# Welcome to Specialty Additives





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Leading Beyond Chemistry

# Specialty Additives as one Division of Evonik



Specialty Additives



Nutrition & Care



Smart Materials



Performance Materials



Technology & Infrastructure

**With our solutions, we shape today just as we shape tomorrow.**



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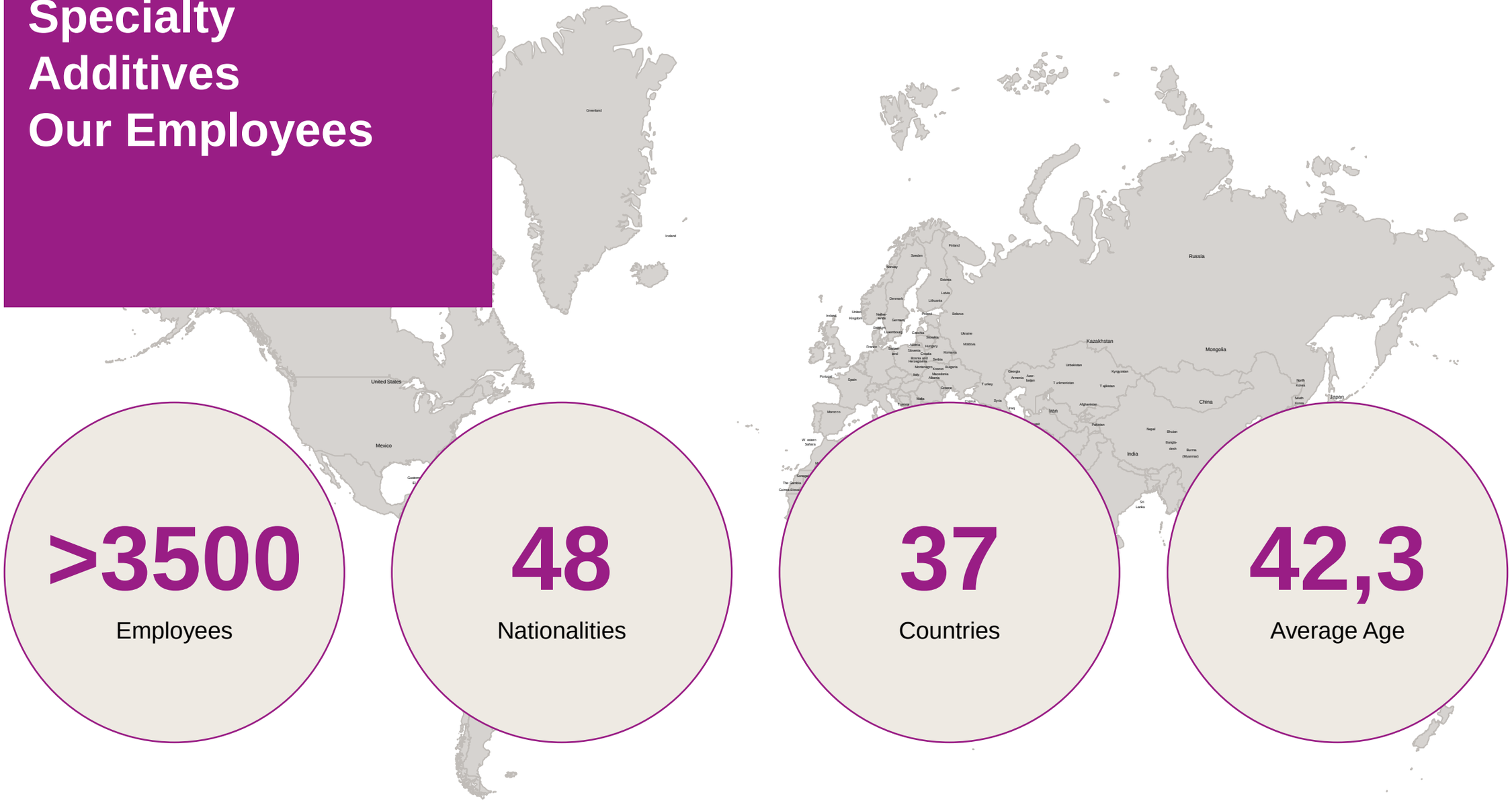
# That’s specialty chemicals.
# And that’s where we’re among the best in class.

| | | |
|---|---|---|
| **€13.1 billion**<br>sales* | **€2.15 billion**<br>adjusted EBITDA* | **€1.15**<br>dividend per share |
| **16.4%**<br>adjusted EBITDA margin* | **80%**<br>of sales from leading market positions | **€842 million**<br>capital expenditures |
| **>32,000**<br>employees | **101**<br>nationalities | **€1.94**<br>adjusted earnings per share* |



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# Specialty Additives Our Employees




**>3500**
Employees

**48**
Nationalities

**37**
Countries

**42,3**
Average Age



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# Specialty Additives at a Glance

## TECHNOLOGY PLATTFORMS

- Silicone
- Amines
- Isophorone
- Methacrylates

## KEY PRODUCTS

- PU Additives
- Lubricant Additives
- Crosslinkers
- Curing Agents
- Antifoams
- Specialty Additives for Plastics

**19%**
return on capital employed (ROCE)

**27%**
profitability (adjusted EBITDA margin)

**€ 918 million**
adjusted EBITDA

**€ 3,381 million**
sales



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# Five leading & versatile Business Lines

