Organomodified Siloxanes (OMS) –

Performance Additives for Scratch Resistance



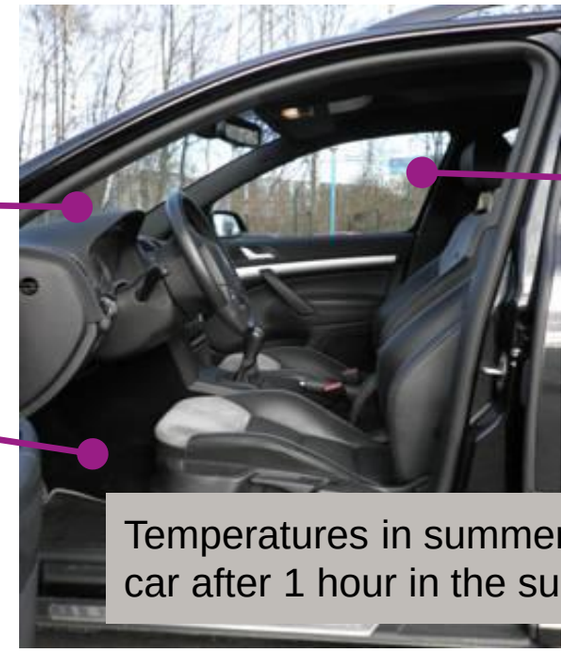
Evonik Interface & Performance

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Durable Scratch Resistance – e.g. in Cars

An unscratched interior after extensive use gives a higher value brand recognition especially with **rental cars or taxis**

Ageing is crucial to evaluate additives for car interior applications



Temperatures in summer in a (closed) car after 1 hour in the sun

To simulate the conditions in a car we do the following testing:

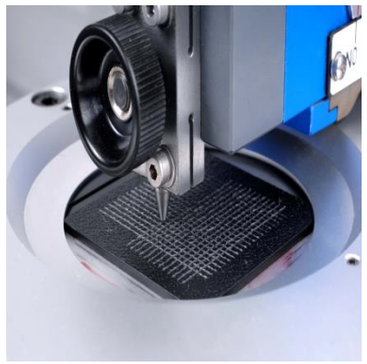
- Scratch resistance test of sample with additives direct after molding
- Same test with sample that was aged for 7 days at 80 °C or QUV test

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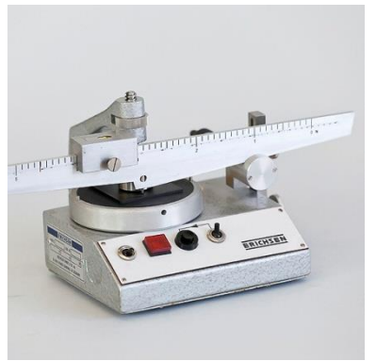
Scratch Methods available at EVONIK for Scratch Evaluation

