

Electrocoating

Technical Data Sheet



The fundamental principle that makes electrocoating work is that opposite charges attract each other. In the electrocoat process a rectifier is used to create a voltage potential between a conductive part and an oppositely charged electrode that is immersed in an electrocoat paint tank. The electrocoat paint particles become electrically charged and are deposited from a water suspension to coat the conductive part when a current is applied so that the components have an opposite charge to the paint particles.

The voltage from the rectifier is used to control the amount of paint that is deposited onto the part. As the voltage is increased, the amount of paint deposited will also increase. The deposition is self-limiting and slows down as the applied coating electrically insulates the part. Electrocoat solids deposit initially in the areas of components that are closest to counter electrodes and as these areas become insulated to the current, solids are forced into the more distant and recessed bare metal areas to provide complete coverage. This phenomenon is known as throwing power and is a critical aspect of the electrocoat process.

Depending on the polarity of components and paint particles, electrocoating is classified as either anodic or cathodic.

The Anochrome Group uses cathodic electrocoating; the parts to be coated are negatively electrically charged (cathodic), this attracts positively charged paint particles in the paint bath. Using these polarities, the anodic process results in only a minimal amount of soluble iron entering the paint film during the cathodic process. Consequently, the paint film exhibits superior corrosion resistance compared with anodically deposited coatings. Cathodic painting forms high-performing coatings with excellent corrosion resistance that can also be formulated to meet arduous exterior durability requirements.

Why choose E-Cote?

Process Overview:

The electrocoat process can be divided into four distinct sections:

Pretreatment: Parts are cleaned and pretreated with a conversion coating to prepare the part for electrocoating.

Electrocoat Tank: Direct current is applied between the parts and positively charged electrodes. Paint is attracted by the electric charge on the parts on which it is deposited.

Post Rinses: Parts are rinsed to reclaim undeposited paint solids.

Baking Oven: Paint is thermally cross-linked (cured) at 200° centigrade.

Parts are transported through the system, hung from programmed indexing flight bars which are used to move the parts from stage to stage and in and out of tanks.

The choice of electrocoat over other coating systems is usually driven by the relatively low cost of electrocoating. The low cost is achievable because electrocoating is an automated process, which gives precise film builds and high paint transfer efficiencies. The process yields a consistent part-to-part, high performing coating, with little need to rework parts due to paint defects such as runs, sags and voids.

The key to electrocoat's high paint transfer efficiency can be summarized in two parts:

The process automatically limits the amount of paint being applied. As paint film builds upon surfaces, an insulating layer forms which resists the deposition of excess paint. By using ultrafiltration, it is possible to recover over 98% of all paint that is carried out of the paint tank and into the rinse stages.

The process also provides the end user the ability to coat complex parts or hard to reach surfaces yet hanging parts in close proximity. Combined with the fact that manual labour is not needed to apply paint, the electrocoat system becomes a fast moving and highly productive coating process.

Environmental advantages include the fact that virtually no volatile organic compounds are produced, eliminating the need for costly emission abatement equipment that is required for many solvent based liquid spray or dip processes. Electrocoat products are heavy metal-free and have low biological oxygen demand and chemical oxygen demand when introduced to waste streams. Products are water-based, thus reducing fire hazards and worker exposure to hazardous materials, compared with organic solvent-based materials.

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Advantages of Selecting Electrocoating Technology

Application & Performance

Outstanding film uniformity: Consistent thickness on all part-to-part surfaces. No sags, runs, or drips.

Excellent film build control: Paint only deposits where substrate is conductive; after paint reaches thickness it no longer continues to coat.

Pre-assembly before coating is sometimes feasible:

Few post painting rejects.

Wide range of features. Formulated to meet corrosion, durability and other performance specifications.

Flexibility: Multiple part configurations can be coated in one tank, without having to change the application equipment.

Typical Performance of Cathodic E-coat

Neutral Salt Spray – ASTM B117 EN ISO 9227 - < 2mm creep after 1000 hours

Hardness – Pencil 6H

Scratch resistance – BS 3900 E2

Abrasion resistance – Taber CS17

Crosshatch adhesion – DIN 3151

Mandrel flexibility – BS 3900 EH

Economics

Totally automated process:

Very high productivity: Dense and non-uniform line loading.

Very high transfer efficiency: Closed-loop rinse system; approaches 100%.

Relatively low energy requirements: minimal air exchange needed during drying and curing.

Relatively few maintenance procedures needed.



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