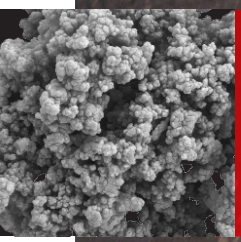


# Matting Agents

Polymethyl urea resin for matting of coated surfaces

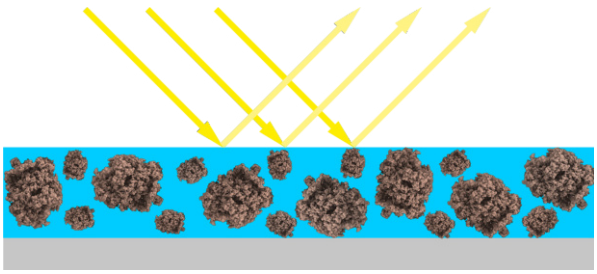
Deuteron®

ADDITIVES TO YOUR SUCCESS

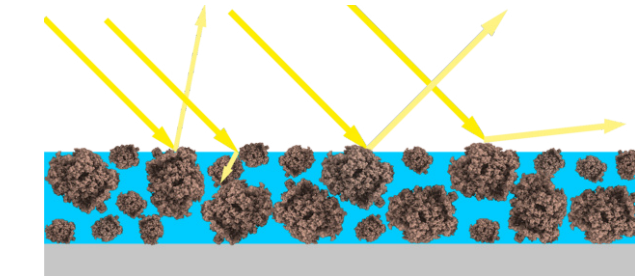
# Matting agents from Deuteron

Polymethyl urea resin for matting of coated surfaces

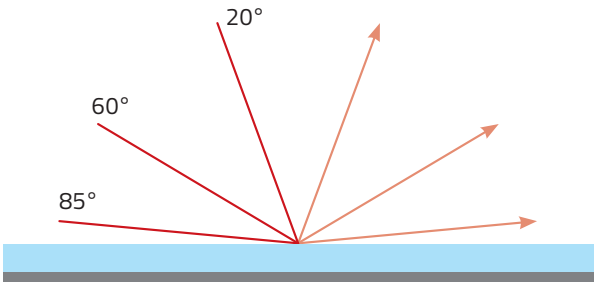
Surfaces are coated with matt lacquer systems for various reasons. In addition to optical and aesthetic aspects, functional and safety-relevant properties also play a major role. Fashion trends in particular are responsible for a constant growth of matted coatings. Matting effects can be created in different ways, all of which are based on more or less pronounced surface roughness.



Smooth surfaces tend to reflect incoming light in a direct way – they appear glossy.



Rough surfaces tend to reflect incoming light in a non-directional way – they appear matte.




Depending on the gloss different geometries (20° / 60° / 85°) are used to determine the gloss level. Usually the 60° angle is used for the majority of gloss readings and established itself as some kind of industry standard. This leads to the situation that differences between high and low gloss systems are described less accurate.

| | Geometry | 60° Angle Gloss |
|---|---|---|
| High Gloss | 20° | > 70 |
| Medium Gloss | 60° | 10 – 70 |
| Low Gloss | 85° | < 10 |

| Matting Agents | | |
|---|---|---|
| **Inorganic** | **Organic** | |
| **Silicates** | **Thermoplastic polymers** | **Duromeric polymers** |
| Pyrogenic, precipitated, wax and silane modified | Polyacrylates<br>Polyurethanes<br>Polyamides | Duromeric polyurethanes |
| inorganic filler | Waxes | Aminoplasts<br>i.e.<br>Polymethylurea |

A variety of different materials can be utilized as matting agents. Depending on the chosen materials the final performance can vary significantly. To achieve a good balance, it is always possible to combine different materials and improve the overall performance.

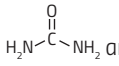
Organic matting agents based on PMU are not directly comparable to $SiO_2$ matting agents. Due to the completely different chemistry and particle structure, our organic matting agents lead to a significantly different performance. Each application should be tested and formulated accordingly.

