



TECHNICAL INFORMATION

ADDITIVES FOR ED COATINGS



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Introduction

ED (electrodeposition) coatings are used both in the automotive industry and in the industrial sector. A distinction is made between cathodic electrodeposition (CED), which is the most commonly used process, and anodic electrodeposition (AED), which is used mainly in the industrial sector.

The benefits of ED coatings lie in their short application time, uniform layer thickness, good adhesion, corrosion and chemical resistance, and excellent cost-effectiveness resulting from high efficiency.

Furthermore, environmental compatibility is an aspect that is more important than ever in today's world.

Angled objects that have hollow spaces, like car bodies, are difficult to reach properly and coat using conventional application methods such as a paint gun. Using the principle of electrodeposition enables the paint to reach all areas and therefore guarantee good corrosion protection there too.

However, the ED coating can only achieve all these benefits if the underlying coating system is perfectly adapted and optimized to the application. Additives play a very important role here. BYK offers solutions for a wide variety of applications in this regard:

- Wetting and dispersing additives not only provide good pigment stabilization and improved anti-settling performance, they also have a positive effect on leveling.
- Surface additives not only improve leveling, they also make the system insensitive to contamination, avoid the formation of craters, and thus ensure good corrosion protection.
- Defoamers prevent foaming in the ED bath, thereby optimizing the application result and allowing a defect-free coating film to be created.

Thanks to our specialized laboratories and the ability to simulate the ED process under laboratory conditions, BYK is capable of recommending specific additives for customer systems and also developing new additive solutions for the ED market.

Note

To ensure the best appearance and full functionality, please open in Adobe Acrobat.

Suggested additives for the ED sector can be found at:
www.byk.com/en/markets/automotive-oem-coatings

Application technology equipment at BYK: competence and customer orientation

Our laboratories in Germany, China, and Japan are equipped with ED facilities that we use to simulate our customers' different applications under laboratory conditions, test the effect of our additives in the corresponding systems, and thus offer solutions for a wide range of problems.

Our laboratory facilities consist of:

1. Rectifier
2. ED bath
3. Ultrafiltration unit

The ED facility creates an electric field between the sheet metal being coated and the opposite pole; an electrochemical reaction takes place whereby the paint is coagulated and deposited on the sheet metal as an insoluble film.

The combination of the ED bath and ultrafiltration allows the paint to be applied professionally, as it would be in a large-scale system, and the permeability of the products can be checked during ultrafiltration too.

Rectifier and
ED bath



Ultrafiltration
under laboratory
conditions



Stabilization of ED baths

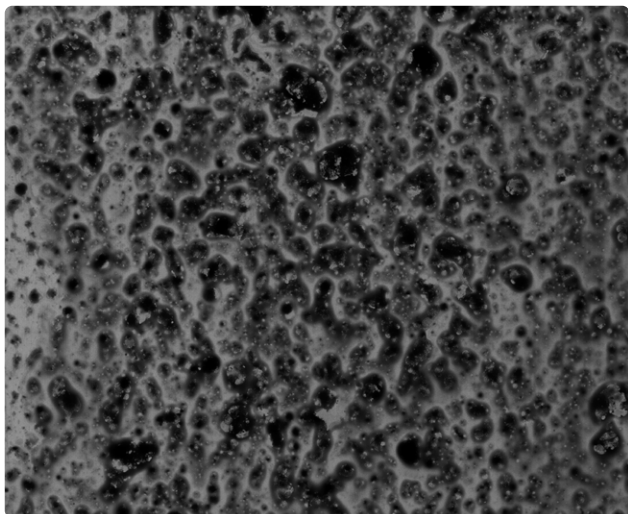
As in all coating systems, pigment stabilization is a key issue in ED coating too. Choosing the right additives not only ensures stability of the ED bath, but also has a positive effect on properties such as leveling and appearance (gloss).

The effectiveness and compatibility of our additives can be tested using different test methods such as the cup test, L profile, and pour out on foil.

Selecting the right additive

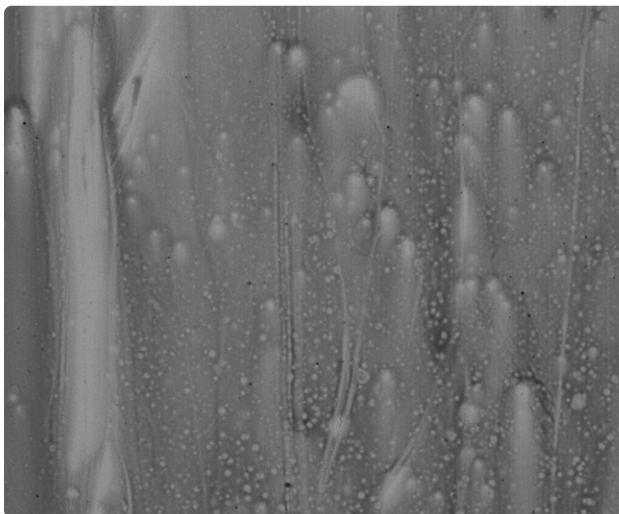
Insufficiently stabilized ED bath leads to:

- Poor leveling
- Rough surface



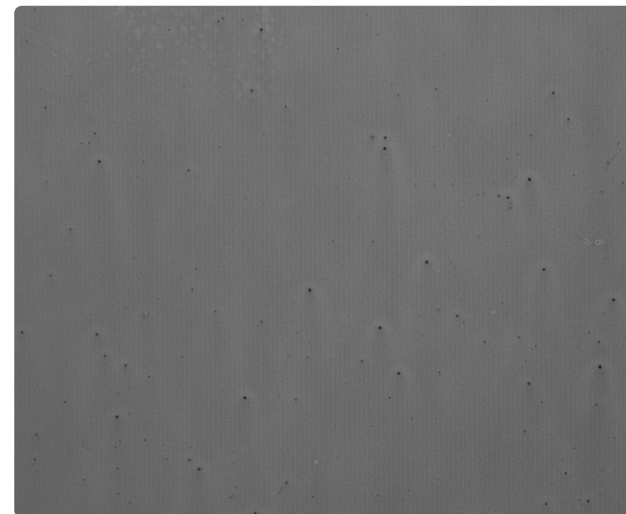
Incompatibility leads to:

- Poor leveling
- Surface defects



Stabilized ED bath leads to:

- Good leveling
- Smooth surface



Improvement of anti-cratering properties

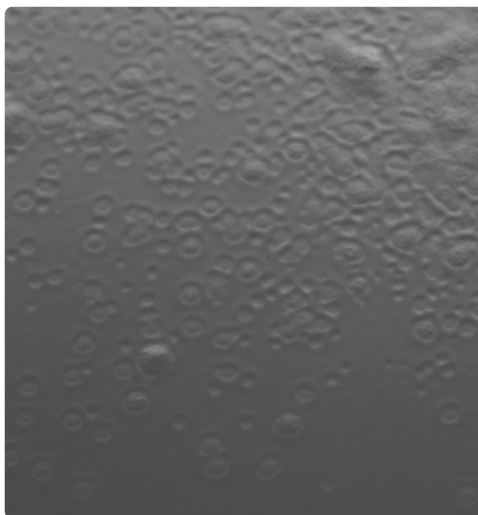
In the industrial and automotive sectors, standard ED baths can be more than three hundred cubic meters in volume. Contamination of the ED bath can cause surface defects such as cratering, which is a major problem because this not only affects the appearance but also has a negative impact on corrosion protection. Anti-cratering additives can help minimize defects like these and reduce the ongoing quality costs associated with them.

As well as by contamination of the ED bath, cratering can also be caused by insufficient cleaning of the substrate or even by the influence of oil vapors from the air in the baking zone. These defects can likewise be prevented by using suitable additives.

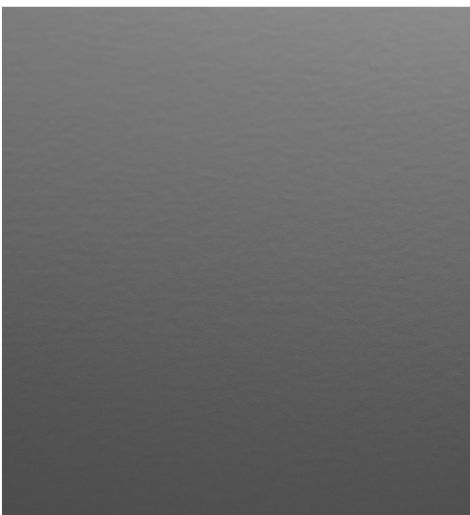
The “toothbrush test” or “aluminum cup test” can be used to simulate the contamination described above and develop suitable additive solutions.

