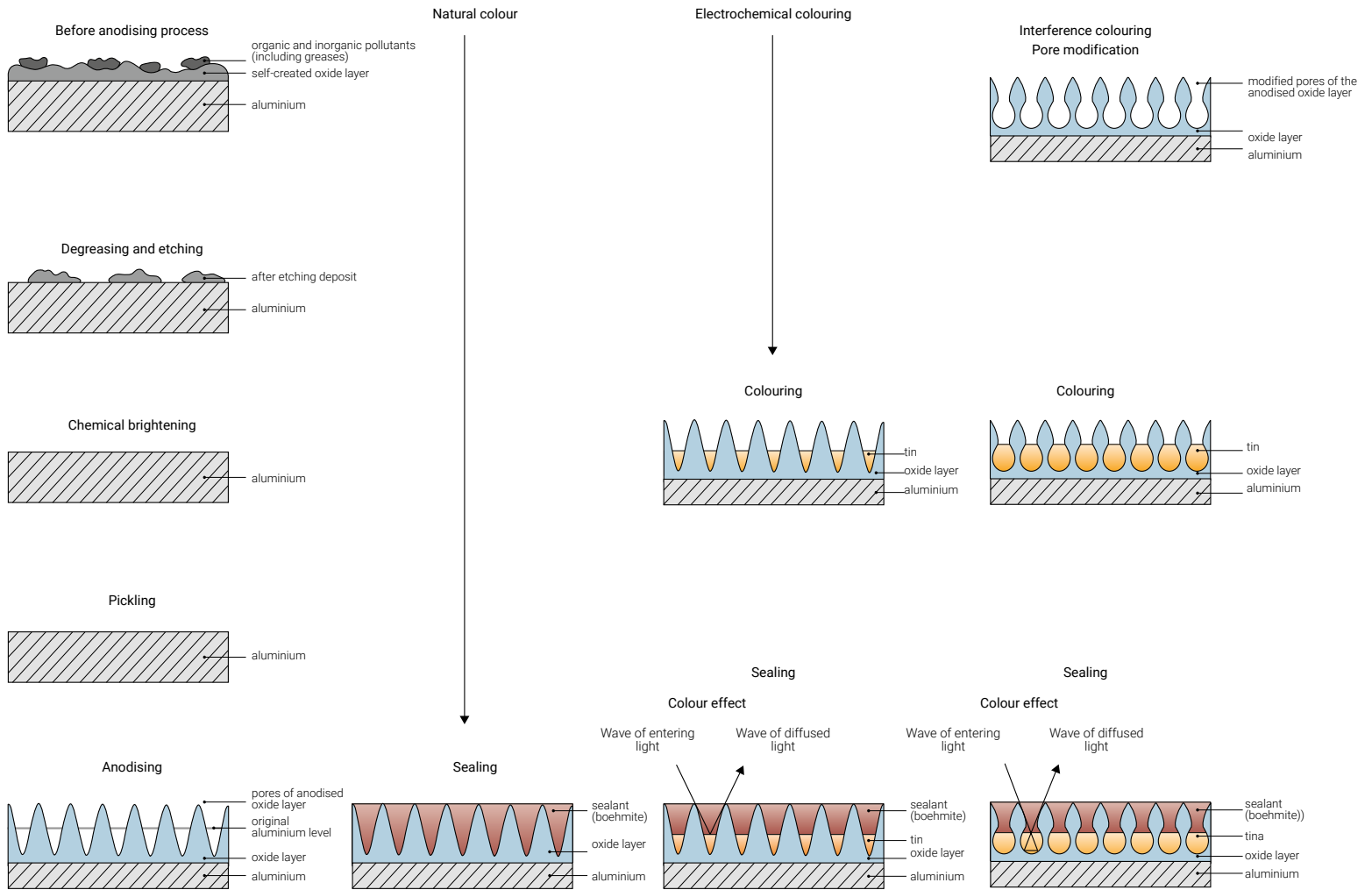
Getting glossy aluminium surface is obtained by the chemical etching before anodising process. The process is based on chemical smoothing of the surface structure, this results in a reduction of matt effect and lightens the metal surface, which gives the gloss finish.

- **Satin**

Obtaining a surface with a delicate satin finish is possible thanks to the so-called dry etching technology. It involves surface treatment by shot blasting using a modern machine for tarnishing the surface. The workpieces are blasted using shot with a diameter of about 0.1 mm, thanks to which a final satin effect is obtained. Importantly, this type of technology allows to significantly eliminate all kinds of surface defects arising in extrusion or rolling processes, such as streaks, thermal stripes, etc., as well as minor mechanical damage in the form of scratches or abrasions. The surfaces obtained this way are characterised by much better quality compared to traditional chemical etching. The applied technical solutions allow to shot blast elements made of 1 mm thick metal sheets without the risk of damage to the surface.



