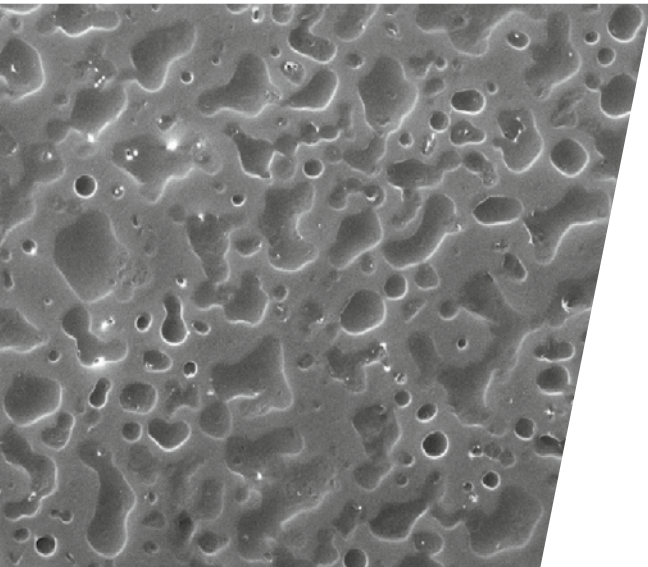


UV-Additives

Matting and haptics for radical curing 100 % UV systems.



/ UV-Additives from Deuteron: Matting alternatives for UV-systems.

With this brochure we would like to present our UV matting agent dispersions Deuteron UV RM10, UV RM15, UV RM17, UV RM19, the powdery variant Deuteron UV RMP and the UV haptic additive Deuteron UV RS20. With these additives you are offered further possibilities for matting and haptic modification of solvent-free, radical curing UV systems.

Radical curing UV systems have been in use since about the 1970s. Since then they have been in continuous development, the raw material base has widened, efficiency has improved and the physical characteristics have adapted to suit the various areas of application. The matting of solvent-free, radical curing UV systems has nevertheless remained a particularly difficult task.

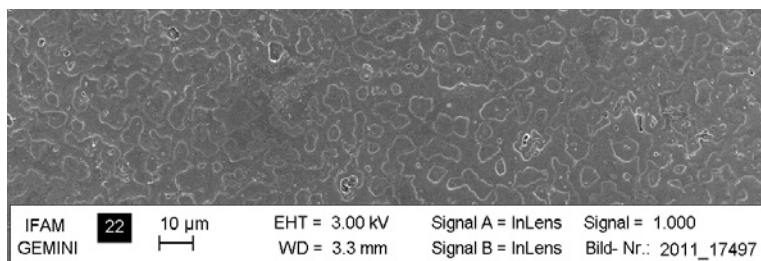
Owing to a lack of volatile solvent, film shrinkage occurs only to a relatively small degree and is too insignificant for the formation of matting. Since the solid content is about 100%, an appropriately high quantity of matting agents are required. This causes the viscosity values to increase and the rheological characteristics are altered accordingly. Typically only those particles of the matting agent are effective that appear on the surface. There is only little movement of the particles in the film towards the surface. Additionally, the UV coating hardens very fast, thus preventing movement processes on the surface.

In the past the matting of 100 % UV systems with conventional matting agents and fillers (either organic or inorganic) was impossible or only possible to a limited extent, involving compromises, as very large quantities of matting agent are required. This also applies to the organic polymethyl urea resin matting agents from our product range.

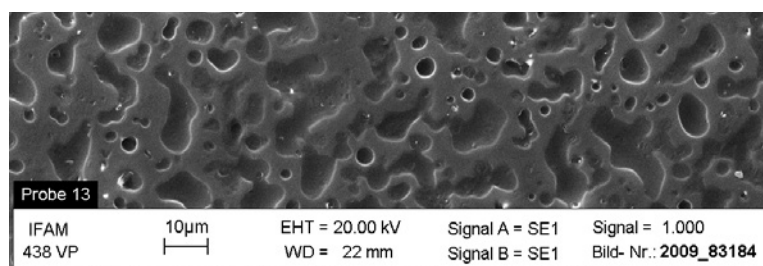
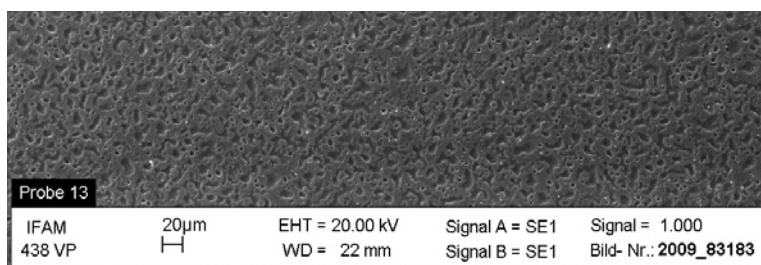


(left):
100% UV clear varnish
with 10% Deuteron UV RM10
25 µm spiral applicator
Gloss 60° = 12.3 GU - Gloss 85° = 34.2 GU

(right):
100% UV clear varnish
without matting agent
25 µm spiral applicator
Gloss 60° = 92.5 GU - Gloss 85° = 99.5 GU



Surface effect of Deuteron UV RM15, 2 µm layer thickness.