## COATING ADDITIVES

Visionaries have no rivals: Coating Additives the no.1 supplier of high performance solutions for coatings & inks



## COMFORT & INSULATION

Leading supplier of additives and innovative solutions for the PU industry



## INTERFACE & PERFORMANCE

Leading innovator in the design of interface properties based on a broad technology platform



## CROSSLINKERS

Leading global supplier of isophorone chemistry & technology leader in epoxy curing agents



## OIL ADDITIVES

The preferred partner for innovative efficiency solutions in lubricants and adjacent fields





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**Minor share of costs**

**Major effects**

**More durability**



**More protection**



**Less energy**



**Less maintenance**





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# Our technical capabilities

## Physical chemistry experts with deep knowledge of interfacial phenomena

### Synthesis





- Expertise in molecular surfactants architecture
- Huge toolbox of silicone and non-silicone chemistry
- Unique nanocomposite and reactive siloxane platform

### Formulation and Processing






- Broad product portfolio with tailored solutions for industrial processes
- Deep understanding of structure/performance relationship
- Integrated and networking with several of Evonik´s industry teams

### Testing and Analytics





- Testing of interfacial behavior of products and applications
- Multiple global locations of pilot lines and laboratory testing facilities
- Adhesive, Release and Substrate compatibility trials
- Operator training sessions

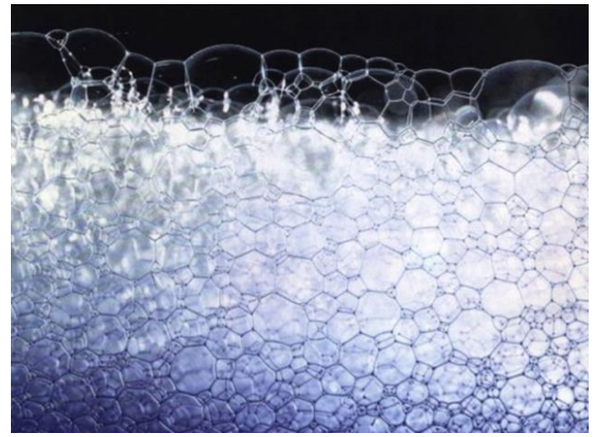


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# Our portfolio for compounding, polymer dispersion and adhesive applications





## Compounding and Dispersing

**Process and other performance additives for masterbatchers and compounders**

- **Property enhancer**
- **Dispersants for high end masterbatches**
- **Dispersants for liquid colorants**
- **Surface treatment**
- **Reactive Siloxanes**

## Polymer dispersions and Adhesives

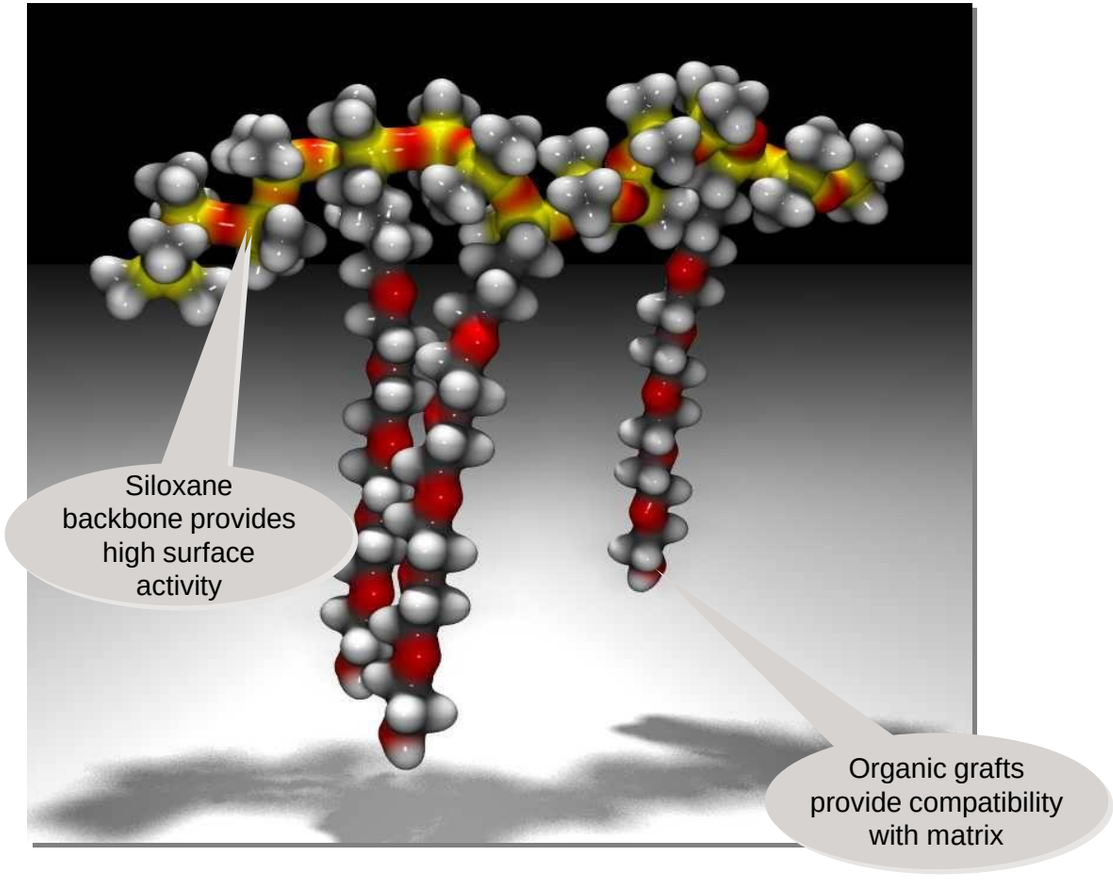
**Antifoams, emulsifiers and performance additives for the production and selected down stream formulation & application of polymer dispersions**

