BYK
Additives & Instruments

Substance for Success.

Technical Information L-AI 1

# Adhesion Promoters

Better Coating Adhesion through Additives

A member of ALTANA

# Adhesion Promoters
# Better Coating Adhesion through Additives

## Adhesion of coatings

In order to protect the substrate properly, in addition to creating a pleasing optical appearance, coatings must adhere to the substrate strongly and permanently. Adhesion comes from the interactive forces between the molecules of the paint film and the substrate and depends strongly on the chemical nature of the involved materials. Mechanical anchoring and diffusion processes at the interface (depending on the substrate) can also contribute to adhesion. In all cases, the focus is on the interface between the coating and the substrate.

## Possible ways to increase adhesion

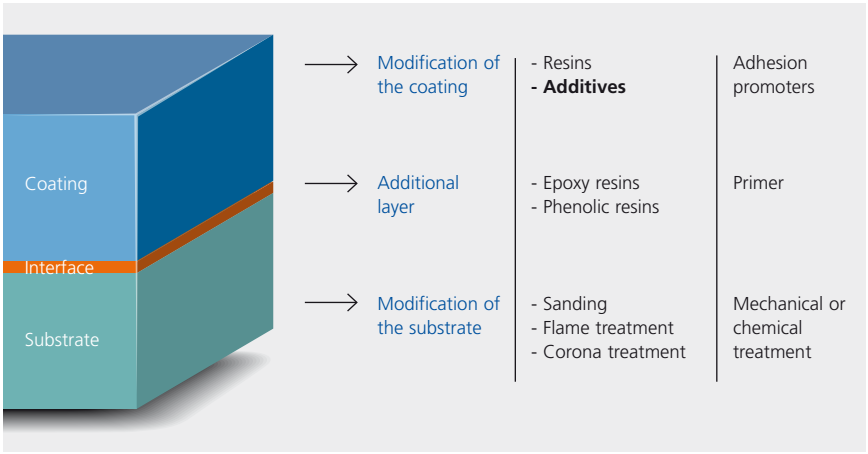



figure 1

## Schematic mechanism of adhesion promoters

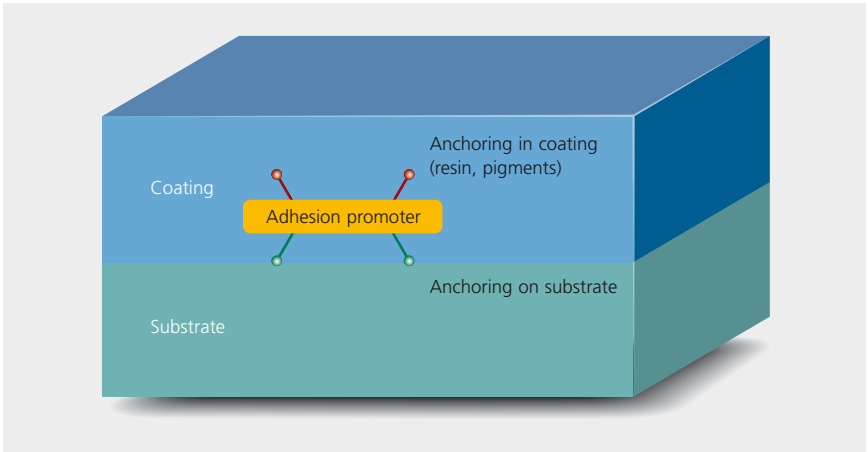



figure 2

## Possibilities for adhesion improvement

All measures to improve adhesion are aimed at this interface and basically there are three options (figure 1):

1. Modify the surface of the substrate (sanding, flame/corona treatment, …).
2. Additional layer ("adhesion primer") between coating and substrate.
3. Modify the coating by adding special adhesion resins or additives.

BYK offers additives that are incorporated into the liquid paint and that act as adhesion promoters. This is the approach described under (3) in the above list. In the development of adhesion promoters, we relied on many years of experience with interfacial phenomena and our knowledge of anchoring groups in connection with pigment stabilization.

## Adhesion promoters

Adhesion promoters are a part of the coating film and they must contain groups that can interact strongly with the substrate, and other groups that integrate the additive in the coating film (via interactions with the resin, pigments, extenders). They should only improve adhesion and not interfere with other film properties.

"Universal" adhesion promoters that give excellent results in all kind of coatings do not exist, because the anchoring groups always must be adapted to the coating system and the substrate in question. Optimum adhesion can only be achieved if the substrate is clean, free from grease, and wetted properly. If necessary, substrate wetting can be improved by using appropriate additives (e.g., polysiloxanes).

## Adhesion promoters from BYK

BYK introduces two new adhesion promoters: BYK-4500 for improved adhesion of aqueous architectural coatings onto aged paint surfaces and BYK-4510 for solvent-borne and water-borne industrial baking systems that are directly applied onto metal.

### BYK-4500

In redecoration situations, it is quite common for a new layer of paint to be applied over aged paint surfaces. BYK-4500 is designed for aqueous architectural coatings and will enhance their adhesion under such circumstances. The additive acts via modified pigment affinic groups that attach themselves to the pigments/extenders of the aged paint surface as well as those of the newly applied coating (figure 3). Excellent adhesion results from this mechanism (figure 4). BYK-4500 is based on a new technology (patent pending).