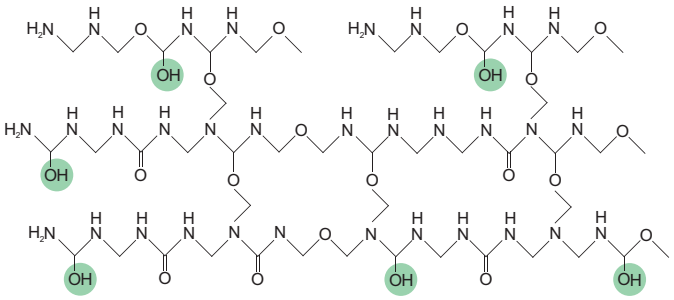
## Matting agents for a perfect finish

Deuteron GmbH produces and distributes organic matting agents based on the aminoplast Polymethylurea **(PMU)**. These polymers are duromeric urea-methanal polycondensates. Our PMU based products are available as finely micronized powders in various particle size distributions and particle shapes.

Due to the chemical and physical properties of this substance group, PMU matting agents open up novel and unique possibilities to the coating formulator. Through their chemical character and structure, they can be used as sole or supplementary matting agents in a wide range of coating materials. Our Deuteron and Pergopak products are well established in a wide range of applications.

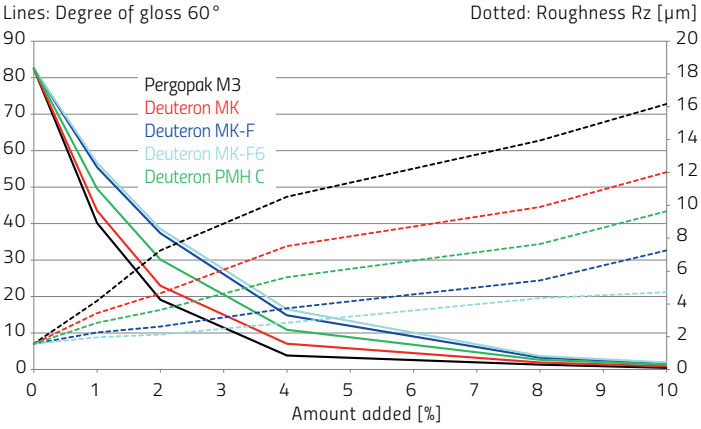
- Excellent matting effect
- Outstanding mechanical resistance (scratches and polishing)
- Approx. 0.25% free OH groups – crosslinking with isocyanates possible for even higher resistance
- Duromer – no melting point; long term durability up to 200°C; short term stability up to 300°C
- Comparably high hardness (approx. 3.5 mohs)
- Low influence on the viscosity

In a first reaction step the monomers urea  and methanal  form various urea-methylols in a chemical addition. In a second reaction step the condensation of the methylols leads to a branched three-dimensional molecule with high molecular weight. Interestingly the morphology of the resulting duromer can be controlled via the reaction conditions – for our matting agents it is a highly amorphous particle structure. Thus, it is possible to utilize the unique properties of the PMU polymers as matting agents in coating applications. Over the last 40 years our PMU products became important additives for the use in high quality paints, varnishes and inks. They are especially preferred in high performance applications.



Due to the special chemistry our PMU materials enable film properties that are not achievable with traditional matting agents on their own. A major advantage is the lower influence on viscosity and rheological behaviour compared to $SiO_2$ matting agents. In order to reach a similar gloss level, a slightly higher dosage of a PMU matting agent is needed. However, the viscosity is still significantly lower and thus the organic matting agents provide a higher freedom to formulate.

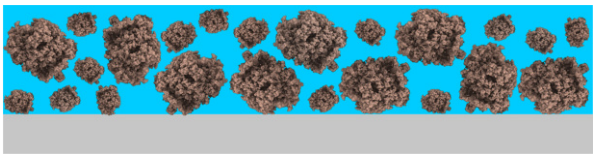
Deuteron and Pergopak matting agents can be used in aqueous, solvent-based and UV-curable inks and coatings. In solvent-free systems without film shrinkage, e.g. 100% UV coatings, solvent-free polyurethane and epoxy coatings or powder coatings, the particle-based matting effect is limited and often not sufficient. The final gloss level (reflectometer value) is related to the particle size and structure of the used matting agent. The particle size is a key criterion for the final matting effect. With identical matting agent types, the matting effect is directly proportional to the particle size. The coarser the particle size distribution the rougher the surface and the stronger the matting effect. For best results the particle size should be coordinated with the dry film thickness.



