DÖRKEN

Dörken - overview

- A family-run business since 1892
- Part of the global Dörken-Group
- Dörken MKS-Systeme began operations in 1980
- Production of micro-layer corrosion protection systems under the brand name DELTA-MKS® - Made in Germany
- Market leader in zinc lamella system technology
- DELTA-MKS® systems are specified and available worldwide
- Global player: represented on 5 continents
- Broad product portfolio for extremely varied applications, such as on screws, springs and clips
- Sustainable, environmentally friendly products: Cr(VI)-free systems used from the beginning

Dörken – approvals

To deliver the Dörken finish to the OEMs it is necessary to be listed in their specifications. This can be a concrete naming of a DELTA-MKS® system in the specification or the products can meet the requirements of a so-called performance specification. Another reason to use the DELTA-MKS® products can be a draw approval for a specific part.

You can find the whole approval list on our website.
http://www.doerken-mks.de/en/products-systems/specifications.html

Our products are approved at OEMs like:

TOYOTA, GM, NISSAN, BMW, JAGUAR, PSA PEUGEOT CITROËN, Mercedes-Benz, VDA, OPEL, Messier-Bugatti, CHRYSLER, LAND ROVER, TATA, Ford, VOLVO, CAT, FIAT, MAN, JOHN DEERE, IVECO, RENAULT, LADA, SCANIA, HYUNDAI, Yale, PORSCHE, BOSCH, DELPHI, Autoliv, KENERSYS, Vestas, ZF, acciona, GE, KNORR-BREMSE, SONY, ENERCON, Continental, ROTAX, SIEMENS, Fuhrländer, SUZLON, IBM, brembo, WABCO, Gamesa, LIEBHERR, ISUZU, TRW Automotive

Zinc lamella technology – coating system

The product portfolio of the company includes both zinc lamella basecoats and organic and inorganic topcoats. As a rule, protective coatings are applied in coat thicknesses of between 6 and 25 µm, enabling very high corrosion durability in salt spray tests.

From the very beginning these products have been free from known carcinogenic substances such as chrome (VI). They thereby fulfil the requirements of the EU Directive on End-of-Life Vehicles, which has forbidden the use of heavy metals in vehicle construction since 2007.

Worldwide, there are various components such as fastening elements, pressed parts, clamps, springs, side-impact protection units, and brake discs that are coated by licensees using MKS systems.

TOP 100 2008 top innovator

TOP 100 2010 top innovator

TOP 100 2012 top innovator

Coatings available from WEP Ltd
Wood Lane, Fordhouses, Wolverhampton WV10 8HN
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enquiries@anochrome-group.co.uk
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Zinc lamella technology – coating system

- Generally speaking, the coating systems comprise a basecoat and an organic or inorganic topcoat. Both basecoat and topcoat are annealing systems, chemically combined at temperatures of below 250°C
- The DELTA®-TONE 9000 and DELTA-PROTEKT® KL100 zinc lamella systems are largely inorganic, micro-layer-forming basecoats, on the basis of zinc and aluminium flakes. The metallic nature of these enables cathodic corrosion protection. The scale-like arrangement of the flake layers creates a barrier effect that significantly retards the onslaught of corrosive media (moisture and oxygen).
- A subsequent organic topcoat with DELTA®-SEAL or the silicate, water-based products of the DELTA-PROTEKT® VH300 range serve to further increase corrosion protection considerably. In contrast to the basecoat, the topcoat is not electrically conductive. Corrosion protection can be further enhanced with the aid of the topcoat. Depending on the choice of topcoat, further requirements regarding colour, temperature resistance, chemical resistance, defined glide and friction characteristics and resistance to loosening under temperature can also be fulfilled.

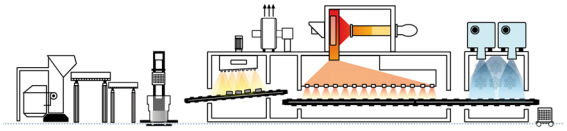
Zinc lamella technology – features of DELTA-MKS® systems

- High-performance corrosion protection in thin layers
- Adaptation of friction coefficient to specific OEM needs
- Colouring
- Chemical resistance
- Temperature resistance
- Resistance to loosening under temperature
- Multi-assembling
- Assembling against steel, KTL and aluminum
- Resistance to stone chipping

Zinc lamella technology – coating technology

The selection of coating technique depends on the respective component. Zinc lamella coating is applied using the standard application procedures of coating technology, followed by annealing in a furnace after each coating stage. The risk of application-related hydrogen embrittlement of high-strength components does not exist, as no hydrogen is present in the coating process. The focus is upon dip-spin applications for small mass-produced parts and the spraying method for larger components.
Free-flowing components are dipped in the coating medium in baskets and then spun to remove excess material. This process takes place in enclosed coating facilities. The necessary coating parameters such as dipping time, spinning time and tilt angle of the unit are controlled with the aid of computers.
Coating and annealing typically occur several times in order to achieve adequate coverage of the material. Heavy, non-pourable parts can be coated using either the spin-coating procedure or via spraying. The spraying procedure involves both hand spraying and automated robot technology.

