PROTECTION AGAINST CORROSION

IN GOOD CONDITION
INTRODUCTION

Outdoor equipment must have a long life and easy maintenance. The user has direct contact with the material and he has to feel the good condition of the item to be able to use it with safety and comfort. The metal parts of our items are protected against the elements. Our metal materials are:

- **IRON WITH ELECTROLYTIC ZINC AND POWDER LACQUERED.**
  Due to its high resistance to impact, it is used in large bars, lintels swings, healthy playgrounds, walkways and climbing areas,…

- **ANODIZED ALUMINUM**
  Thanks to its surface hardness and due to the adhesion and properties of the anodized, it is used in brackets, balconies’ sheets, short bars and stair steps, among others.

- **STAINLESS STEEL**
  Since it is a very durable material and will not rust it is used in wear areas, such as sheets for slides, swing lintels, firefighters bars, hardware, brake shoes,…

- **HOT GALVANIZED STEEL**
  which is used in part of the hardware.
Cataphoresis or cathodic electro-deposition is a method of painting by immersion based on the movement of charged particles within an electric field (painting) toward the opposite pole (metal piece to paint). By applying a difference of electric potential, the paint molecules break and are evenly deposited on the part (cathode) attracted by their electric charge. The main objective of this process is the protection of surfaces against corrosion.

Cataphoresis advantages:
• Excellent degree of protection and resistance to corrosion.
• Excellent adhesion.
• Resistance to mechanical deformations.
• Wide compatibility with other paints. It can be used as a base.
• It can be applied on all types of substrates: steel, aluminum, electro-plated, galvanized, plated, casting, etc.
• Paint free of heavy metals.
• Process respectful with the environment: 100% performance of materials, low content in Volatile Organic Compounds (COV’s) and emissions.
The physical-chemical principle that rules this process is the displacement of charged particles in an electric field. The phenomenon takes place in an aqueous medium and, through a process of electrolysis, the destabilization of a polymer of a generally epoxy nature is generated; it coagulates depositing, by effect of the electric conductivity, on the surface of the part. This is the first application of paint and is composed of a dispersion of resins and pigments in the aqueous medium with a low content in organic solvents.

The outline of the process of Cataphoresis with its anodic and cathode reactions is the following:

- **Cataphoresis:**
  The part, connected to the negative pole or cathode, is introduced in a cataphoretic paint bath, whose tank is connected to the opposite pole, the positive or anode. Thus, by means of the electric current, the cataphoretic paint is placed on the body.

  The reactions between the anode and cathode are of dissociation of the molecules of paint by the effect of the direct current.

  Solubilized molecule $\rightarrow$ Dissociation molecule (by direct current)

- **Cathode:**
  * Water Electrolysis:
  \[ 2\text{H}_2\text{O} + 2\text{e}^- \rightarrow 2\text{OH}^- + \text{H}_2 \]
  * Paint Coagulation:
  Dissociated molecule + OH\(^-\) $\rightarrow$ Paint deposited + H\(_2\)O

- **Anode:**
  * Water Electrolysis:
  \[ 2\text{H}_2\text{O} \rightarrow 4\text{H}^+ + \text{O}_2 + 4\text{e}^- \]
  * Neutralization of the acid:
  R-COO\(^-\) + H\(^+\) $\rightarrow$ R-COOH

Some parameters and circuits for the maintenance of the bath are:

- **AD Conductivity:**
  < 10 µS/cm. This is achieved by applying a potential difference between the anode and the cathode within the range of values between 100 and 400 V.

- **Bath temperature:**
  Between 29°C and 33°C. It is of the utmost importance for the conductivity of the circuit.

- **Bath conductivity:**
  900 – 1800 µS/cm.

- **Bath pH:**
  Should be kept between 5 and 5.5 to ensure stability.

- **Bath dry extract:**
  Helps to verify the stoichiometry of the relationship paste - binder.

**OUR SPRINGS**

They are made of iron and treated by means of cataphoresis (KTL); oversized without facing and powderlacquered, with a diameter of 20 mm.
**Polymerization (Crosslinking):**

The anti-corrosive protection finalizes with the drying of the piece. The reaction of crosslinking will take place in the oven which will reach its optimum effectiveness with 15 minutes at 165 °C giving the coating the properties of chemical protection and desired mechanical resistance.

The thickness of the layer depends fundamentally, on the tension applied, since the layer that is deposited does not conduct the electric current, so the electric effect ceases when the layer reaches a determined thickness. It also depends on the time of immersion, on the concentration of the bath and on the electric current. With a time of immersion between 2 and 4 minutes, the values of the thickness oscillate between 20 and 25.

**Anolyte Circuit:**

Circuit for collecting the acid generated and whose conductivity should be controlled (occasionally we will regenerate it with the incorporation of CH3-COOH) between 4000 and 10000 µS/cm. Besides the pH must be controlled, which will be maintained between 1.9 and 2.0.

**Ultra-filtration Modules:**

System for the recovery of paint through selective membranes with ion-exchange resins which separate the solids or colloids from the aqueous solution. The Dry Extract of the liquid UF < 0.25% is controlled at the exit of the modules, the paint goes back to the tank and the liquid (UFN AND UFR) is used for subsequent washing operations. After the cataphoresis, the part is washed with deionized water to remove the remains of product that have not adhered.