



There is one thing that we expect our corrosion protection to provide: everything.

DELTA-MKS® basecoats and organic topcoats.

Our slogan:

It isn't good until it's better.

Innovation doesn't mean simply changing or updating: it means improvement. This applies to all aspects of our products: functionality, resilience and environment, as well as costs. For over 25 years, we have been working with micro-layer corrosion protection systems that are free of hazardous chrome (VI). We are particularly committed to our products being able to be processed without any hesitation, which is why we avoid harmful heavy metals such as chrome, lead, molybdenum, nickel or cadmium. And we repeatedly set new standards in the market with our zinc flake systems, marketed under the brand name of DELTA-MKS®.

Dörken MKS-Systeme provides a product range that covers all tasks and areas concerned with modern micro-layer cor-

rosion protection. Despite the low coating thickness, the demands placed on coatings today extend far beyond simple corrosion protection.

As a specialist in multifunctional micro-layer corrosion protection systems, Dörken MKS-Systeme produces and configures highly-efficient surface protection for the automotive and other industry sectors.

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. We advise users, coaters and plant constructors in all application questions – worldwide.



The only things that are harder than day-to-day uses:

Our testing procedures.



We set ourselves new challenges every day. And this is how it works: we test different materials, extreme resilience, complex components – and all of that at ever increasing demands upon resistance endurance life, frictional properties and resistance to chemicals and temperature.

Our basecoats and topcoats are so finely attuned to each other that many automotive manufacturers rely on our systems. When all is said and done, Dörken MKS-Systeme offers a product range that covers inorganic and organic topcoats, that provide an optimal one-stop solution for every task.

Here, the organic DELTA-MKS® topcoats offer you a particularly wide range of uses:

- excellent adhesive strength
- high freedom from pores with thin coating layers from 6 µm
- high degree of hardness with good ductility
- supplying frictional values in compliance with customer requirements
- high level of insulation – protection from contact corrosion
- excellent resistance to chemicals (acids, alkaline solutions and various solvents)
- excellent resistance to salt spray
- low curing temperatures
- no hydrogen embrittlement from the application process
- diverse colours available

Some requirements we particularly like to fulfil:

Your special ones.

We are always pleased to deal with a special challenge, because we know that there is a lot that can be achieved – and we can achieve it. We work closely together with our partners, so that we can find the optimal solution for their business in the long term. Thus we find the best system for each requirement and optimise the process until we have reached the highest level of product quality.

Micro-layer corrosion protection systems generally have a coating thickness of between 1 and 18 µm. The main areas of application are those where high-performance corrosion protection is applied functionally and especially demanded.

Because of the diversity of requirements, DELTA-MKS® systems often consist of a basecoat such as e.g. DELTA®-TONE 9000 or DELTA-PROTEKT® KL 100 and a topcoat such as e.g. DELTA®-SEAL.



A bit like Botox.

Only for metals.



You have the highest requirements.

We have the topcoats to match them.

DELTA-MKS® systems are particularly resistant and diverse. This is thanks to the effective combination of basecoat and topcoat. 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 entire system and thus provide a wide area of application. Depending upon the required application, both organic and inorganic topcoats are at your disposal.

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 essential in the case of screws and high-tensile steel.

Topcoats provide a range of functional properties which additionally improve the active cathodic corrosion protection of the basecoat. Organic DELTA-MKS® topcoats already provide a closed barrier film with a high freedom from pores from very thin layers of 6 µm onwards, protecting the materials below and reducing the danger of contact corrosion. As highly cross-linked organic micro-layers, they extend the range of application in the corrosion protection sector, thus covering a wide range of industrial requirements.

Irrespective of whether it is packaged goods such as screws, nuts, dowels, or clips as used in the automotive industry, in the building trade or in the steel construction, or higher value workpieces such as die stamped or forgings, chains,

axles, as well as threaded joints for wind turbine generators – they are all subjected to complex stresses.

It is only with a combination of high-value components and a suitable and finely attuned coating process that these demands can be met.

A good example of this is the coating of larger high-tensile screws for wind turbine generators. In the case of high-tensile screws with a tension rating of over 1,000 MPa there is a danger of brittle fracture. A coating that would increase the risk of hydrogen embrittlement (such as e.g. electroplating) would consequently be fatal. With DELTA-MKS® systems, hydrogen-induced cracking can be excluded to suit the application.

Another benefit is the low curing temperature for DELTA-MKS® basecoats and topcoats. This means that you can save even more energy than before.

Corrosion protection doesn't always have to look the same:

How about sky blue, for example?

Over the last pages you have become acquainted with the many properties of the DELTA-MKS® topcoats. Now we would like to show you a further side. DELTA®-SEAL, for example, fulfils aesthetic requirements, as well as providing magnificent corrosion protection. DELTA®-SEAL is available in many colours and shades. So you'd like a customised colour? No problem: we are also delighted to fulfil special requirements.

Standard colours for the DELTA®-SEAL system:



Some words don't even sound good in French.

La corrosion, for example.

As a global player we speak almost every language in the world. We are everywhere where our customers are – as good service does, after all, list highly among the most important characteristics of Dörken MKS-Systeme. For this reason, we are represented in all markets by local product managers.

We can advise you in all areas of application technology, support you in the setting-up of your plant and are always ready to provide answers. And this is indeed no empty promise. In this way, you can rest assured that together, we can always reach the best solution.



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.

The details stated in this technical leaflet are based upon our current knowledge and experience. They do not release the user from the testing that is inevitable, given the diversity of possible influences in the processing and application of our products. Any legal guarantee of specific properties of suitability for any concrete operational purpose may not be assumed from the information provided.

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