You can find the coating lines on our website.
www.doerken-mks.de/coatinglines



Zinc lamella technology – coating system

Basecoats

DELTA®-TONE: Zinc flake system with cathodic protective effect; in industrial production use for over 25 years
DELTA-PROTEKT® KL 100: Zinc flake system with cathodic protective effect and enhanced corrosion protection; the standard system for fasteners
DELTA-PROTEKT® KL 101: Zinc flake system with cathodic protective effect, optimised white rust resistance and improved adhesion and resistance to wear
DELTA-PROTEKT® KL 105: Efficient zinc flake system with integrated lubricant
DELTA-PROTEKT® KH 250: Air-drying VOC-free basecoat for coating brake components

Topcoats

DELTA®-SEAL range: Organic topcoat, with integrated lubricant possible, colour configuration and very good chemical resistance
DELTA-PROTEKT® VH 3xx range: Water-based; extremely thin layers possible: 1-3µm; OEM-specific adjustment of friction coefficient possible
DELTA-PROTEKT® VH 35x/36x range: Water-based seal for galvanic sub-surfaces; increased corrosion protection; OEM-specific friction coefficient possible
DELTACOLL® range: Seal, with solvent content, for galvanic sub-surfaces; increased corrosion protection; OEM-specific friction coefficient possible
DELTA-PROTEKT® EK 800 range: KTL application with solvent content; extremely thin layers for very small parts

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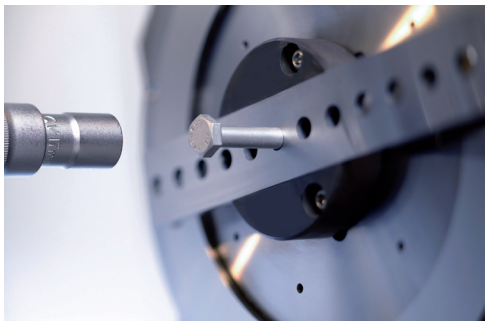
Fastener – coating requirements

A fastener is a hardware device that mechanically joins or affixes two or more objects together.
The zinc lamella technology is mainly used on fasteners which are manufactured with high-strength steel.
Beside the high corrosion protection the fasteners require further features like:

- Easy assembling
- Multi-assembling
- Colour
- Temperature resistance
- Assembling against steel, KTL and aluminum



Fastener – Overview
DELTA-MKS® systems – coefficient of friction

Fastener – assembling factor

Due to its versatility, zinc lamella systems can fulfil most requirements of fastener elements. In the foreground high corrosion protection requirements and defined friction factors with low spreads are requested here. Maintaining the friction factor and minimizing the friction factor spread on a bolt connection are indispensable in automated assembly in the field of automobile construction.

However this factor is also important in wind turbine assembly, where corrosion protection requirements are joined by the need for optimal connectability of the fastening elements on the construction site.

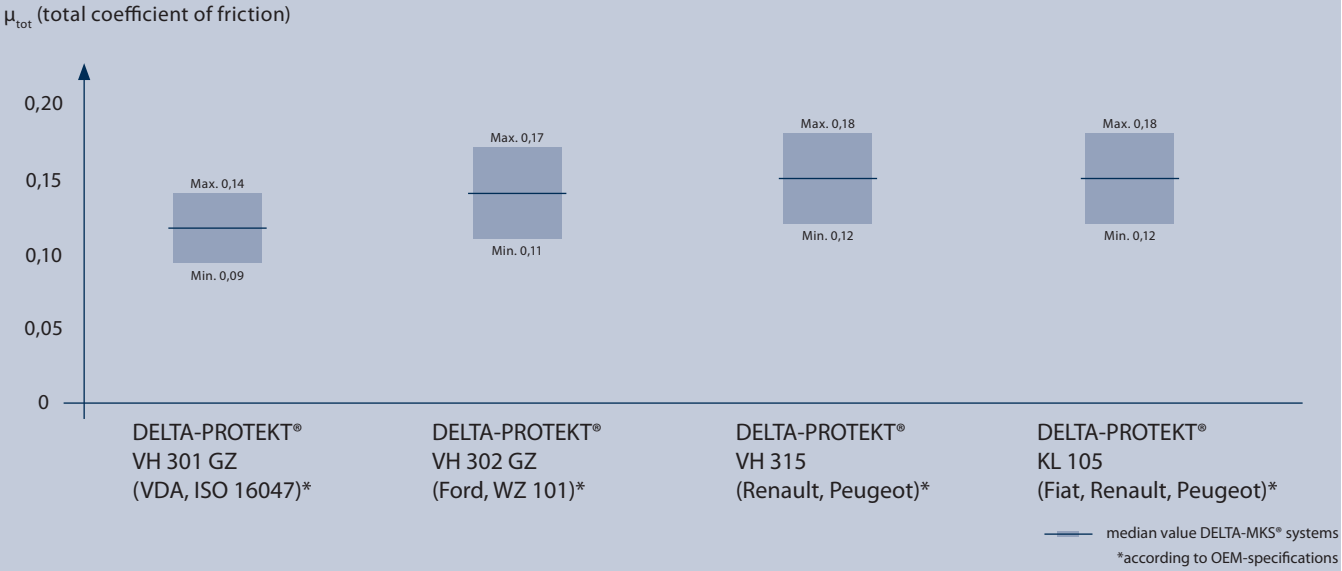
Torque is the control element in screwed assembly. A bolted connection is defined as secure when a specified pretension has been applied. The pretension of the bolted connection depends on the geometry, the strength class, the friction factors and, naturally, the tightening torque. Relating to bolt type and coating, up to 80 percent of the tightening torque is required to overcome the friction, with just 20 percent converted into pretension.

The friction factor therefore secures the correct ratio of tightening torque to pretension. Excessively high friction factors reduce pretension, if the friction factors are too low, pretension is increased - with the risk that the bolt may break as a result of the permissible tension in the bolt being exceeded or by becoming loose.

Fastener – stick-slip effect

- The stick-slip phenomenon, also known as stick-slip, is the spontaneous jerking motion that can occur while two objects are sliding over each other.
- Stick-slip is caused by the surfaces alternating between sticking to each other and sliding over each other, with a corresponding change in the force of friction.
- The stick-slip effect can be avoided by using the right Basecoat and Topcoat system.

Dispersion of the coefficient of friction*



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