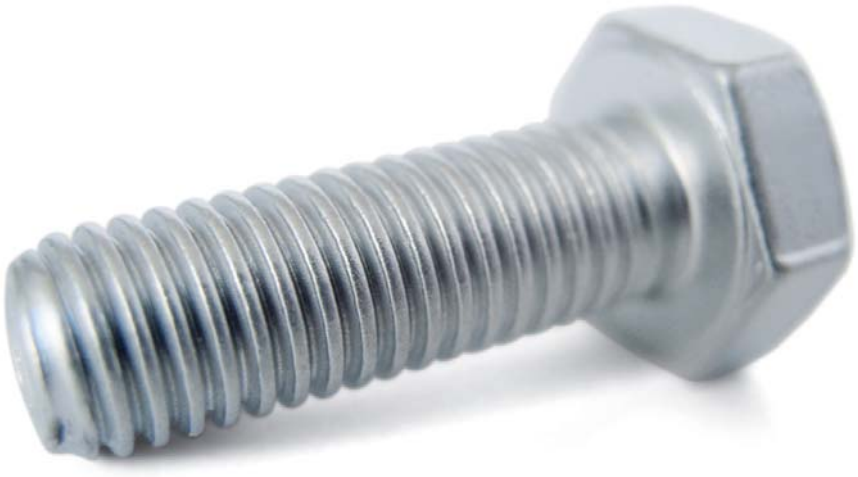
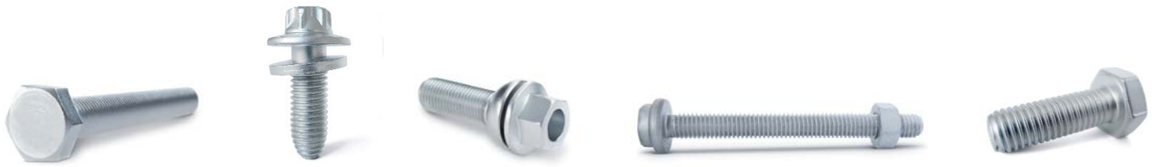


The best thing that can ever happen to a screw:

DELTA-MKS® basecoats and inorganic topcoats.



Just one thing we know even better than your screws:

Your requirements.

Apart from the obvious areas of application, there is a further analogy between screws and our solutions. Just as screws connect and bind objects, we connect our know-how and tie it in with your requirements. Because we see ourselves as a solutions provider, we have consistently developed our micro-layer corrosion protection systems to meet our customers' requirements.

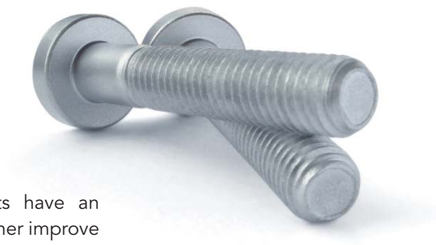
Dörken MKS-Systeme provides a product range that covers all tasks and areas concerned with modern micro-layer corrosion protection. Despite the low coating thickness, the demands placed on coatings today extend far beyond simple corrosion protection.

For over 25 years, we have been working with micro-layer corrosion protection systems that are free of hazardous chrome (VI). We avoid harmful heavy metals such as chrome, lead, molybdenum, nickel or cadmium with all of our products, so that they can be processed without hesitation. Apart from that, we have succeeded in repeatedly setting new standards in the market with our zinc flake systems, marketed under the brand name of DELTA-MKS®.

But your final decision about the suitable DELTA-MKS® system to use is by no means the end of our task – it is where our job begins. Over the following pages, we'll show you what we mean by that and explain how you can expect just that little bit more from us.

What is the most important property of a corrosion protection system?

Diversity.



DELTA-MKS® systems consist of a basecoat and a topcoat. This makes them just as resistant as they are diverse. In this way, the basecoat establishes the corrosion protection of the system and provides cathodic protection. Topcoats complement the properties of the basecoat, influence the chemical or mechanical resistance of the whole system and thus provide a wide area of application. It is the topcoat that sets the properties which are required for the specific application.