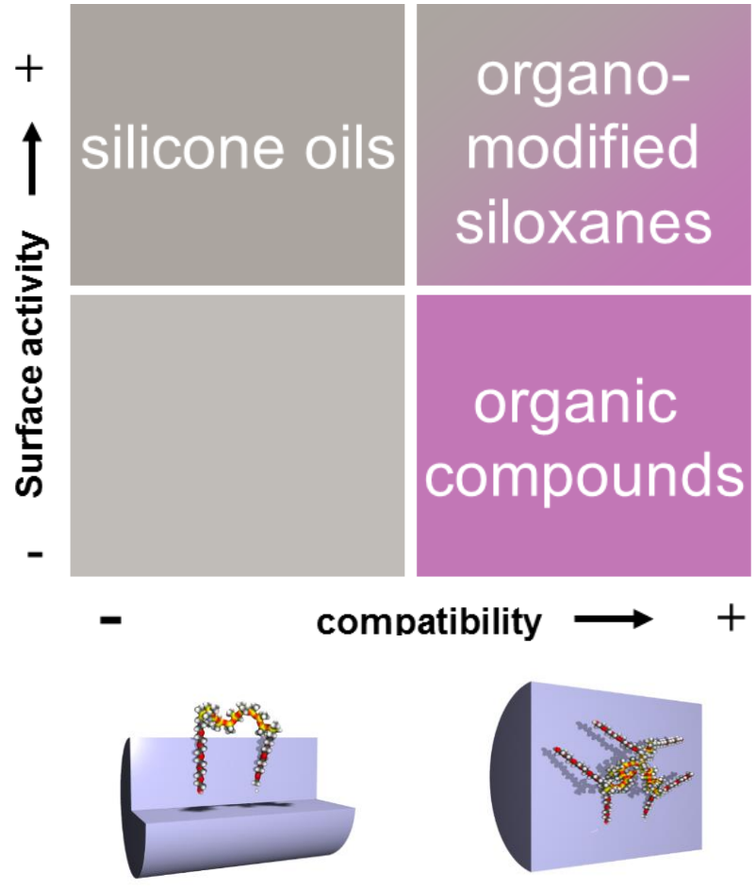
- **Antifoams for the polymer production**
- **Antifoams for the formulation**
- **Wetting agents**
- **Thickener**
- **Dispersants**
- **Emulsifiers**



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# Core Technology of Plastic Industries Organo Modified Siloxanes (OMS)



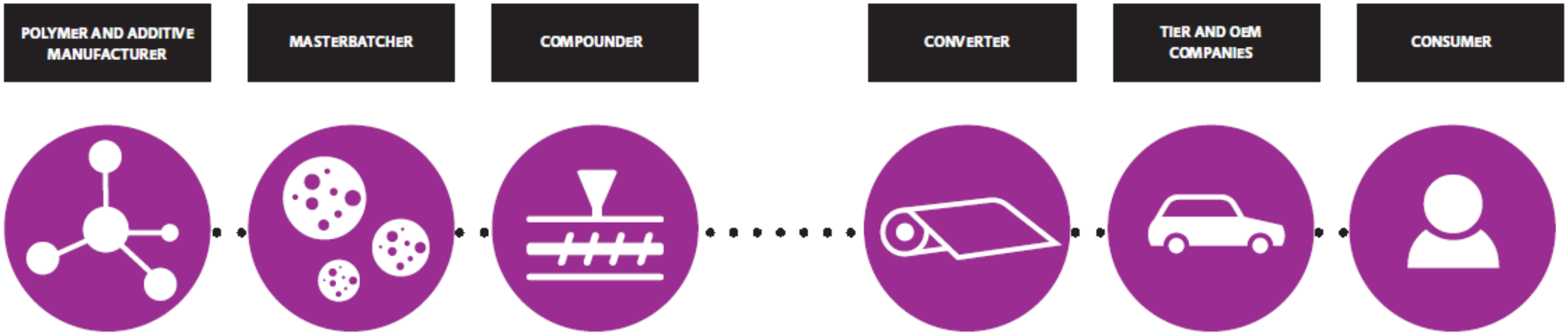




**Organomodified siloxanes overcome the disadvantage of PDMS by the introduction of organic groups on the siloxane backbone generating a permanent implementation in thermoplastic and elastomeric polymers.**



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# Enabling solutions for the future
## Special Effects for the Needs of the Value Chain




**RAW MATERIAL MANUFACTURER**
- *Antistatic additive*
- *Melt flow improver*
- *Slip agent*
- *Chain extender*
- *Processing aids*
- *Dispersant*
- *Polymers*
- *Pigments, fillers, flame retardants*
- *UV stabilizer*
- *Antioxidants*

**COLOR MB AND LIQUID COLORANTS**
- *Dispersant*

**ADDITIVE MB**
- *Antistatic agent*
- *Antifogging additive*
- *Slip agent*
- *Antiblocking additive*
- *UV stabilizer*
- *Odor adsorber*
- *Processing aids*

