In the program: Zinc flake coatings

Fasteners with zinc flake coatings conforming to ISO 10683 with a resistance of 480 h in the salt spray test according to ISO 9227 and an adjusted overall coefficient of friction of μ = 0.09 - 0.14 (VDA friction window) are available in the Reyher warehouse program:

Hexagonal screws	Cap screws	Hexagon nuts	Washers
ISO 4014 8.8	ISO 4762 8.8	DIN 439 04	ISO 7090 (200 HV)
ISO 4014 10.9	ISO 4762 10.9	DIN 934	
ISO 4017 8.8		DIN 936 17H	
ISO 4017 10.9		ISO 4032 8	
		ISO 4032 10	
		DIN 980 8	
		DIN 980 10	

Corrosion

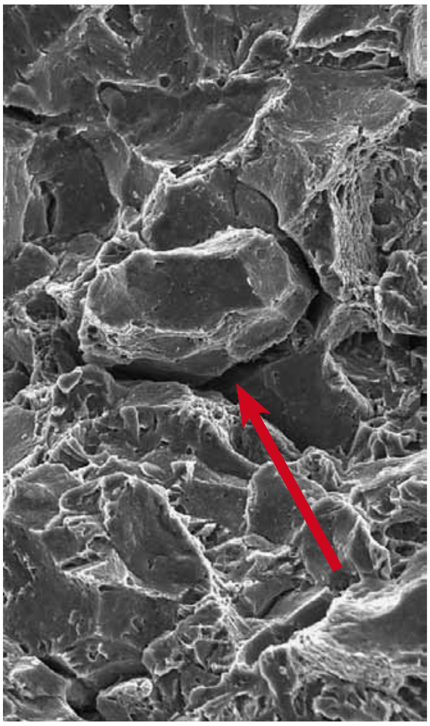
Corrosion occurs and appears in various forms and is unfortunately unavoidable. The resultant reaction of a metallic material with its environment leads to a measurable change in the material and can lead to impaired function of the metal component or an entire system.

Corroded nuts

One solution to satisfy the increasing quality demands and increasing demands for corrosion resistance are zinc flake coatings according to ISO 10683. These were developed to achieve high corrosion protection and counteract the weaknesses of electrolytic (galvanic) applied coatings to the greatest extent possible. Thus, in galvanic coatings on high tensile/hardened parts with tensile strengths from about 1000 N/mm² (for a core or surface hardness over 320 HV) and spring hard parts with hardness over 390 HV, the risk of hydrogen induced stress corrosion cracking (also called hydrogen embrittlement) cannot be excluded. This can be reduced by post-treatments such as tempering, but cannot be completely eliminated (see also ISO 4042).

By hydrogen-induced stress corrosion cracking, stored hydrogen atoms cause harm to the cohesion of grain boundaries in the metal lattice. Such damage to the grain boundaries, in particular under tensile stress, has a crack propagation result which can lead to the failure of the part. Only by examination through a scanning electron microscope can the cracks at the grain boundaries be made visible. Hydrogen is introduced through the electroplating process as well as by pre-treatment (pickling) in the metal.

In contrast, for zinc flake coatings the pretreatment can take the form of glass beads or sand blasting so that in this process no atomic hydrogen is stored in the metal lattice. Following this, often a thin, fine-crystalline phosphate layer is applied as a backing layer and adhesive. The coating, which consists of a mixture of zinc and aluminum flakes in an organic vehicle is converted, after application by dip-spin or spray by a firing process, into an inorganic matrix.



Cracks at grain boundaries

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Applications
The automotive industry has been using this coating since the 1970s. Here, corrosion-resistant coatings that can be used at elevated temperatures were demanded early on. These also had to offer good chemical resistance, be environmentally friendly and have good friction properties. Meanwhile, this coating system is being used in various fields such as wind turbines, in the construction industry or in machine and plant construction.

Standards
In addition to a variety of manufacturers terms and brand names such as Delta Tone, Delta Protekt, Dacromet, Geomet, Magni Flake and others, the normative foundations were created to meet the needs of zinc flake coatings with DIN EN ISO 10683. The norm distinguishes between chromium(VI)-containing (flZnyc) and chromium(VI)-free (flZnnc) coatings. Due to a number of European directives (Life Vehicle Directive ELV, Electric Act, etc.), in which, among other things, hexavalent chromium is prohibited in certain areas of implementation, chromium(VI)-free systems are almost exclusively to be found in the market. Otherwise, no carcinogenic, mutagenic or organ-damaging agents are present in these coatings.

Coating method
The coating itself is performed in one or more passes. Bulk-capable small parts are processed in coating centrifuges in the so-called dip-spin process. After wetting, the parts are placed in a centrifuge with predetermined values and excess coating material is removed. Spinning speed, spinning time and the viscosity of the coating material are crucial for the layer thickness to be achieved. In order to coat even the most complicated parts or adding drive systems (internal drive) different centrifuges are available.

Parts which are not bulk-capable are coated in a frame by means of a spray process. The spray process coating is similar to paint applied by a spray gun – this can be done manually or in a fully automated spray system. After coating, the coating is baked in an oven between 200° C and 300° C, wherein the coating becomes cross linked and an adhesive solid, dry surface is obtained and then cooled.

This base layer, also called the basecoat, is a thermo-active system densely packed with zinc and aluminum flakes in an inorganic carrier layer. These produce a silver-metallic color coating that displays high anti-corrosion properties and guarantees cathodic protection over the entire layer.

In a second coating process, an organic layer can be applied, which acts as a sealer/additional coating and is often referred to as the topcoat. Through burning, a thin, nonporous and chemical-resistant coating is created. With this topcoat further properties such as friction and color can be influenced.

Resistance in the salt spray test according to ISO 9227– compared to electrodeposited zinc layers – is higher by at least a factor of 10. If parts with 8 micron galvanic zinc coating and transparent chromating withstand about 48 h in the salt spray test, then the zinc flake coatings in the Reyher stock have already withstood at least 480 h.

In addition, the parts display a temperature resistance between 150-180° C, so that this coating can be used, for example, in encapsulated engine compartments.

Your benefits

- increased corrosion resistance
- no risk of hydrogen embrittlement
- chromium(VI)-free
- adjusted coefficient of friction
- immediately available from stock

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