Although inorganic topcoats have an extremely thin layer, they further improve the active cathodic corrosion protection of the basecoat. Considering e.g. the gaugeability of screws, it quickly becomes clear that this is the optimal system for metric threaded parts.

What has a truck in common with a roadster?

DELTA-MKS® systems.

Our basecoats and topcoats are so finely attuned to each other that many automotive manufacturers rely on DELTA-MKS® systems. Only we offer a product range that covers inorganic and organic topcoats, providing an optimal one-stop solution for every task.

DELTA-MKS® systems generally have a coating thickness of between 1 and 18 µm and are predominantly used wherever high-performance corrosion protection is also to be used functionally.

Where it is a question of coating screws, a combination of DELTA-MKS® basecoats such as e.g. DELTA-PROTEKT® KL 100 with inorganic topcoats like e.g. DELTA-PROTEKT® VH 301 GZ provides the best solution.

As the most modern system on the market, these combinations optimally fulfil the ever more complex requirements placed upon screws. Here you can see why:

- extremely thin coatings are particularly suited to metric threaded parts
- extremely heat-resistant inorganic topcoats do not fail under heat load and assure the functionality of the screw at high temperatures
- maximum corrosion protection
- the coefficient of friction can be set to the customer requirements

There's something we improve as constantly as our coatings:

Business relationships.

For us, continuity is the key element of a business relationship. It is only in this way that we can provide the best solution in the long term. We work closely together with our partners to find the best system for every requirement. After that, we optimise the process until we have reached the highest level of production quality.

Because quality is absolutely essential with the demanding requirements placed on micro-layer corrosion protection systems, and is not just a question of the product, but also of the application. Thus a feature of our ongoing quality assurance includes close cooperation with our partners and certified coaters.

Our customers can rely upon our quality and safety standards at all times and are not at risk, even in the case of highly safety-critical parts (e.g. in the automotive sector).

Where does “base“ come into it?

How zinc protects from corrosion.

The essential purpose of a basecoat is to protect the coated steel surface by means of the active decomposition of zinc. Because zinc is more of a base metal than steel, for example, the corrosion attacks the zinc first, thus protecting the more noble metal. The DELTA-MKS® basecoat consists of zinc flakes that are connected by an inorganic matrix. If the coating is damaged by a scratch, for instance, then it is not the steel that corrodes, but rather the zinc.
Unlike electroplating, it is in the nature of the zinc flake application that no hydrogen-induced cracking corrosion occurs (hydrogen embrittlement), which is particularly important in the case of screws and high-tensile steel.

Screws can never be too small.

Only ideas can.

Topcoats provide a range of functional properties, which improve the active cathodic corrosion protection of the basecoat. In this way, inorganic transparent topcoats are characterised by a particularly low coating thickness and are primarily used for screws within the range of M4 – M18.
It is especially with the thin topcoat layers of 1-3 µm that the high demands placed on screwability and the functionality of the screw as a connecting element can be fulfilled. In the case of the smaller and smallest screws, a homogeneous coat build-up and a low coating thickness are of great importance, as it is only possible in this way to still maintain the gaugeability. Any internal recesse fill can be prevented and a problem-free fit can then be assured. On top of that, the coefficients of friction are set specifically to automotive requirements.

SAFETY

1 micrometre of corrosion protection:

The DELTA-MKS® topcoats.

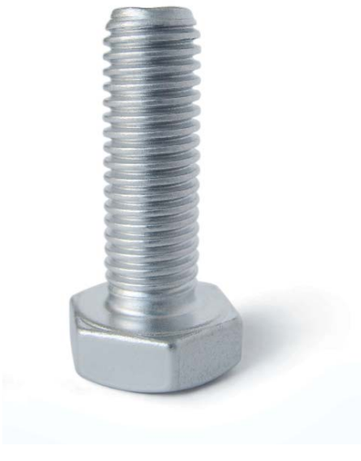
Particularly within the automotive sector, screws are subjected to the highest demands as safety-critical parts. Whether it is for use within the running gear, where chemical resistance is vital, application within the engine area, where extreme temperature resistance is required, right through to wheel bolts. It does not matter which dimensions, strength or geometry a screw has – because DELTA-MKS® topcoats ensure that your screws always have the optimal coating.