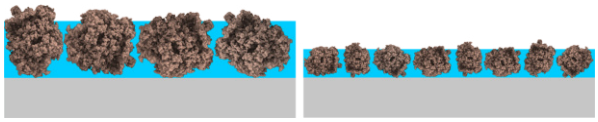

*Gloss levels in relation to the surface roughness*

## Properties

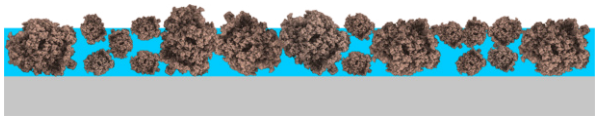
Without volume shrinkage it is not possible to develop an uneven / rough surface. The film remains glossy.

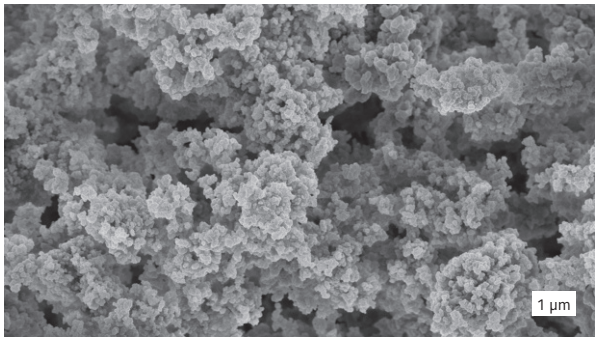


The roughness and matting effect can be adjusted to the dry film thickness by using different particle sizes.

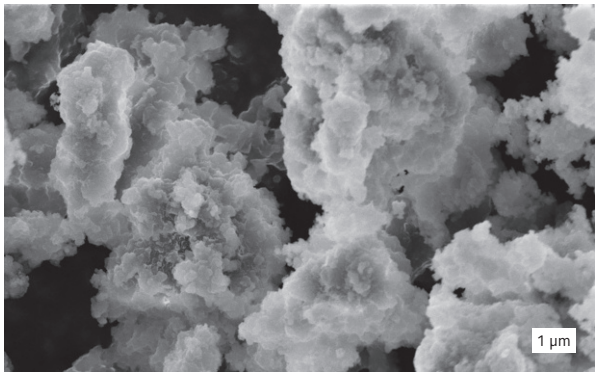


Combinations of different particle sizes or different matting agents can significantly improve the overall performance.