**COMPOUNDER**
- *Antiscratch additive*
- *Mold release agent*
- *Impact modifier*
- *Nucleator*
- *Chain extender*
- *Dispersant*
- *Haptic enhancer*
- *Flame retardant/synergist*
- *Foaming agent/cell stabilizer*
- *Slip agent*
- *Melt flow enhancer*
- *Processing aids*
- *Stain preventer*
- *Odor adsorber*

***Molder, film manufacturer, foam manufacturer or cable companies***
- *Processing aid/PPA*
- *Antistatic additive*
- *Antifogging additive*
- *Mold release agent*
- *Antiscratch additive*
- *Haptic enhancer*
- *Odor adsorber*
- *Melt flow enhancer*

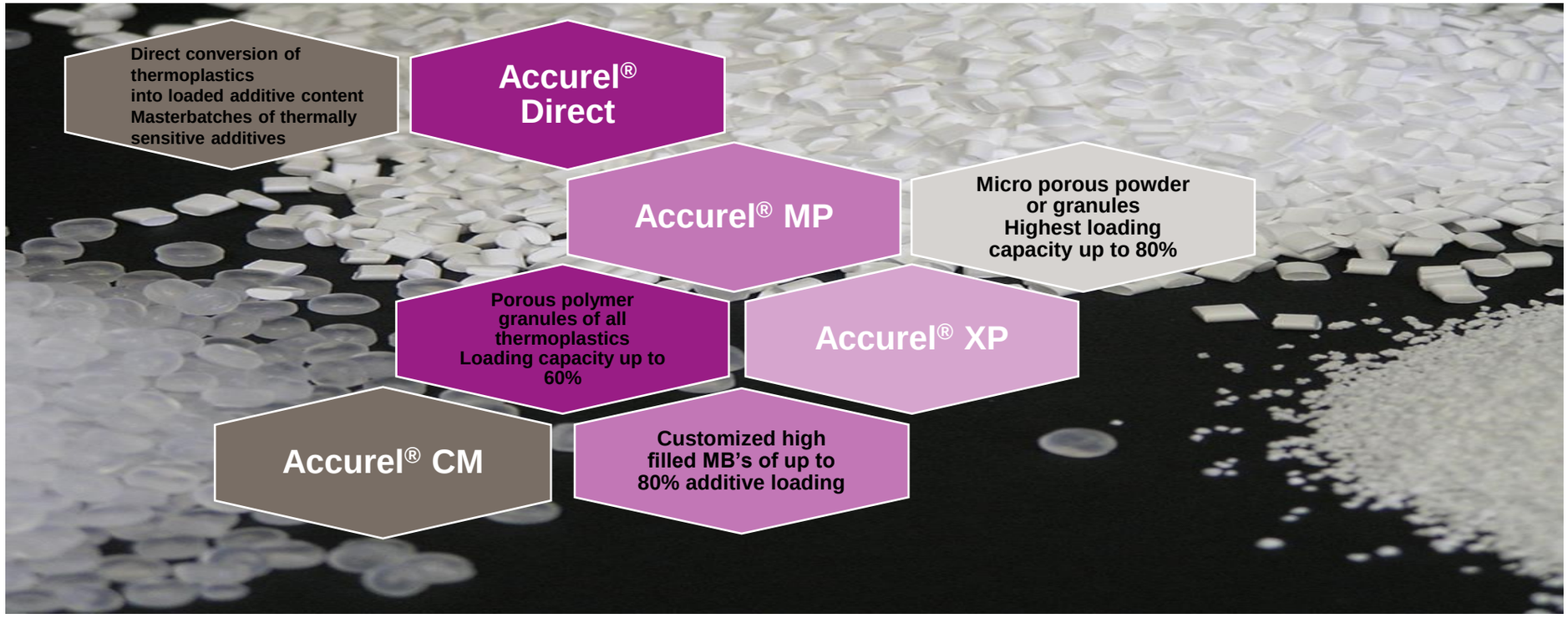
***OEMs** from various industry segments such as automotive, appliances, electronics, packaging, cable, medical define their needs which can be supported by the additive supply to the master-batcher, compounder or converter.*

*As **consumers** we require that our expectations in goods will be fulfilled. At Evonik we have the right additive solution for it.*