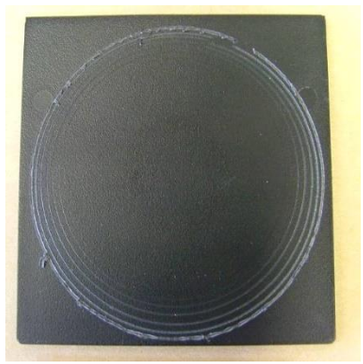
Erichsen
Scratch
Tester 430 P





Erichsen
Abraser
Model 413





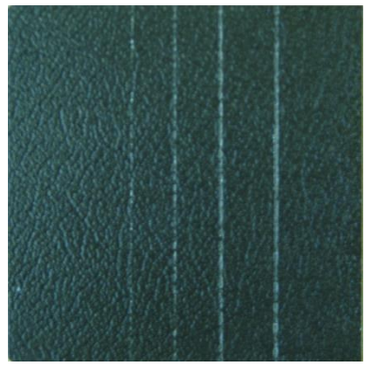
Crockmaster
Crockmeter
CM-5





Multifinger
Scratch/Mar
Model 710

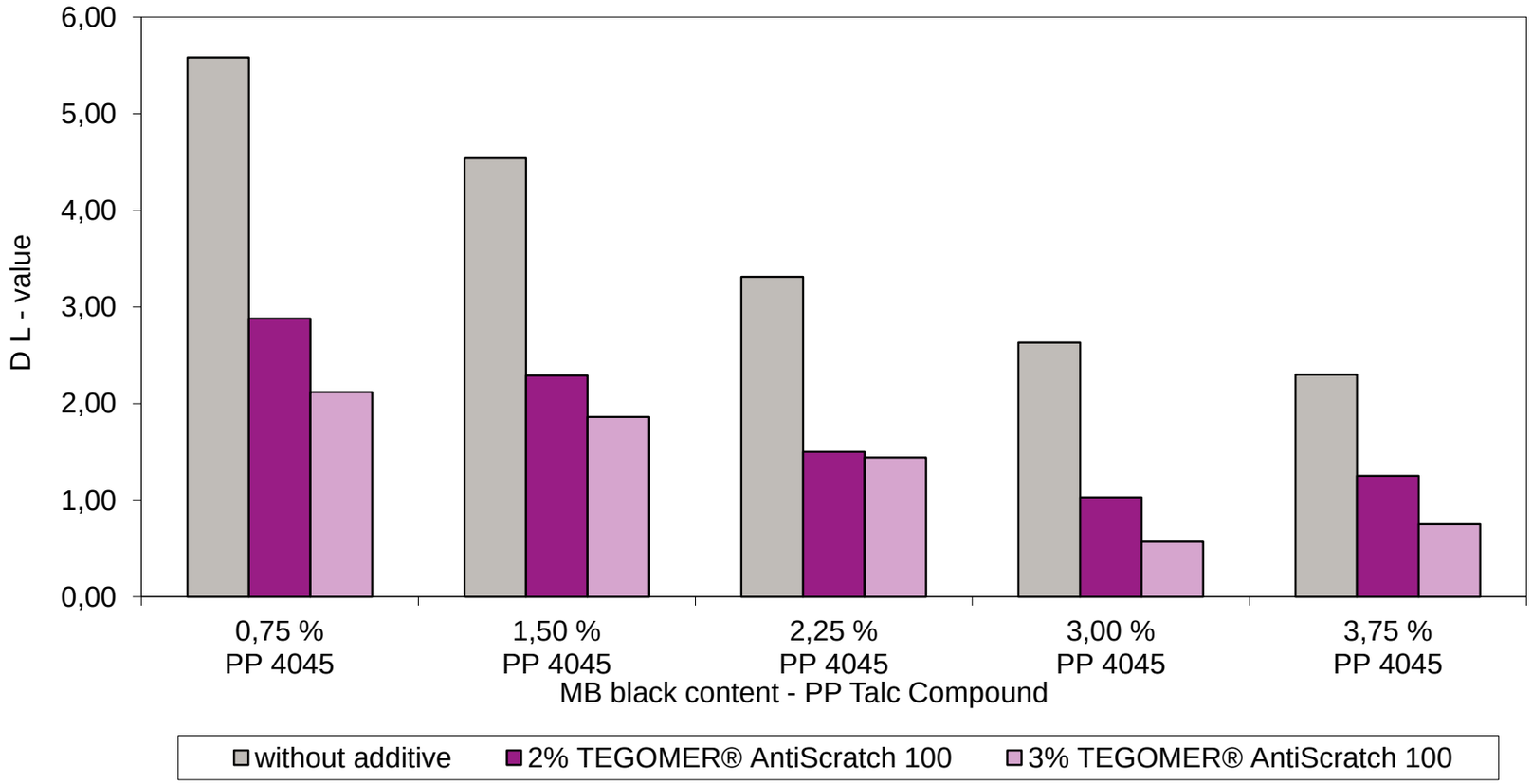




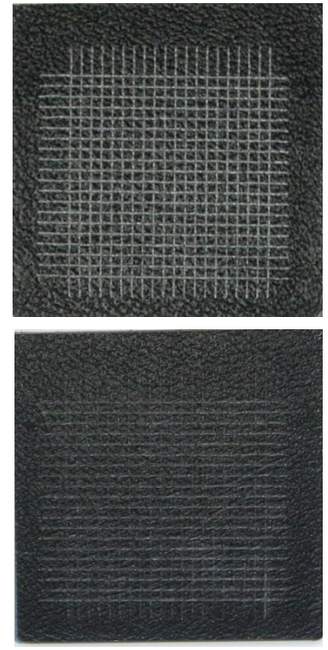
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Improvement of AntiScratch
