



**We have even more suggestions  
for improvement:**

**DELTA-MKS® topcoats for electroplated surfaces.**

## The best thing about electroplating:

**DELTA-MKS® topcoats.**

We are particularly keen on new technologies: this is why a large part of our work consists of research and development. An example is our having consistently manufactured microlayer corrosion protection systems that are free of hazardous chromium (VI). And now, over 25 years later, we are again and again setting new standards, marketed under the brand name of DELTA-MKS®. No Dörken MKS-Systeme product contains hazardous heavy metals such as chromium, lead, molybdenum, nickel or cadmium –

our products can be processed without any hesitation.

It is also in the case of conventional and widespread processes such as electroplating that DELTA-MKS® topcoats are the first choice: they provide the finish to electroplated zinc or zinc alloy to make them fit the specification.

Dörken MKS-Systeme multifunctional topcoats can be used for diverse applications. The DELTA-PROTEKT® VH 350

series, DELTA-PROTEKT® VH 360 series and DELTACOLL®, as well as the organic topcoats from the DELTA®-SEAL and DELTA-PROTEKT® EK 800 series can be focused to suit your requirements, thus providing the correct sealant for electroplated surfaces.



## Our staff in Korea also speaks foreign languages:

**English, for example.**

When we speak of being exactly where our customers are, you can take our word for it.

As a global player, we are represented in all international markets – with local Product Managers and employees. After all, good service is one of the most important quality characteristics of Dörken MKS-Systeme.

We can advise you around the clock about application technology, support you with our employees in the set-up of your plant and we are there to answer your questions. Do feel free to contact us –

you can be sure that we have the correct product recommendation for the task that you have. Whatever you have in mind, you can be sure that we will understand.



## The dimensions of our biggest challenges:

7.0 mm – 7.66 mm – 3.2 mm.

The smaller the components to be coated, the higher the demands on the coating. DELTA-MKS® topcoats offer a range of functional properties that can also improve the corrosion protection of electroplated surfaces.

The aqueous and transparent inorganic topcoats from the DELTA-PROTEKT® VH 350 and DELTA-PROTEKT® VH 360 series are characterised by very low coating thickness and lend themselves extremely

well to screws within the dimension range of M4 – M18. Thinner layers of 1-3 µm fulfil the higher requirements for screwability, as well as the function of the screw as a connecting element.

A thin, uniform coating is important, particularly with small components such as screws and nuts (M4 – M6), because it is the only way to ensure gaugeability. Using DELTA-MKS® topcoats recess fill can be prevented and free fitting can be

assured. This is how you attain the best results. In the case of black surfaces our DELTACOLL® 80 inorganic topcoat is most suitable.



## A matter of appearances:

This even applies to screws sometimes.

DELTA-MKS® organic topcoats already provide a barrier layer with a high freedom of pores from very thin layers of 8 µm onwards. It protects the materials below effectively and reduces the danger of contact corrosion. The highly cross-linked organic microlayers effectively cover a wide range of industrial requirements.

Do you require lasting lubrication? A thicker organic coating, for example, provides a reserve of lubricant. This is where organic DELTA-MKS® topcoats can provide much more: corrosion protection is not

just a question of safety, but also often a question of aesthetic appearance – which is why DELTA®-SEAL is available in various colours.

Whether you need to coat complex workpieces or the smallest components, we recommend DELTA-PROTEKT® EK 800 series topcoats, which are particularly suitable for the EC-Automat 2000+. The EC-Automat 2000+ is a patented electrophoretic coating machine that makes it possible to achieve a particularly tight coating distribution for complex workpieces and the smallest components.



The result? Particularly homogenous and attractive coatings that can provide visual highlights.

# 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 $\mu_{tot}$	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 $\mu\text{m}$ 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 RV1/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 $\mu_{tot}$	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 $\mu_{tot}$	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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