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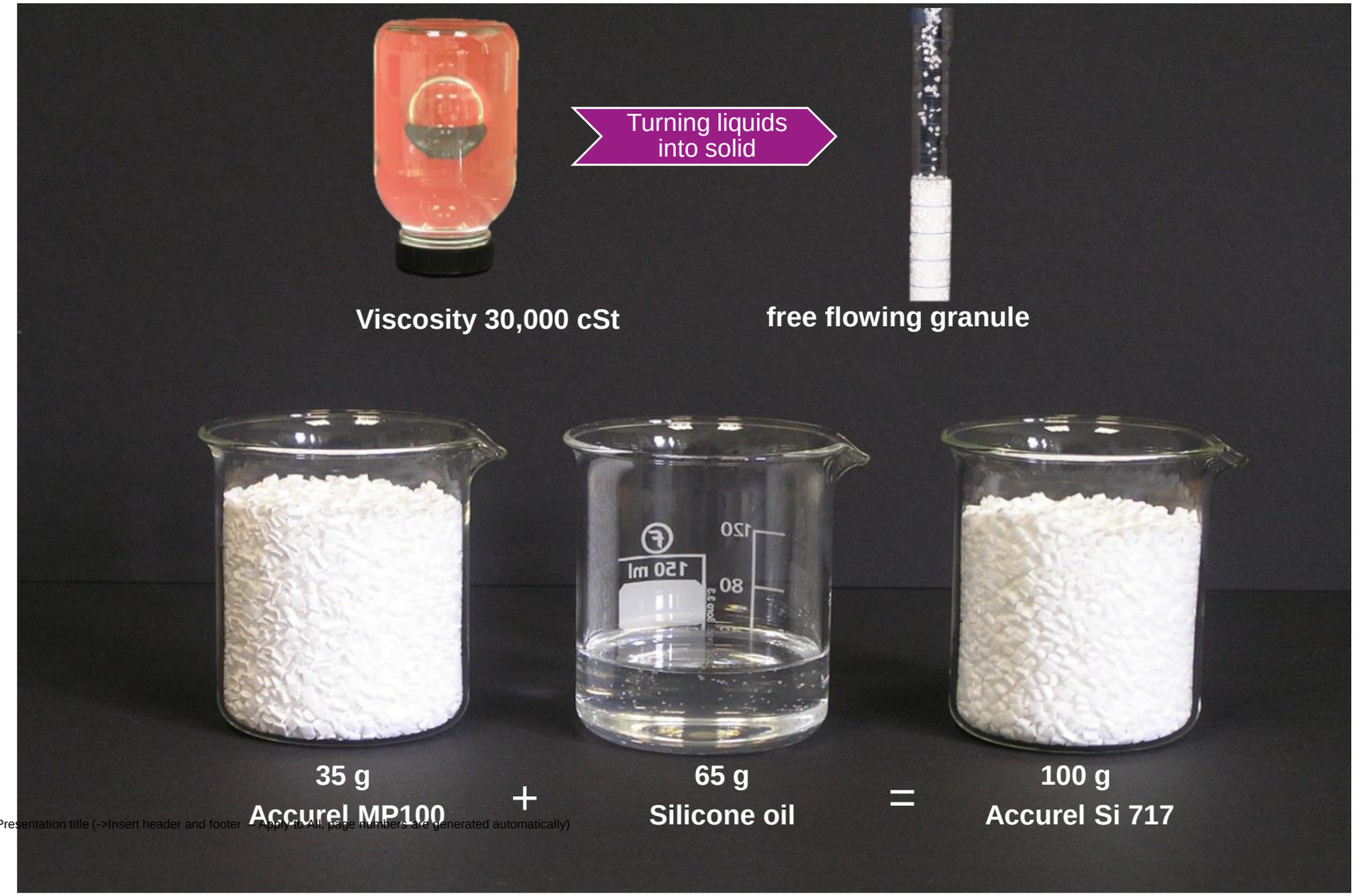
# Accurel® Product Portfolio - pourous Carrier for sensitive Additives






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# Additive Loading on Accurel® MP Porous Polymer






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# Highly filled additive Masterbatches – selection guide

## Accurel® grades for various polymers

| | HDPE | LLDPE | LDPE | EVA | PP | PA 6 | PC | PS/ABS/ ASA/SA N | PET | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Slip Agent COF reduction** | Accurel® Si803 | | Accurel® SF640 | Accurel® SF660 | Accurel® Si707 / SF610 | | | Accurel® SF1710 | | HDPE pipes and HDPE molded parts; LDPE film, BOPP film, PS film/sheet |
| **Antifog Agent** | | Accurel® AF401 | | | | | | Accurel® AF450 | | Agriculture PE films with cold fog performance; PS films with cold and hot fog characteristics |
| **Antistatic Agent** | Accurel® SF179 | Accurel® SF261 GA372 | Accurel® GA301 SF112 | | Accurel® GA300 SF266 SF268 SF271 | | | Accurel® GA302 GA381 | | Short and long term antistatic effects; PE film and bubble film; electronic packaging and molded parts; BOPP standard packaging film; PP cast film; PP print lamination film and molded PP parts, PS films, foams and molded parts even for electronic application |
| **Antiblock Agent** | | Accurel® SF1760 | | | Accurel® AB103 | | Accurel® SL810 | | Accurel® SL811 | PE and EVA film and sheet application, PP films, e.g. metallized films, cigarette film, transparent PC sheets, transparent PET sheets or parts |
| **Mold release Agent** | Accurel® Si754 | | Accurel® Si703 | | Accurel® Si796 | Accurel® Si755 | Accurel® Si792 | Accurel® Si753 | Accurel® Si790 | Injection moldind application for various polymers |
| **Foam Cell Stabilizer Foaming Agent** | | | Accurel® GA301 GA354 | Accurel® GA303 | Accurel® WF100 | | | | | PE and EVA foams with homogeneous cell structure; TPE-V sealants with reduced density due to foaming |
| **Flame Retardamt** | | | | | | | Accurel® FR519 FR512 | Accurel® FR504 | | PC sheets with transparency, molded PC parts with anti-dripping, e.g. seats or lamps, PS and PC/ABS FR application |
| **Haptic Enhancer** | | | | | Accurel® GA300 | | | | | PP fibers and nonwovens with soft grip performance |