TEGOMER® AntiScratch 100 in TPO/talc

Influence of **OMS** and **CB content** on Scratch Resistance



No additive

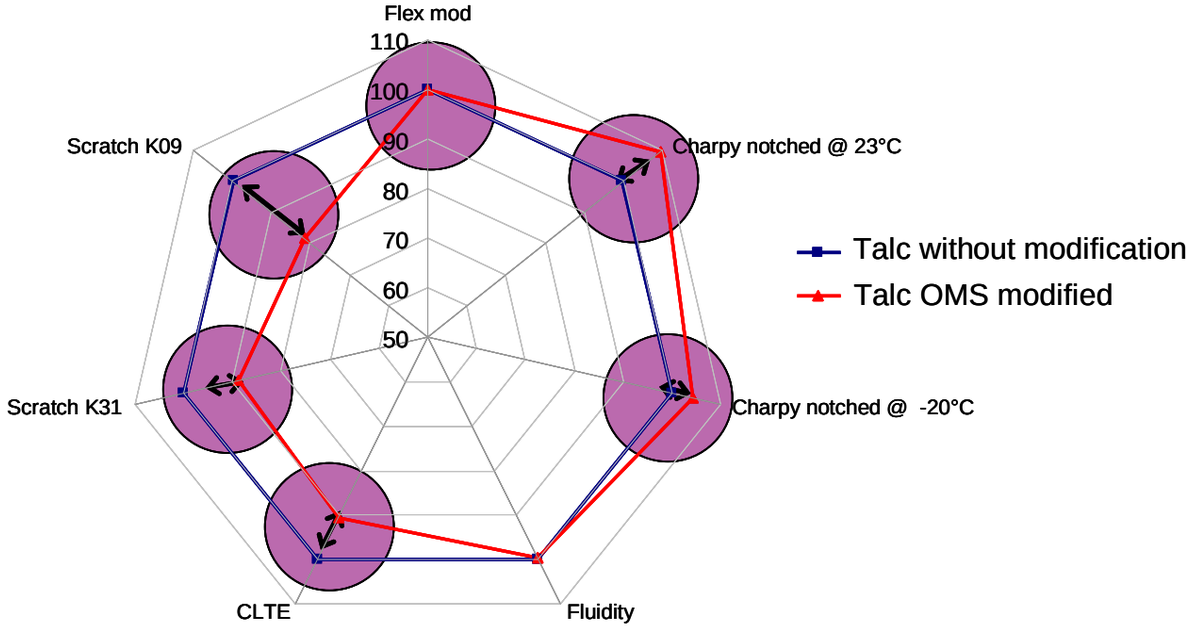


+ 3 % TAS 100

Grained surface K09

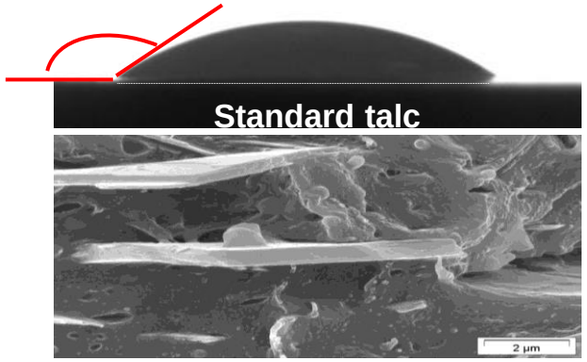
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Benefits of using Treated Talc in TPO Applications

