Environmentally friendly pre-treatment with QUALICOAT authorisation

Chromium-free Passivation before Varnishing

The furniture component supplier Kesseböhmer has changed the iron phosphating process over to a more economical and more environmentally friendly passivation variant and hence permanently optimised the pre-treatment process. The result is improved paint adhesion, a smaller quantity of sludge accumulating and a working temperature corresponding to the ambient temperature.

For some years now, the company KIESOW DR. BRINKMANN has, with its passivating agent SURFASEAL 440, been showing in various applications and sectors of industrial varnishing how aluminium, steel and zinc surfaces can be passivated chromium and phosphate-free before varnishing. The passivation specially conceived for aluminium, steel and zinc surfaces is free of chromium, nickel, cobalt, molybdenum and phosphates and can be used both in spraying and in dipping processes.

In the application improved adhesion of the paint as compared with the iron phosphate coatings, a process bath with little sludge, a short exposure time (1 minute) as well as simple and environmentally friendly disposal. Moreover, low working temperatures (20 to 40°C) are possible. The process bath and the coatings produced are analysable.

The conversion coatings produced in this way have a layer thickness of 30 to 100 nm, providing the later varnishes with an excellent primer for adhesion. The passivation SURFASEAL 440 is applied at a pH value of 4.8 to 5.2 and a concentration of 5 to 20 ml/l. In this process yellowish to bluish/lilac iridescent coatings are formed on the steel.

Evidence in the drop test

On aluminium and zinc, on the other hand, transparent coatings are formed. The quality of the passivation coating can be tested on steel, aluminium and galvanised material by means of a drop test. For this a solution of orange-coloured reagent with 0.1% caustic soda is prepared as far as the change to blue. This test solution is then spread over/dropped onto the treated surface by means of a pipette. If there is a coating the solution takes on a yellow colouring within 19 to 60 seconds.

Chromium-free passivated swivelling extraction element for kitchen furniture

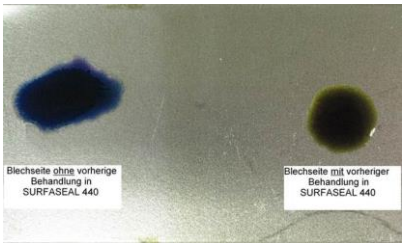

Plate side without pre-treatment

Plate side with pre-treatment

The blue ink reacts in the drop test only with the chromium-free passivated coating, taking on a yellow colouring.

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In order to be able to determine the quantity of coatings our own analytical method was developed. An aluminium test plate is immersed, after treatment, in a stripping cuvette in order to remove the coating for subsequent analysis.

In order to be able to also determine the quantity of coating on the aluminium an analytical method was developed in which an aluminium test plate is immersed, after treatment, in a stripping cuvette in order to remove the coating.

Then this solution is subsequently treated with reagents and measured photometrically. In the process bath the concentration can also be determined very easily with the help of a photometer at a wavelength of 500 nm. This guarantees optimum monitoring of the process.

Adequate coating with chromium-free pre-passivation requires pre-treatment with at least five zones in conformity with the following treatment workflow:

- Zone 1: alkaline degreasing
- Zone 2: washing
- Zone 3: washing with fully demineralised water
- Zone 4: passivating agent SURFASEAL 440
- Zone 5: washing with fully demineralised water

Drying at 100 to 150 °C.

The pre-treatment plant at Kesseböhmer

Pull-out frame from the furniture sub-contractor Kesseböhmer as an example of an application of chromium-free passivation

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Change over to environmentally friendly pre-treatment

Since passivation ensures optimum adhesion of coatings both on aluminium surfaces and on steel as well as on zinc, it is used in many industrial coating sectors.

Thus passivation on galvanised steel material is used by, among others, sub-contractors in the automotive sector. For the passivation of steel and aluminium SURFASEAL is used in various contract coating firms and internal coating departments, such as at Kesseböhmer in Bad Essen, a company in the metalworking sector active at the international level. Kesseböhmer is a supplier to the furniture sector in the areas of furniture fitting systems, shop fitting / goods presentation, office furniture and automotive industry.

With more than 2200 employees at five locations in Germany, the family-owned company founded in 1954 generated sales of approximately 395 million euros in 2013. At its registered office in Bad Essen (approximately 1000 employees), Kesseböhmer has, in addition to one of the biggest and most powerful electroplating plants in the world for the chromium plating of steel and non-ferrous metals, also a plant for powder coating in which passivation has been successfully used for some years now.

Optimisation of the pre-treatment process

Guido Kipsieker, Head of Powder Coating at Kesseböhmer, is satisfied with the results, "Kesseböhmer stands for design, quality and surprisingly different solutions. For this reason more than two years ago we changed the iron phosphating process over to the passivation product SURFASEAL 440 which is much more economical and environmentally friendly and hence optimised the pre-treatment process at that time. The better paint adhesion, the reduced quantity of sludge and a working temperature that corresponds to the ambient temperature quickly convinced us."

Since 2013 SURFASEAL 440 has additionally obtained the provisional QUALICOAT certification and has been included in the list of authorised alternative pre-treatment processes (No. A-094) for the area of powder coatings of aluminium surfaces in front construction.

Further information:
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