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# Standard Accurel® Grades

## Accurel® XP grades for various polymers

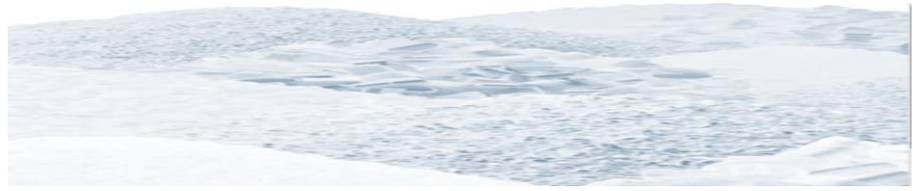
| Accurel® | Polymer | Standard Loading capacity [%] |
|---|---|---|
| XP100 | PP | 70 |
| XP200 | HDPE | 60 |
| XP300 | PVOH | 60 |
| XP315 | LLDPE | 30 |
| XP400 | LDPE | 50 |
| XP500 | EVA | 50 |
| XP550 | EMA | 30 |
| XP601 | PC | 60 |
| XP650 | PMMA | 50 |
| XP700 | PA6 | 65 |
| XP712 | PA12 | 65 |
| XP800 | PS | 60 |
| XP850 | SBC | 50 |
| XP851 | SAN | 50 |
| XP880 | ABS | |
| XP900 | PET | 60 |
| XP950B | Bio Polyester | 50 |
| XP951B | PLA | 60 |

## Accurel® MP grades for various polymers

| Accurel® | Polymer | Standard Loading capacity [%] |
|---|---|---|
| MP100 | PP | 70 |
| MP1000 | PP powder | 65 |
| MP200 | HDPE | 65 |
| MP300 | LLDPE | 70 |
| MP400 | LDPE | 65 |

## Accurel® CM – Customized Grades

**Customer specific grades utilizing Accurel® technologies on request**





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# TEGOMER® / TEGOPREN®- Multifunctional Additives for Thermoplastics

**TEGOMER® and TEGOPREN®** are OMS (Organo Modified Siloxanes) based performance additives to improve surface and bulk properties of polymers like

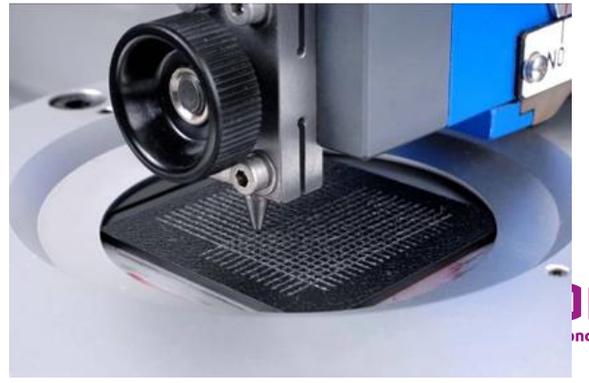
- scratch resistance
- surface smoothness
- processing parameters like mold filing and deforming
- prevention of cut propagation in orientated films
- no VOC
- reduction of shark skin and COF
- Improved melt flow
- replacement of flour based PPA‘s