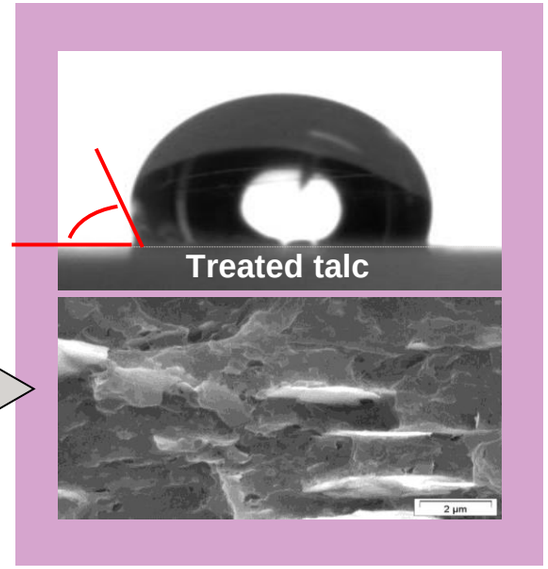


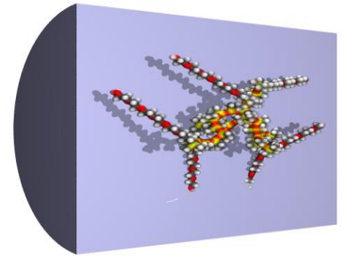
Improved

- Scratch Resistance
- Mechanical properties
- Surface Hydrophobicity



OMS-Treatment





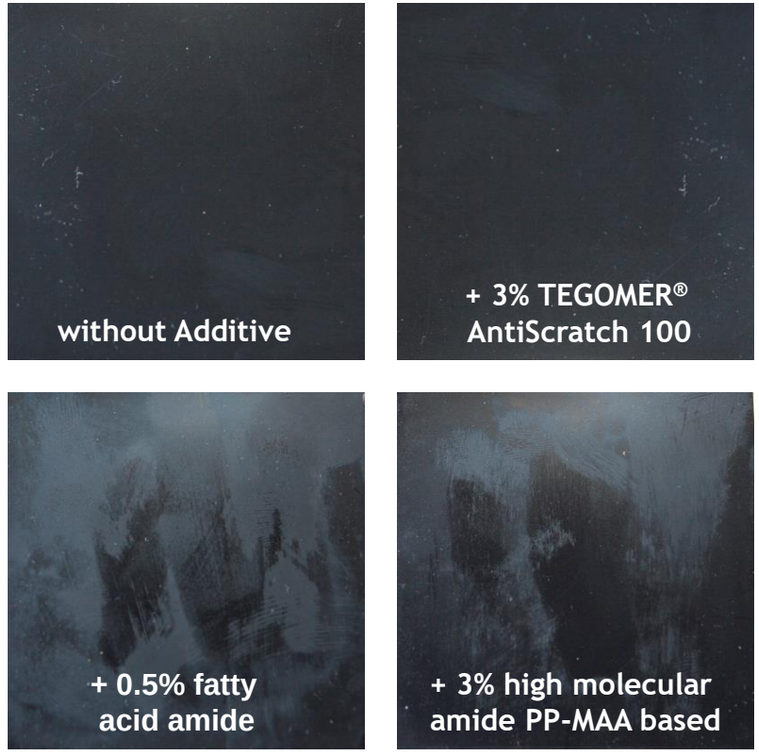
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Additive with Long Lasting Effect – No Tackiness after UV Irradiation

The PV 1306 test method of VW/Germany is used to analyze interior automotive parts based on PP and PP/Talc compounds regarding their tackiness and migration after UV irradiation (5 x 96 h).