# Anodising process of aluminium products



## Anodising colour palette



Natural **C-0**



Champagne **C-32**



Olive **C-33**



Brown **C-34**



Black **C-35**



Inox **C-45**



Grey **CI-63**



Graphite **CI-65**



Green **CI-75**



Anthracite **CI-78**

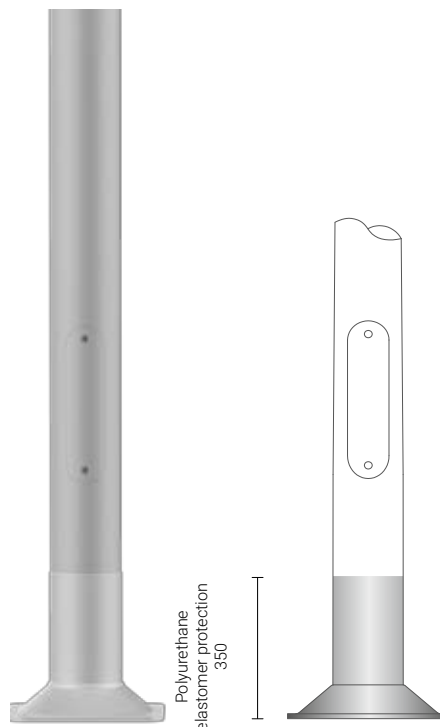
Real anodising colour can differ from presented colour sample.

**Elastomer protection**

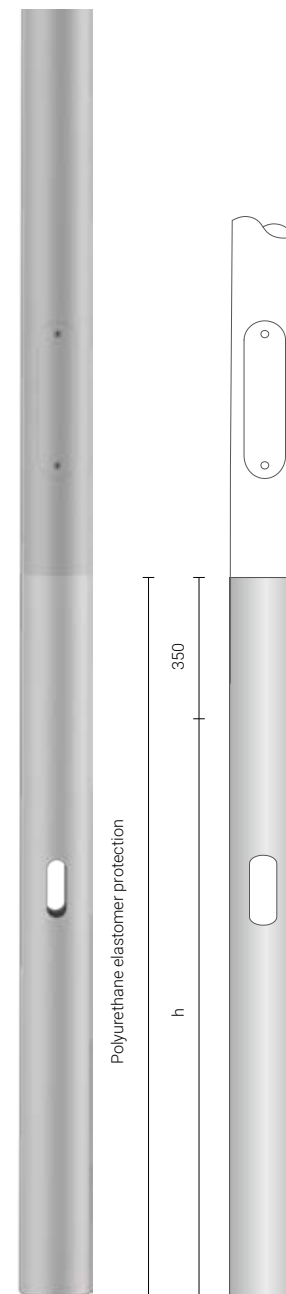
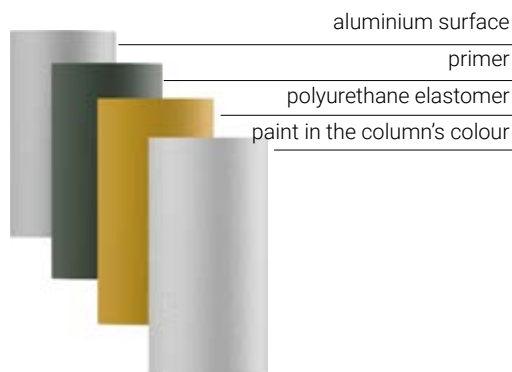
In very unfavourable (environmental) conditions, the base-plates and parts of the rooted column are exposed to the adverse effects of salt compounds and mechanical damage. For additional corrosion protection at the bottom of the column, we offer the option of covering the base-plate (including holes for mounting bolts) and a part of column (up to 350 mm) with polyurethane elastomer.

The thickness of the protective coating is from 0.7 mm to 1 mm with a hardness of about 90°sh. The surface of the elastomer is painted with a UV-resistant paint, similar to the colour of the anodic coating of the column. Elastomer protection is in accordance with the EN-40 standards, i.e., the European requirements for aluminium lighting columns.

All rooted columns type SAL DZ are protected with a polyurethane elastomer as standard. Both material and production technology are environmentally friendly.



Polyurethane elastomer protection of columns with base-plate



Polyurethane elastomer protection of rooted columns

# Ecology, economy, and quality of our products

## **Ecology – we act for the climate.**

We have always been focused on keeping up with the changes that affect us. Climate change is one of them. That is why, we have focused on ensuring that our products guarantee long-term operation – 50 years of lighting sets' service life is an absolute record on the market.

All our products are manufactured in a process, that protects the natural environment and are intended to be used without harming it. For the sake of our surroundings, every day we take actions, that are a joint investment in the future.

For us and our loved ones.

## **'Green metal'**

ROSA columns are mainly made of a material that is called "green metal" for a reason. It is aluminium. Why „green metal“?

Effective aluminium recycling allows to save up 95% of energy needed to produce new material, without losing original value. In relation to environmental protection, this process allows a 100% reduction in the amount of solid waste, multiple reduction of CO2 emissions to the atmosphere and to minimise water consumption to 97%.