DELTA-MKS® systems can, by the way, be cured at particularly low temperatures in comparison with competitive products and are consequently optimal for screws rolled after heat treatment, as higher curing temperatures would preclude the additional benefits provided by these screws.

With DELTA-MKS® systems, the best results can be obtained with even the tiniest screws (M4 – M6). And the thin coats can provide even more: the lower material consumption reduces production costs.

You will find us everywhere where there are cars:

Around the world.



It is particularly because we see ourselves as a partner and solutions provider for our customers that not just the quality of our product is decisive, but also our worldwide service and support. We can advise you in all areas of application technology, support you in setting-up your plant and are always ready to provide answers. Indeed – this is no empty promise, because our product managers and employees are situated locally in all international markets.
Thus you can be sure that together we can achieve the ideal result – without any unnecessary loss of time or money.

SERVICE

The DELTA-MKS® System Summary.

DELTA-MKS® basecoat + inorganic topcoat
The optimal system for screws within the range of M4 – M18. Depending upon the build-up of coats, geometry and type of application, a corrosion resistance endurance life (SST) of over 1,000 hours can be reached.

System	Properties		
Basecoat + Topcoat	Coefficient of friction* in μ_{tot}	Systems specified for (extract)	Remarks
DELTA-PROTEKT® KL 100 + DELTA-PROTEKT® VH 3xx	DELTA-PROTEKT® VH 300 (without defined coefficient of friction setting)	Bosch Continental Teves DaimlerChrysler GM VW	High-performance system Extremely thin layers of topcoat as low as 1–3 µm are possible
	0,09 – 0,14 DELTA-PROTEKT® VH 301 GZ	BMW Bosch Continental Teves DaimlerChrysler Deutz Fiat MAN Porsche VDA VW	High-performance system with specific automotive coefficient of friction adaptation
	0,10 – 0,18 DELTA-PROTEKT® VH 302 GZ	Ford/GM/Volvo	
	0,12 – 0,18 DELTA-PROTEKT® VH 315	PSA/Renault RVI/Volvo Truck	
DELTA-PROTEKT® KL 105	0,10 – 0,18	Fiat/Iveco Renault (in preparation)	Basecoat with integrated lubricant, no necessity for additional topcoat, particularly cost-effective, awarded the German Material Efficiency Award 2006
DELTA-PROTEKT® KL 108	~ 0,30	Toyota (in preparation)	Basecoat with integrated lubricant, specific adaptation for the Asian automotive market

* Depending upon the respective customer norms

Electroplated base + DELTA-MKS® topcoat
Multifunctional topcoats for diverse applications on electroplated bases. Depending upon the build-up of coats, geometry and type of application, a corrosion resistance endurance life (SST) of over 720 hours can be reached.

System		Properties		
Basecoat + Topcoat		Coefficient of friction* in μ_{tot}	Systems specified for (extract)	Remarks
Electroplated zinc or zinc alloy	+ DELTA-PROTEKT® VH 35x-series	Specific automotive adaptations	BMW DaimlerChrysler Ford TRW Volvo VW	Aqueous sealants, curing system
	+ DELTA-PROTEKT® VH 36x-series	Specific automotive adaptations	TRW	Aqueous sealants, inline product, force dryable
	+ DELTACOLL®	DELTACOLL® 80 black (without defined coefficient of friction setting)	BMW GM VW	Solvent-based topcoat, curing system
		0,09 – 0,14 DELTACOLL® 80 GZ black	BMW GM VDA VW	
		DELTACOLL® 80 uncoloured (without defined coefficient of friction setting)	BMW GM TRW VW ZF	
		0,09 – 0,14 DELTACOLL® 80 GZ uncoloured	BMW Bosch DaimlerChrysler GM TRW VDA VW ZF	
	+ DELTA-PROTEKT® EK-800-series	0,09 – 0,14 DELTA-PROTEKT® EK 800/801	VW	Suitable for the EC-Automat 2000+, the innovative coating process for complex workpieces and smallest components
	+ DELTA®-SEAL series	0,09 – 0,14 DELTA®-SEAL GZ		Varying colour adaptations possible

* Depending upon the respective customer norms

DELTA-MKS® basecoat + organic topcoat
The versatile system for springs, clips, clamps and bolts. Depending upon the build-up of coats, geometry and type of application, a corrosion resistance endurance life (SST) of over 1,000 hours can be reached.