Toothbrush test

Without additive

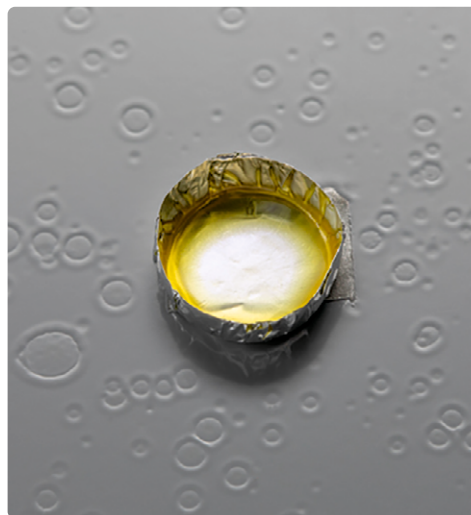


With anti-cratering additive

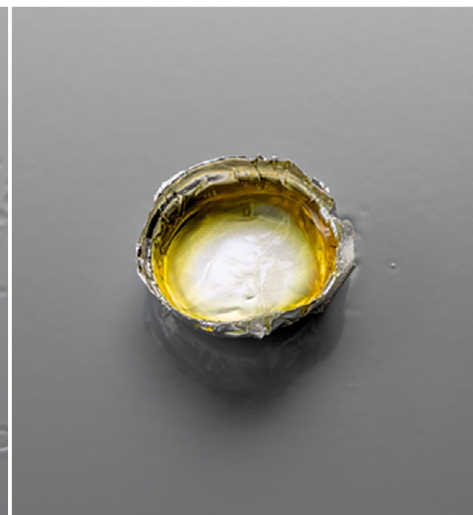


Aluminum cup test

Without additive



With anti-cratering additive

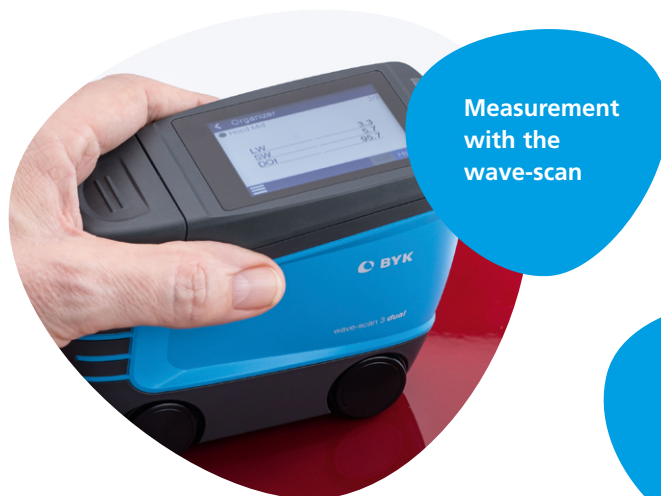


Leveling optimization

Good leveling is not only important for the visual appearance of the ED coating; it also lays the foundation for all the subsequent coating layers.

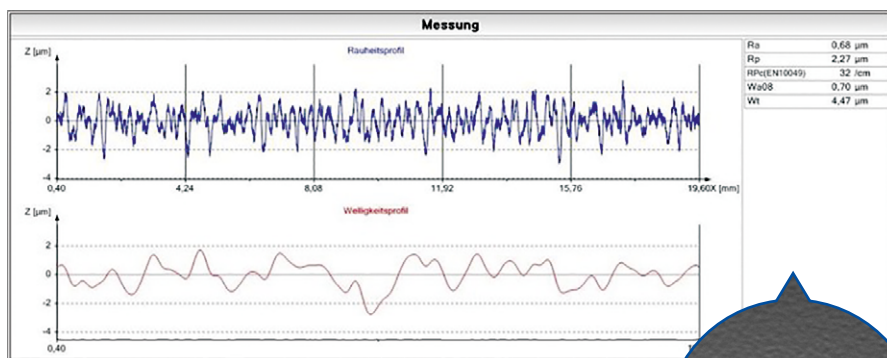
The wave-scan measuring device from BYK-Gardner enables the waviness of the deposited coating to be checked, which makes it possible to judge the effectiveness of an additive.

In addition to the wave-scan, the Hommel tester can be used to analyze the leveling and roughness, thus allowing the right additive for the respective system to be selected.



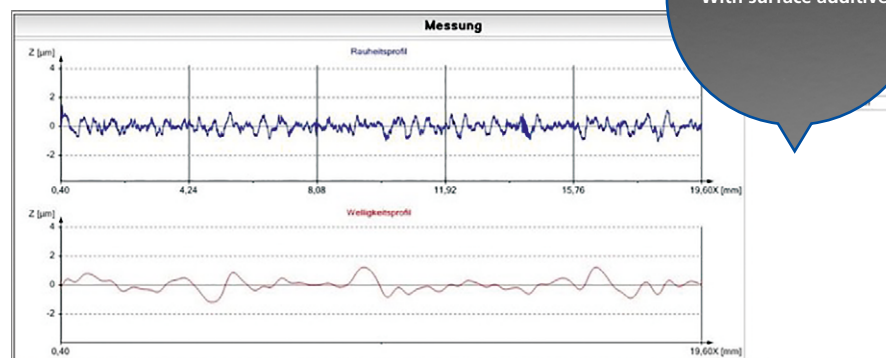
Using a surface additive to improve roughness