The pro-ecological choice of raw material is a wise decision, which benefits not only current but also future generations.

## **Economic modernisation**

Thanks to the fact, that ROSA columns are anodised aluminium, the surface renewal (even after a very long period of use), does not require any special technological processes, that involve additional environmental pollution. Removing an anodic layer from the columns and the application of new ones take place during the same technological process. The anodic layer can be freely modified for both corrosion resistance and the colour style of the finish.

## **Environment friendly production**

In addition, our ROSA products are manufactured in environmentally friendly conditions. They are created in production plants that are efficient in energy management. The energy is obtained, among others, from company's own photovoltaic farms. We also produce energy in cogeneration, where the fuel used for energy production is natural gas, the combustion of which is less harmful to the environment, and its use contributes to the active fight for healthier air.

The generated waste heat is used in the process of anodising aluminium, as well as for heating and cooling rooms and production halls or heating utility water.

## **Energy efficiency**

ROSA LED luminaires significantly reduce energy consumption, providing A ++ savings class. Moreover, LEDs are environmentally friendly because they do not emit UV rays or infrared radiation.

## **Photobiological safety**

Photobiological safety is one of the basic requirements of European directive included in PN-EN 62471:2010 standards, that must be met by a light-emitting product.

Threats resulting from the use of artificial lighting:

- eye hazard of UV radiation
- burn to eye's cornea
- cataract
- retinal injury - from staring at strong light source

At ROSA, we strive for a high level of health, safety, and environment protection. We own specialised research equipment, that allows us to outline photometric parameters based on which, the risk group (RG0, RG1, RG2, RG3) is determined, to which the LED luminaire will be included. By choosing our products, you can be sure that the equipment is tested and safe.

## **Quality is a priority**

We know how ground-breaking the technologies and ways of manufacturing our products are. They cost us many years of trials, that led the development of production to where it is now. Therefore, that's why we protect them with patents.

We take quality seriously. Therefore, we conduct our daily activities in accordance with the Quality Management System ISO 9001:2015.

We also have all certificates in force in the EU, including Qualanod, which is awarded to the highest quality anode coatings and confirms compliance with European standards, as well as a passive safety certificate of anodised aluminium columns in the class 100-NE-C-S-SE-MD-0 according to EN 12767: 2019 (100 NE2 according to EN 12767:2007).

## **ENEC Certificate**

The high quality of our products has been confirmed by granting the Certificate of Electrical Products – ENEC to luminaires' series CUDDLE II LED, CUDDLE II LED REG, ISKRA LED and ISKRA LED ALFA, ISKRA LED PROG, as well as ISKRA LED PROG ALFA for selected optics.

ENEC is a European mark that guarantees compliance with European EN standards, safety, reliability and confirms the highest quality. The certification process includes inspections at the production plant and product testing. Awarded by an independent certification and testing body, it is recognised throughout the EU. ROSA, as a brand with many years of experience, performs regular inspections to make sure that products meet all the requirements of standards.



# Anodised aluminium – cleaning and maintenance

Proper maintenance and regular cleaning of anodised aluminium products allows to keep their aesthetic and decorative appearance for longer.

**Below we have defined the division of contaminations and indicate the recommended cleaning products**

## I Category

industrial atmosphere pollution, road salt residues, permanent precipitation from car exhausts, etc.,



### Recommended cleaning products

- HENKEL LOCTITE SF 7840
- HG – Super Cleaner;

### Contamination removing process:

1. Apply the cleaner to the column, then wait until it reacts with dirt.
2. Wash column with a sponge or brush (soft bristle).
3. Rinse thoroughly with clean water



**If necessary, repeat the process until effect is achieved**

### Recommendations before maintenance

1. It is not recommended to clean aluminium with:
  - corrosive potassium (potassium hydroxide),
  - technical soda (sodium carbonate),
  - caustic soda,
  - acid products,
  - polishing products,
  - products that can damage the anode surface.

## II Category

graffiti, paint, markers



- HG – Graffiti Remover
- HENKEL BODERITE S-ST 1302
- AGS 5SR;

1. Wash column according to first category cleaning procedure.
2. Apply graffiti and paint remover. Leave for the time specified in the product card. Wash with sponge and cleaning detergent.
3. Rinse thoroughly with clean water.



## III Category

stickers, tape, glues



- HG - Sticker Remover
- HENKEL BODERITE C-MC 400
- AGS GLUE REMOVER;

1. Wash column according to first category cleaning procedure.
2. Use a plastic spatula to remove stickers and tapes. Apply a sticker remover. Leave for the time specified in the product card. Wash with sponge and cleaning detergent.
3. Rinse thoroughly with clean water.



### 2. Health and safety information:

- Use protective clothing as recommended by the cleaning product producer.
- It is recommended to use biodegradable preparations and liquids with a neutral pH. Before cleaning the surface, it is necessary to check the effect of the cleaning agents used for this purpose. You can do test in a less visible place. In case of undesirable effects, the use of the tested cleaner should be stopped.