Q-Sun Xe-1-B



TEGOMER® AntiScratch 100 does not show any migration and tackiness in the PV 1306 test. It stays in the bulk phase of plastics compounds and provides a long-lasting scratch resistance.

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Unfilled black PP – hoover application

- **Unfilled black PP** with **high gloss** is used for a certain part of a hoover
- PP is cheaper than ABS which is usually the preferred polymer for a number of appliances such as coffee machines, toasters or hoovers where gloss is an issue

- Using **2-3 % TEGOMER® AntiScratch 100** guarantees glossy, non-scratched surfaces



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$CaCO_3$ Filled PP Arm Rest of Chairs

- Furniture such as parts of office chairs are just one example where **filled PP** is used
- scratches appear especially if **grained higher value surfaces** are used
- Those parts are made from **$CaCO_3$ or talc filled PP** where white scratches appear and make it look old even after short period of use

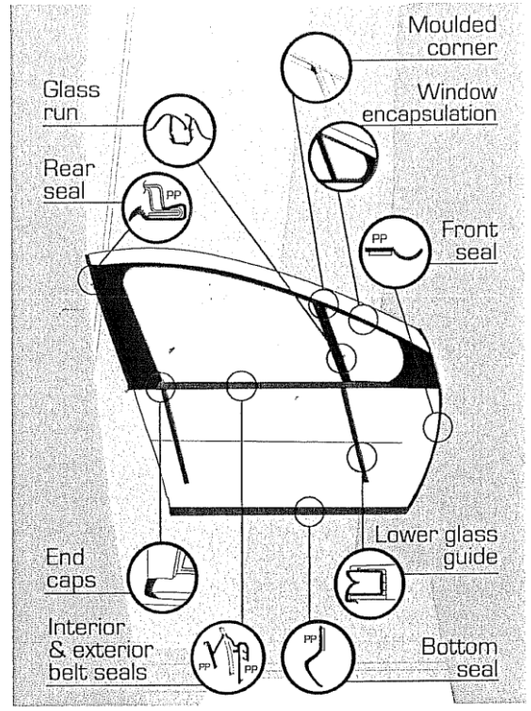
- **2 % TEGOMER® AntiScratch 100** gives a long-lasting scratch resistance



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SEBS based Glassing Application

- SEBS is used as a price competitive TPE material in a number of application, e.g. automotive
- SEBS has **very good haptic issues** and is much less expensive than TPU and TPE-E, even than TPE-V
- Automotive frames are just one application where **scratch resistance in combination with good slip** is required



OMS additives used are

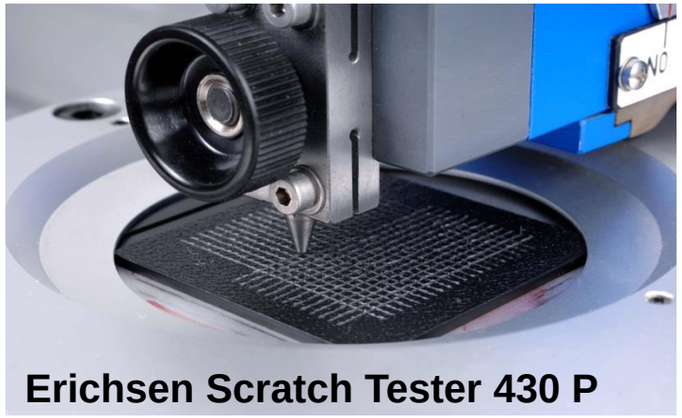
- TEGOMER® AntiScratch L
- TEGOMER® M-Si 2650
- TEGOMER® H-Si 6441 P

depending on the overall formulation



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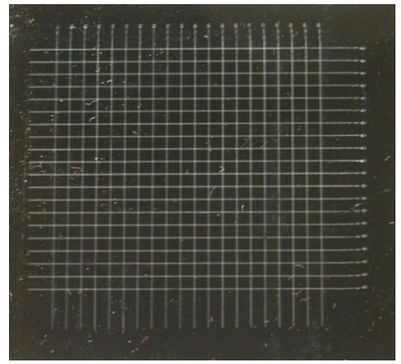
PA and PA/GF Compounds - TEGOMER® H-Si 6441 P