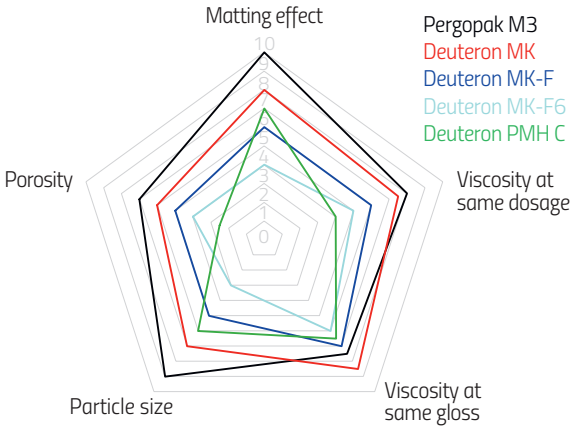



*SEM picture of the Deuteron MK particle morphology*

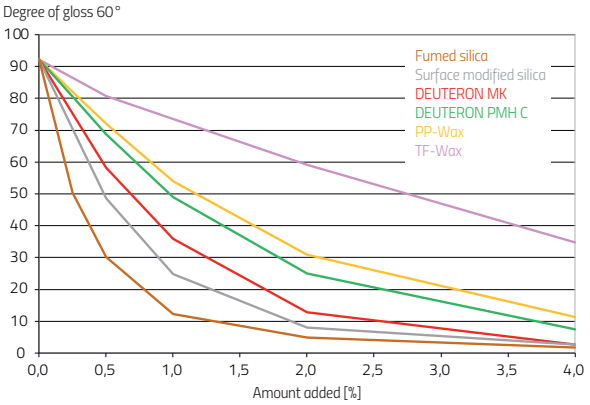



*SEM picture of the Deuteron PMH C particle morphology*

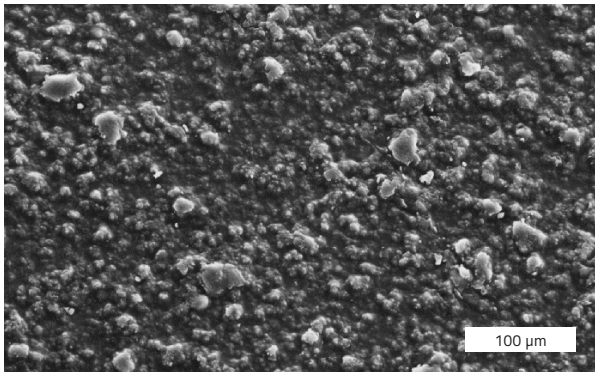
The particle size and the particle size distribution of the matting agent define the surface roughness and thus the final gloss.




*Overview of important product properties*




*Gloss level comparison of different materials in s/b CN coating*




*SEM picture of Deuteron MK embedded in a coating film*

## Pure PMU Products

Our unmodified standard matting agents are based on 100% PMU and are offered in four different particle size distributions. The products are similar chemically. For different effects (rough or smooth) or film thicknesses we offer various particle size distributions. Typically, the matting efficiency increases, the bigger the particles are.

**Deuteron MK –** medium fine standard grade. Recommended as a starting point for the majority of applications.

**Deuteron MK-F, MK-F6 –** fine and very fine grades. Both grades lead to a smoother, almost waxy appearance with nice haptics. Typically used for thin-film applications.

**Pergopak M3 –** coarsest grade. Best matting effect due to the high particle size. Leads to a dry, rough feel – standard grade for traditional soft touch coatings.

**Deuteron PMH-C –** medium fine grade with compact particle morphology. Slightly lower matting efficiency but lowest viscosity impact of all organic matting agents. Especially suitable for flexible systems and when smooth and silky feel / slip is needed.

## Organically and Inorganically Modified Products

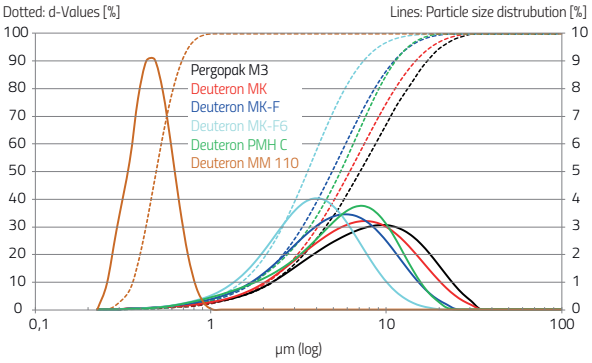
**Deuteron MM 659 –** $SiO_2$ modified PMU. Especially developed for matting of UV-curable systems with low viscosity impact.

**Deuteron MM 669 –** Wax modified PMU. Designed as multipurpose matting agent for UV-curable systems.

**Deuteron MM 680 –** Inorganically modified PMU designed for the use in 2pack PU- systems.

**Deuteron MM 682, MM 684 –** Inorganically modified PMU designed for the use in coil coatings and DIY-systems.

**Deuteron MM 823 –** PTFE modified PMU for outstanding scratch resistance and great surface slip. PFOA and PFAs free.




*Comparision of the amount of particle sizes and d-values*

## PMU Compounds

Deuteron also offers PMU combinations utilizing different particle sizes and morphologies. Compared to Deuteron PMH C our compounds Deuteron PMH F and PMH M show a similar viscosity impact with slightly different particle sizes and roughness. Both compounds can lead to higher abrasion resistance.