Without additive: poor leveling



Without additive

With surface additive: good leveling



With surface additive

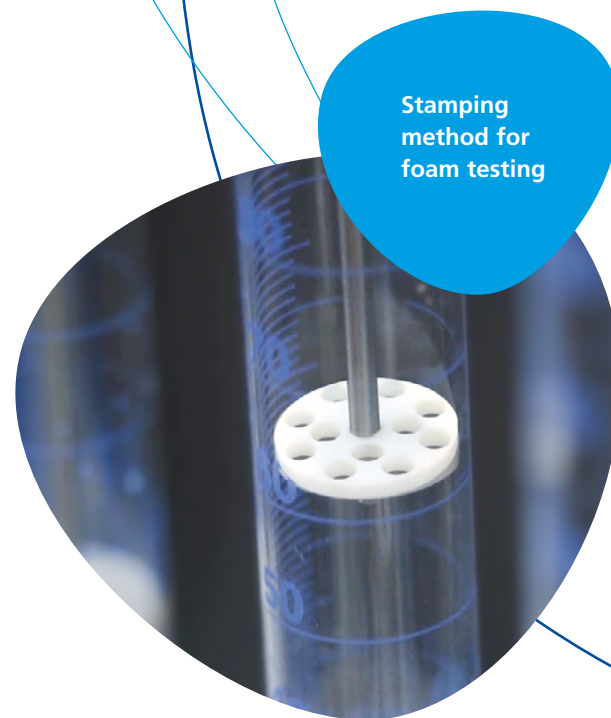
Defoaming

An ED formulation consists of approximately 80 % water. The other components can have a foam-stabilizing effect similar to surfactants. This can not only cause problems in the process sequence, but can also have a highly detrimental effect on the quality of the coating and a negative impact on its anti-corrosive properties, for example. It is therefore important to avoid foam formation and stabilization in the

ED bath in an effective and lasting manner. In this regard, BYK defoamers play a significant role in ensuring that the process is controlled and that the coatings are high quality.

The effectiveness of the additives can be tested using the stamping method, which assesses the formation and stability of the foam.

Effect of different defoamers in the ultrafiltrate



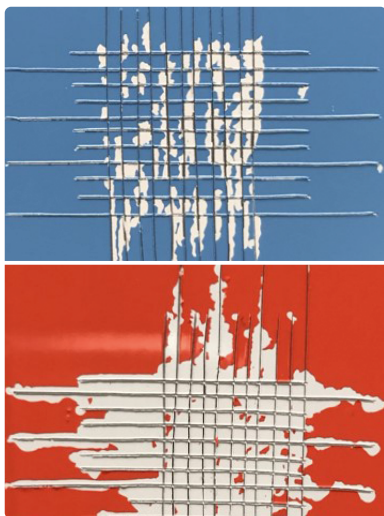
Stamping
method for
foam testing

Improvement of adhesion and recoatability

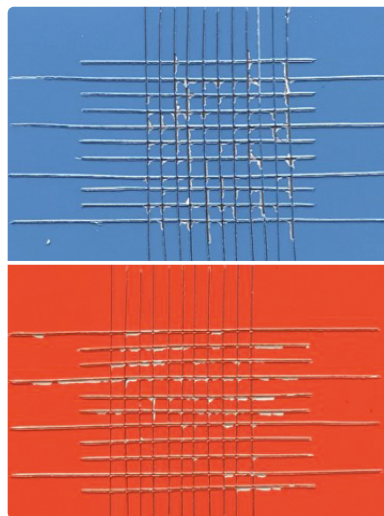
Good adhesion to the subsequent layer is essential for any coating and therefore plays a key role. Adding special additives can, for example, increase the surface energy of the coating layer and thereby improve the subsequent adhesion. This makes it possible to achieve improved stone chip protection in the automotive sector or a more robust surface coating in the industrial sector.

Using an adhesion promoter to improve adhesion

Without additive



With additive



About BYK

BYK additives offer a wide range of applications for ED coatings. They improve product properties, optimize production processes, and therefore ensure perfect applications and the best possible property profiles in the end use. BYK is your technology partner for improving specific properties of ED coatings in the automotive industry and industrial sector.

If you have any questions or require technical support, please do not hesitate to contact our global ED coating team at ecoat.byk@altana.com. Suggested additives for the ED sector can be found at: www.byk.com/en/markets/automotive-oem-coatings

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This issue replaces all previous versions.