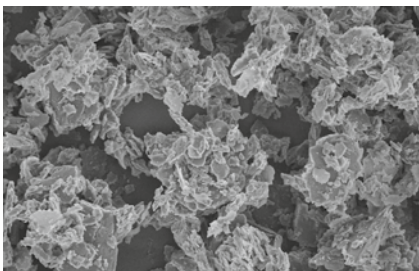
Surface effect of Deuteron UV RM15, 25 µm layer thickness.

Our Deuteron UV RM-, RS-, RMP- and SO-products offer further alternatives for the matting and haptics modification of UV curable systems. Special combinations of waxes and in some cases inorganic additives give rise to particles that – unlike with micronized waxes – create a rough micro-structure. Using a special process developed by ourselves we can now use the effects of wax-based products for the surfaces of 100% UV systems. Profit from this versatile range of possibilities.

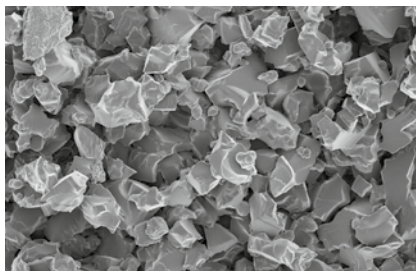
/ Advantages at a glance:

- Little influence on viscosity and rheology
- All binding agents and reactive diluents can be used
- Largely independent of layer thickness
- High surface resistance
- Silicon free
- For all applications from thin-film to thick-film
- Can be combined with one another and with other products for different gloss levels

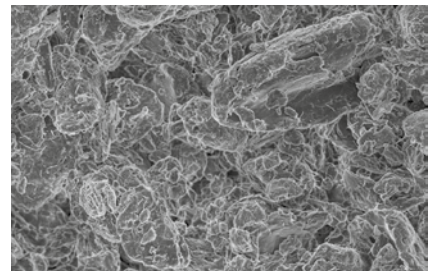
Deuteron RM
Wax compound



Deuteron SO
Polyester elastomer



Deuteron RMP
Wax compound powder



Comparison of the particle morphology of different Deuteron UV-matting agents.

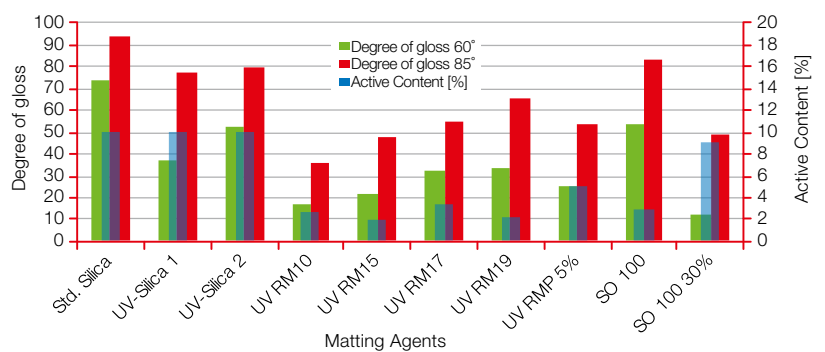
/ Other possibilities for UV matting ...

Deuteron RM additives act on the surface by a different mechanism. These products consist of special combinations of waxes and in some cases inorganic additives. By means of a special process, particles are produced that create a rough microstructure, particularly on the surface. Similar wax-based particles that have been micronized do not show this effect. This new process has enabled us to take full advantage of the benefits of wax-based products on the surface for 100% UV systems.