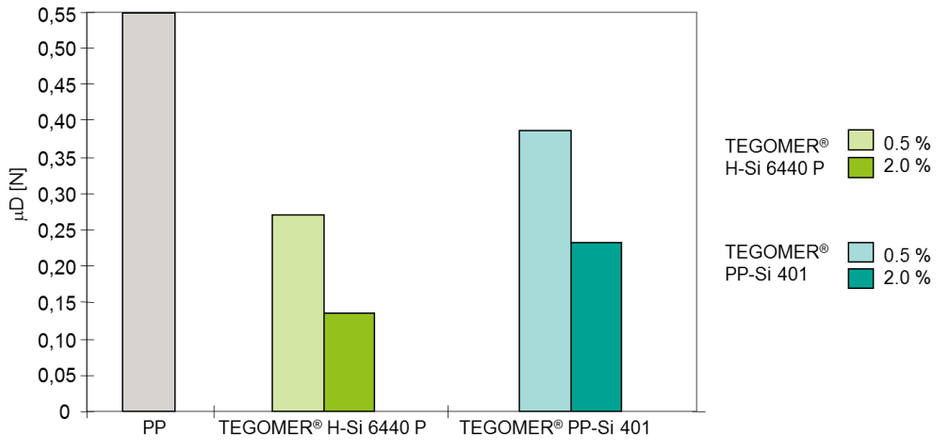




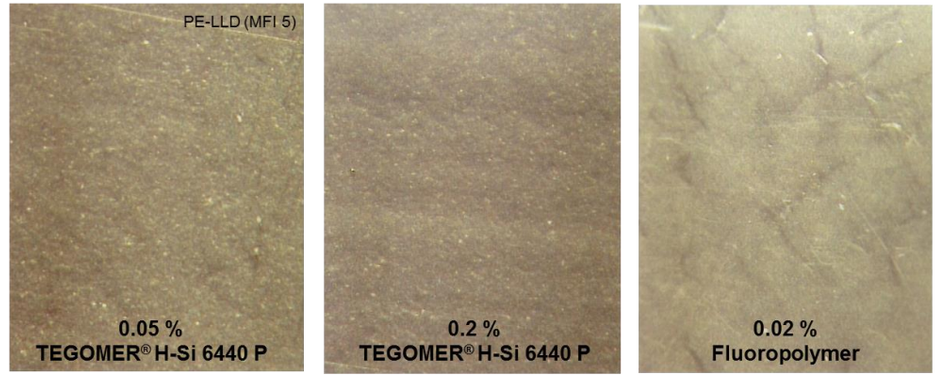



# OMS as Eco friendly PPA Technology in Thermoplastic Film & Tape Production

PP + OMS: Coefficient of Friction
DIN 53375 (A) Film/Film

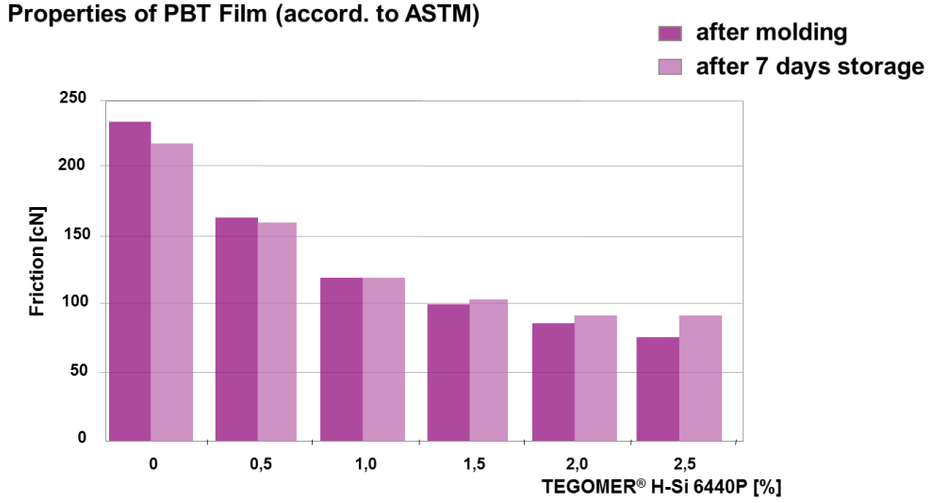


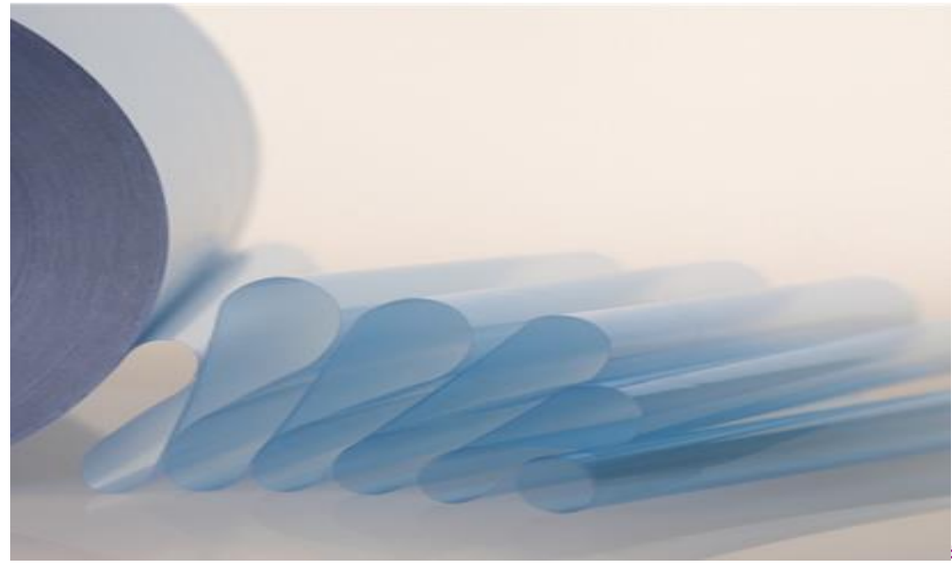

**Positive Influence on melt fracture with TEGOMER® H-Si 6441P**




TEGOMER® H-Si 6441P can be used as an enviroment friendly replacement of Fuorploymers in blow film application. As it works as an internal additive it allows much quicker color changes in the production.

**Properties of PBT Film (accord. to ASTM)**





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# The use of TEGOMER® H-Si 6441P

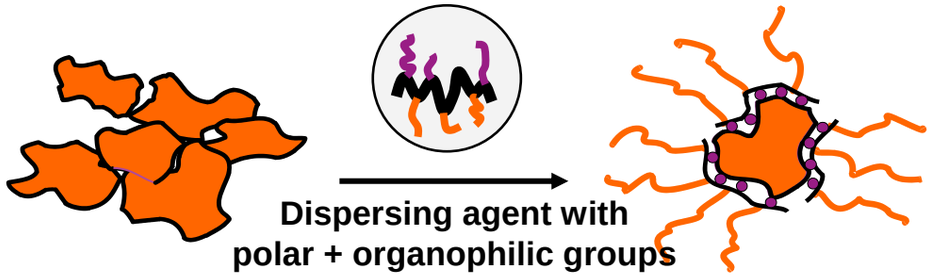
| Application | Properties | TEGOMER® H-Si 6441P |
|---|---|---|
| PP injection molding | Mould release | 0.2 - 0.5 |
| PE injection molding | | 0.2 – 0.5 |
| PP film | COF | 0.1 – 0.3 |
| PE film | | 0.1 – 0.3 |
| PP film | Shark Skin Prevention | 0.05 – 0.2 |
| PE film | | 0.05 – 0.2 |
| Polyolefin films | Release | 0.1 - 0.2 |
| Orientated films | Cut propagation | 0.5 – 1.0 |
| PA<br>PBT<br>PET | Mould release | 0.2 – 0.5 |
| | Melt flow improvement | 1.0 – 2.0 |
| PA | Hydrophobisation | 5.0 |
| PP + 20% talc comp. | Scratch Resistance | 0.5 – 1.5 |
| Legislation | Food contact approval | FDA 177.1520* |