### BYK-4510

BYK-4510 was developed for coatings that are applied directly onto metal substrates. It is recommended for solvent-borne baking systems (industrial and coil coatings) and can also be used in water reducible systems after neutralization. Polar groups in the molecule create strong interactions with the metal surface and the additive also shows high affinity towards many different binder systems (figure 5). Excellent adhesion on various metallic substrates can thus be achieved (figure 6).

## Mechanism of BYK-4500

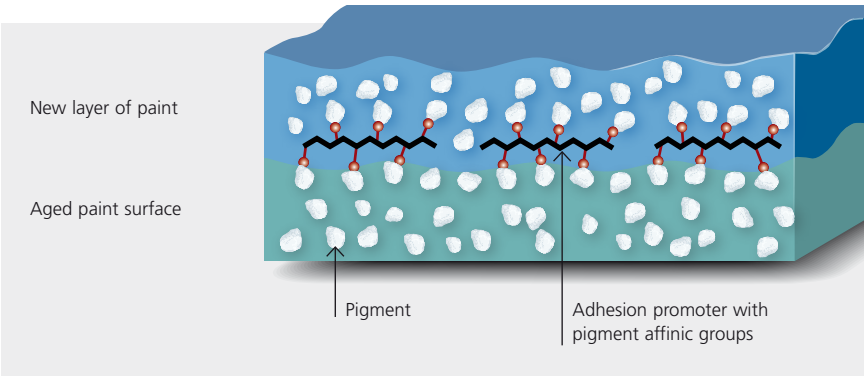



figure 3

## Wet adhesion on aged alkyd paint


Grey: aged alkyd paint White: new paint layer
Adhesion test after 3 hours loading with wet towel

figure 4

## Mechanism of BYK-4510

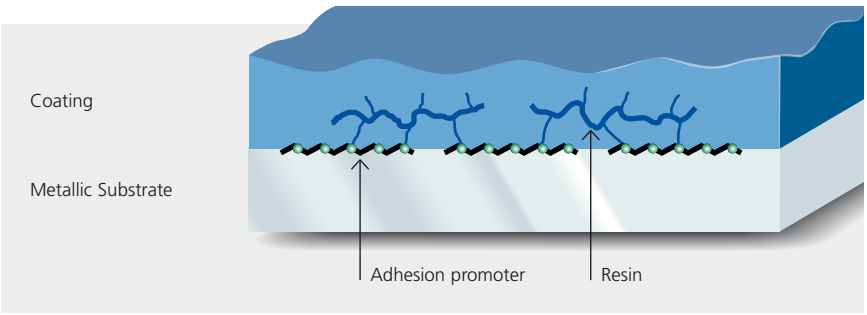
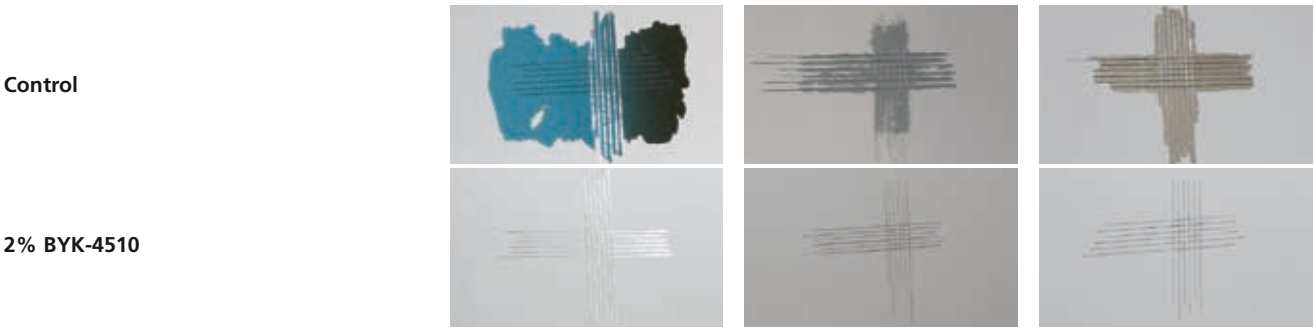



figure 5

## Improved adhesion with BYK-4510




Cross hatch adhesion test with adhesive tape

figure 6

# Products and Applications

## BYK Additives

Additives are used during the production of coatings, printing inks and plastics to optimize the production process and to improve the quality of the final product.

**Product Range Additives**
- Additives to improve surface slip, leveling and substrate wetting
- Adhesion Promoters
- Defoamers and air release agents
- Foam stabilizers
- Processing additives
- Rheological additives
- UV-absorbers
- Viscosity depressants
- Waxes
- Wetting and dispersing additives for pigments and extenders

**Application Areas**
- Ambient curing resins (FRP)
- Architectural coatings
- Automotive OEM
- Automotive refinishes
- Can coatings
- Coil coatings
- Color masterbatches
- Industrial coatings
- Leather coatings
- Marine paints
- Molding compounds
- Paper coatings
- Pigment concentrates
- Polyurethane foams
- Powder coatings
- Printing inks
- Protective coatings
- PVC plastisols
- Thermoplastics
- Wood and furniture coatings

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