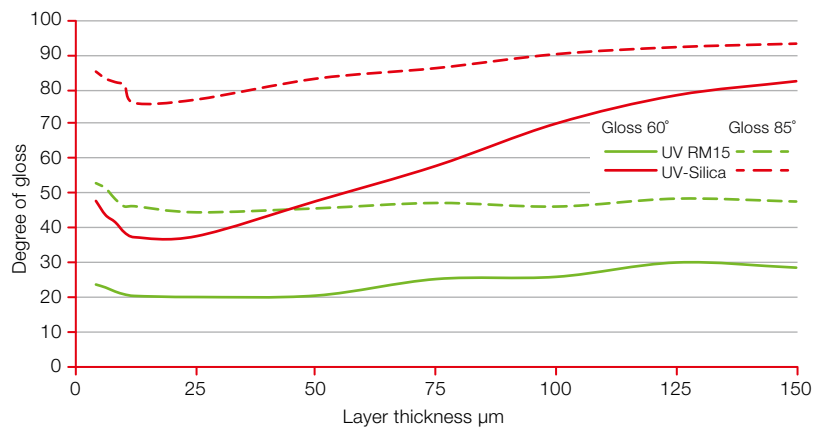
The effect can be observed over a large range independent from layer thickness. It is possible to achieve very resistant surfaces while only influencing the rheology to a small degree. Especially in thick layers amounts of 2-2.5% active content will lead to a largely constant degree of gloss.

These products are dispersion pastes in reactive diluents and are suitable for all thin-film to thick-film uses across all applications. They can be used alone or combined with each other. The proportion of reactive diluents contained can be easily offset in the overall formulation. These products result in a coating formulation with a proportionately lower content of solid agents (approx. 1-4%). As the formulator, you still retain the full formulation latitude of binding agents, reactive diluents and photoinitiators.

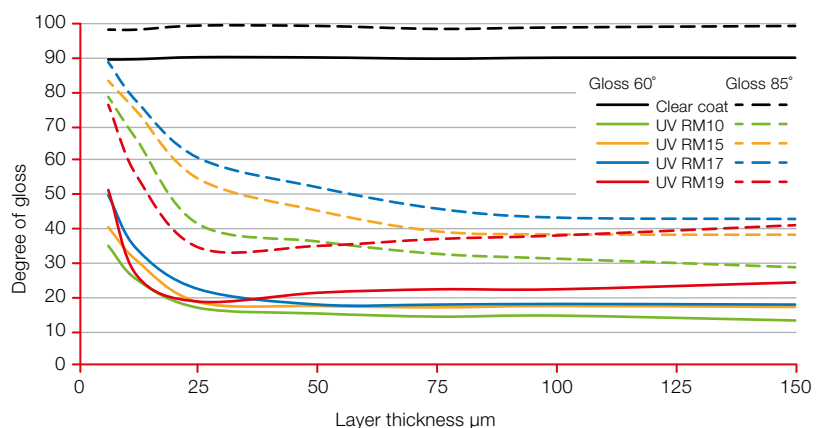
Deuteron UV RMP is available in powder form, which can be used more flexibly compared to the products containing reactive thinner. However, in proportion to the active content, a slightly higher amount is needed.



Comparison of gloss levels of various matting agents, 10% in UV test-lacquer, 12 µm spiral drawdowns.



Comparison of gloss levels of Deuteron UV RM15 vs. UV-silica, 10% in UV test-lacquer.



Comparison of gloss levels of Deuteron UV RM-types for different layer thicknesses, 10% in UV test-lacquer.

As with other matting agents, the matting effect depends on the parameters of the raw materials used. In summary the following can be said:

Matting effect is generally stronger,

- ... the lower the viscosity of the coating is
- ... the lower the reactivity of the monomers/oligomers is
- ... the lower the functionality of the monomers/oligomers
- ... the lower the conveyor speed/higher the UV intensity

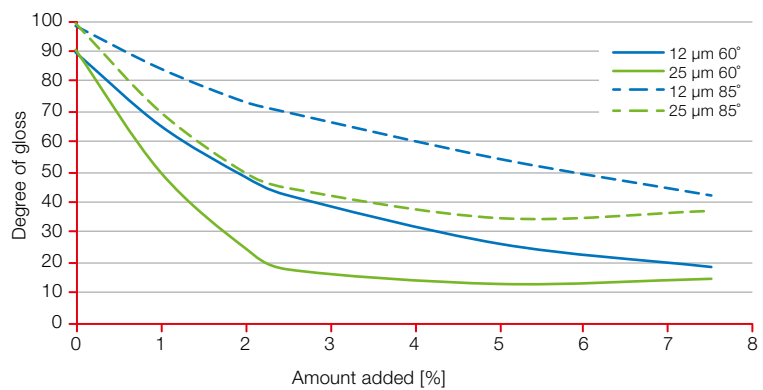
Since these dependencies partly contradict the requirements of modern coatings (speed), particular care should be taken here in selecting the components to be used in order to find the ideal combinations. In this regard our products do not differ from conventional matting agents.