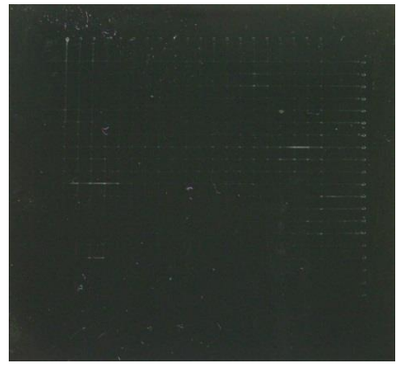
Erichsen Scratch Tester 430 P

30 N Force

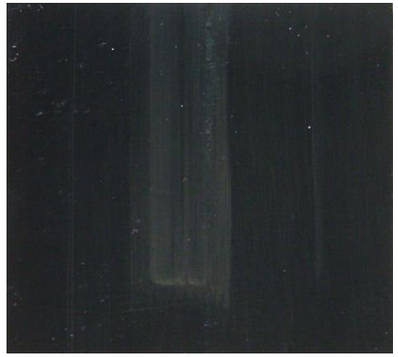
PA, PA/GF



without Additive



with 2% OMS



without Additive



with 2% OMS

1000 stokes for PA

9 N Force

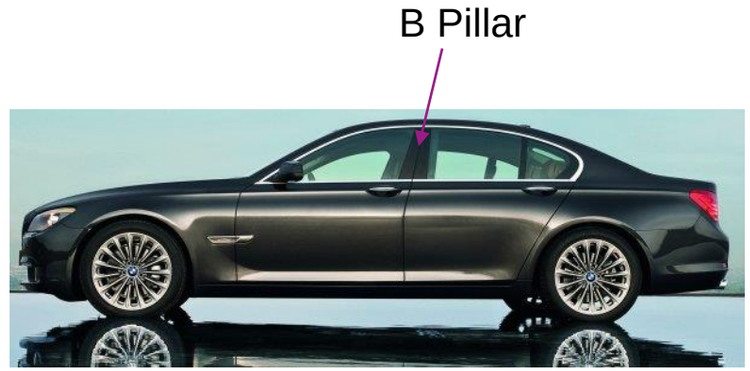


Crockmaster Model CM-5

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PMMA – Automotive B Pillar

- B pillars of cars are either made from coated metal or PC or can be created as **black PMMA** which has a suitable durability and high gloss but should be improved regarding scratch appearance



- **2-3 % TEGOMER® H-Si 6441 P** can be applied in PMMA without reducing even high jetness black appearance and it is improving **scratch and mar resistance** significantly

- Further Applications:
  - Automotive interiors
  - Electronics **(PMMA, PC/ABS or PMMA/ABS)** no additional coating / transparent top layer necessary



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Summary – Organomodified Siloxanes for Scratch Resistance

- OMS give scratch and abrasion resistance
- No negative side effects such as malodor, fogging, tackiness

TEGOMER® Antiscratch 100	(solid)	PP, PP/TPO
TEGOMER® Antiscratch L	(liquid)	PC, TPE
TEGOMER® H-Si 6441 P	(solid)	PA, PC, PMMA, PS, PET, TPE
TEGOMER® M-Si 2650	(liquid)	PA, PC, PMMA, PS, PET, TPE
TEGOPREN® 6846	(solid)	PS, PMMA



Evonik supports customers with evaluation of scratch and abrasion resistance

Details about the formulation help us (kind and amount of filler, pigment, polymer,…)

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