System	Properties		
Basecoat + Topcoat	Coefficient of friction* in μ_{tot}	Systems specified for (extract)	Remarks
DELTA®-TONE 9000 + DELTA®-SEAL	DELTA®-SEAL (without defined coefficient of friction setting)	Bosch Continental Teves DaimlerChrysler Enron Fiat Ford GM Kamax Knorr-Bremse MAN Porsche Renault Truck Suzlon TRW VDA Vestas Volvo VW ZF	Highly cross-linked organic topcoat: - varying colour adaptations possible - excellent chemical resistance - particularly suitable for multiple screw fixing
	0,09 – 0,14 DELTA®-SEAL GZ	BMW Bosch Continental Teves DaimlerChrysler Fiat GM Knorr-Bremse Porsche TRW VDA VW	Highly cross-linked organic topcoat: - varying colour adaptations possible - excellent chemical resistance - particularly suitable for multiple screw fixing - specific automotive coefficient of friction
DELTA-PROTEKT® KL 100 /KL 101 + DELTA®-SEAL	DELTA®-SEAL (without defined coefficient of friction setting)	Bosch Continental Teves DaimlerChrysler GM Hyundai/Kia VW	Highly cross-linked organic topcoat: - varying colour adaptations possible - improved corrosion protection - excellent chemical and temperature resistance - particularly suitable for multiple screw fixing Alternative to DELTA-PROTEKT® KL 100 basecoat: - DELTA-PROTEKT® KL 101 with optimised resistance to white rust formation, e.g. ideal for black surfaces
	0,09 – 0,14 DELTA®-SEAL GZ	Bosch Continental Teves DaimlerChrysler Delphi Fiat Ford GM VDA VW Yale	Highly cross-linked organic topcoat: - varying colour adaptations possible - improved corrosion protection - excellent chemical and temperature resistance - particularly suitable for multiple screw fixing - specific automotive coefficient of friction Alternative to DELTA-PROTEKT® KL 100 basecoat: - DELTA-PROTEKT® KL 101 with optimised resistance to white rust formation, e.g. ideal for black surfaces
	> 0,20 DELTA®-SEAL RZ		For applications with increased friction resistance
DELTA-PROTEKT® KL 100 HC+DELTA®-SEAL HC	–		Optimised for springs, spring-loaded band-type clamps and clips
DELTA-PROTEKT® KL 100 + DELTA-PROTEKT® VL 450	–		Black, high-gloss topcoat, UV-resistant in compliance with SAE J1960
DELTA-PROTEKT® KL 100 + EK-800-series	0,09 – 0,14 DELTA-PROTEKT® EK 800/801		Suitable for the EC-Automat 2000+, the innovative coating process for complex workpieces and smallest components
DELTA-PROTEKT® KL 110 + DELTA®-SEAL	Specific automotive adaptations		Black basecoat ideal in combination with DELTA®-SEAL in black

* Depending upon the respective customer norms

Application possibilities: e.g. dip spin, dip coating, spray immersion or spin coating.

You can find detailed information about individual DELTA-MKS® systems in our product brochures.

Dörken MKS-Systeme GmbH & Co. KG
Wetterstraße 58
58313 Herdecke
Germany
Tel.: +49 2330 63-243
Fax: +49 2330 63-354
www.doerken-mks.com
mks@doerken.com

Representative Office UK

Tel.: +44 121 744 2334
Mobile: +44 781 794 3460
mks@doerken.co.uk

A member of the Dörken-Group.

ISSUE 08/08