/ ... and UV haptics

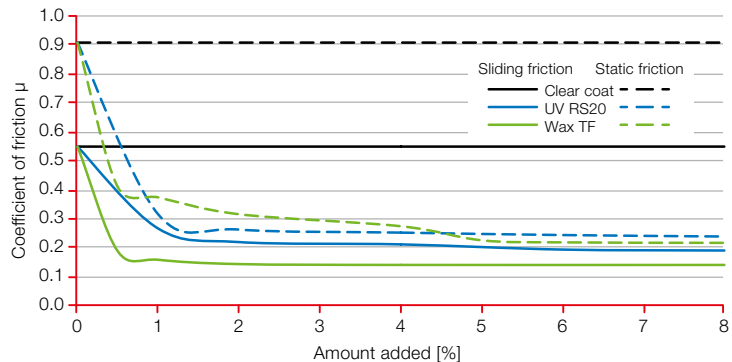
In addition to the Deuteron UV RM products we offer our Deuteron UV RS20, a UV-additive that does not primarily function as a matting agent but is rather designed to influence the haptics.

Deuteron UV RS20 is a wax dispersion with fine-particulate PE wax, primarily for improving slip behaviour. Soft effects are supported and can be adjusted by varying the dosage from low to high. With higher dosages a matting effect also occurs.

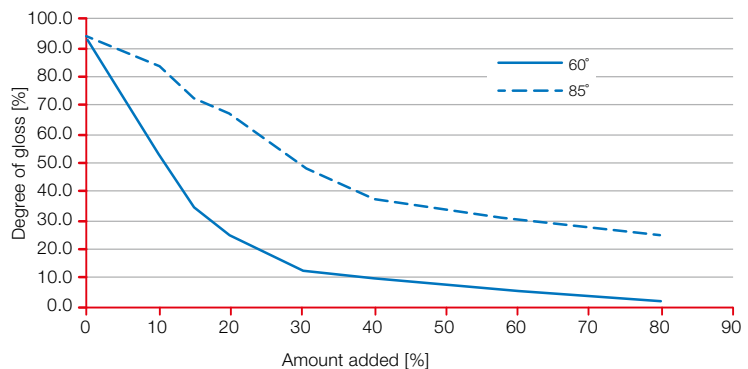
The effects achieved here are also highly dependant on the system. By also using silica and waxes, advantage can be taken of the resultant synergies.



Comparison of gloss of Deuteron UV RMP at different concentrations and layer thicknesses.



Comparison of static and sliding friction of Deuteron UV RS20 vs. PTFE-wax for various concentrations.



Degree of gloss of Deuteron SO 100 in 100 % UV-lacquer.

Product	Delivery Form	Type	Active content	Reactive thinner	Reactivity	Inorganically modified	Particle sizes approx. d50	Particle sizes approx. d90	Dosage approx.	Matting	Slip improvement	Soft/Grip
Deuteron UV RM10	Dispersion	Wax compound	26.4	DPGDA/LA	slow	X	2.5	10.5	<= 10	***	*	*
Deuteron UV RM15	Dispersion	Wax compound	20	DPGDA/LA	good		4	11	<= 10	***	**	*
Deuteron UV RM17	Dispersion	Wax compound	35.1	DPGDA/LA	good	X	2.5	9.5	<= 10	***	*	*
Deuteron UV RM19	Dispersion	Wax compound	21	TMP(EO)3TA	fast		7.5	16.5	<= 10	**	**	*
Deuteron UV RS20	Dispersion	Wax	25	DPGDA	good		4	9	1-20	*	***	**
Deuteron SO 100	Dispersion	Elastomer	30	DPGDA	good		7	15	10-50	***	**	***
Deuteron UV RMP	Powder	Wax compound	100	-	-		8	17	1-10	***	***	**
			%				µm	µm	%			

Technical Data of our UV-additives.
 * = Slight / ** = Good / *** = Very good



/ Deuteron: First-class products for the coatings industry

DEUTERON GmbH has 30 years of experience in the production and sales of additives including: matting agents, conductivity agents and UV initiators. In the course of our company's 30-year history, we have become an important partner for the paint, lacquer and coatings industry – we operate nationally and internationally and are represented all over the globe. We serve you with the dependability and close business relationship that only an owner-operated, medium-sized company can offer – and we also have the expertise of a global provider. Get in touch with us! We are happy to be of assistance and to help find individual solutions for your needs.

/ Visit us on the Internet



You can find detailed information on all our products at www.deuteron.com. Matting and texturing agents, surface additives, UV initiators and much, much more: We supply first-class products and look back on more than 30 years of experience as an important partner for the coatings industry.

This brochure intends to give technical advice without warranty and does not claim to be complete.

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