**Deuteron PMH F –** combination of very fine PMU grades for smoothest appearance. Very similar to PMH C

**Deuteron PMH M –** coarser combination of PMU grades leads to slightly rougher surface and potentially better abrasion resistance than PMH C.

## Dispersions

**Deuteron MM 677 –** Water-based dispersion of our PMU-based matting agents. The product offers an easy-to-use, dust-free alternative to our powder matting agents and can be used via auto-dosing systems. Deuteron MM 677 is manufactured additive-free without the use of additional additives such as dispersants, emulsifiers or defoamers.

**Deuteron MM 100 –** Ultra- fine PMU particles dispersed in DPGDA for radically curing systems. The product is especially designed for UV-curable ink-jet systems.

**Deuteron MM 110 –** Similar to Deuteron MM 100 but formulated using a special dispersant. As a result, the product offers a higher active content and lower viscosity.

# Matting agents from Deuteron

Polymethyl urea resin for matting of coated surfaces

## Properties at a glance

- Good matting effect
- Low influence on viscosity
- High temperature stability up to 200°C, short-term up to 300 °C
- Duromer: no melting point
- Pleasant haptics in soft coatings - soft effects are supported
- High mechanical, scratch and polish resistance
- Contains approx. 0.25 % cross-linkable OH groups
- Good re-coatability
- Good blocking resistance
- No influence on catalysts and thickeners
- Non-flammable and no tendency to dust explosion
- Suitable for food contact applications
- Low dust tendency
- Biodegradable = no microplastic

## Technical data

| | Supply form | Modification | Active content | Solvent | Oil absorption g Palatinol N/100g | Bulk density kg/m³ | Particle size µm d50 | d90 | d99 |
|---|---|---|---|---|---|---|---|---|---|
| **PERGOPAK M3** | Powder | - | 100 | - | 333 | 140 | 7 | 16 | - |
| **DEUTERON MK** | | | | | 325 | 150 | 6,3 | 13,8 | |
| **PERGOPAK M4** | | | | | 325 | 150 | 6,4 | 14,2 | |
| **DEUTERON MK-F** | | | | | 278 | 150 | 4,6 | 10,6 | |
| **DEUTERON MK-F6** | | | | | 251 | 120 | 3,5 | 6,5 | |
| **DEUTERON PMH C** | | | | | 167 | 220 | 5,5 | 12,1 | |
| **DEUTERON PMH F** | | PMU | | | 180 | 300 | 6,8 | 14,5 | |
| **DEUTERON PMH M** | | | | | 180 | 325 | 7,7 | 17 | |
| **DEUTERON MM 659** | | $SiO_2$ | | | 238 | 100 | 7,4 | 17,1 | |
| **DEUTERON MM 669** | | $SIO_2$ / Filler / Wax | | | 183 | 150 | 6,3 | 14,5 | |
| **DEUTERON MM 680** | | $SiO_2$ / Filler | | | 230 | 100 | 6,7 | 13,9 | |
| **DEUTERON MM 682** | | $SiO_2$ | | | 182 | 145 | 6 | 12,8 | |
| **DEUTERON MM 684** | | $SiO_2$ / Filler | | | 206 | 120 | 6 | 13,3 | |
| **DEUTERON MM 823** | | PTFE | | | 288 | 150 | 6,3 | 17,3 | |
| **DEUTERON MM 677** | Dispersion | - | 22 | Water | - | - | 5,5 | 12,1 | - |
| **DEUTERON MM 100** | | | 17 | DPGDA | | | < 0,6 | 0,8 | < 1,2 |
| **DEUTERON MM 110** | | | 25 | | | | < 0,6 | 0,8 | < 1,2 |

Deuteron®
ADDITIVES TO YOUR SUCCESS

### Deuteron: First-class products for the coating industry

Deuteron successfully develops and sells innovative additives since 1977. Our product range consists of matting agents, anti-static additives, texturing additives, thickeners and UV initiators. In the course of our company history we have become an important partner of the national and international paint, lacquer and coating industry with sales agencies around the globe.

### Visit us on the Internet

Our documents such as product datasheets, safety datasheets, regulatory information and brochures are available in the download area of our website without registration.



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