*** Food Contact Status:**
**TEGOMER® H-Si 6441 P and TEGO XP 21025 may be used as an additive in flexible food-contact polyolefin (PE, PP) under 21 CFR 177.1520, in food-contact ethylene vinyl acetate (EVA) film, in food-contact polystyrene (PS) film and in single and repeated-use food-contact polyethylene terephthalate (PET). TEGOMER® H-Si 6441 P may be used up100 mg/sqm food contact area in PP, PE, EVA and PS films, and in single- and repeated- use PET up to 100 mg/sqm and 600 mg/sqm food contact area, respectively.**



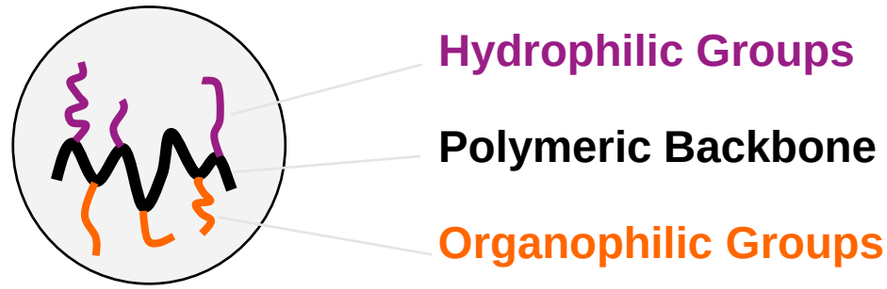
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# Benefits of TEGOMER® as Dispersant




Agglomerate

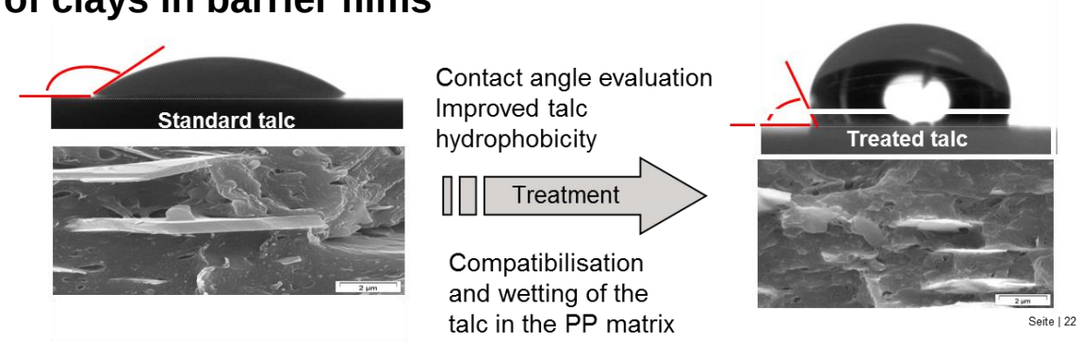
Aggregate




TEGOMER® DA

**Due to their special chemical nature TEGOMER® DA additives**

- **interact with the pigment or filler surface and form a stable layer on it**
- **will compatibilism the pigment/filler to the polymer matrix**
- **are compatible with polyolefin and technical polymers**
- **Exfoliation of clays in barrier films**






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# $TiO_2$: TEGOPREN® 6875 Improves Processing and avoids Lacing

Advantages due to surface treatment of pigments:

- Improved processing due to less dusty appearance and no bridging in the feeder
- Higher loading possible
- Better dispersion
- No specks
- No lacing
- Higher color strength/ better hiding power




Silicone oil treated grade with TEGOPREN ® 6875



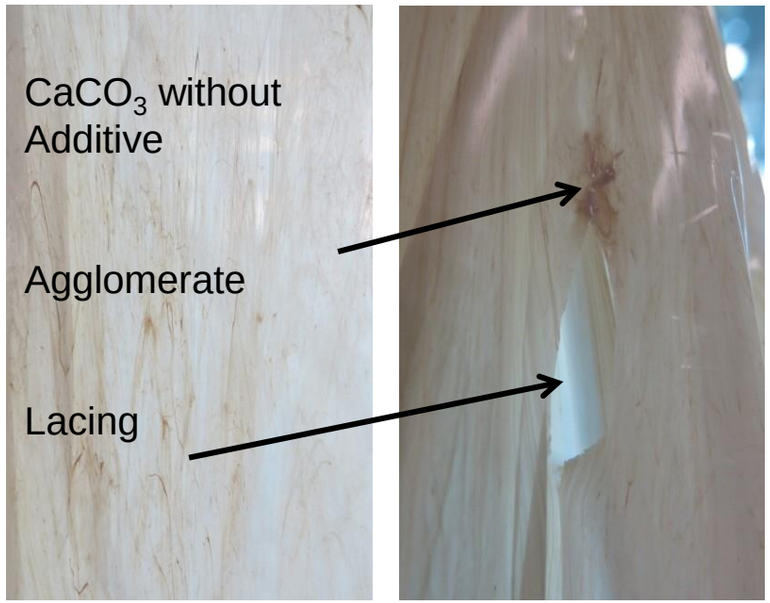
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# TEGOPREN® 6875 allows to reduce Dustiness and Imparts Free Flow

- Advantages due to surface treatment of pigments:

➢ 25-50% reduction in dust with a TEGOPREN 6875 treated grade compared with a silicon oil treated grade.This can be proved using the Continuous Drop Down method (see principal picture on the right)

➢ Free flowing pigments are available due to the TEGOPREN 6875 treatment-allowing easy discharge of silos and IBC‘s









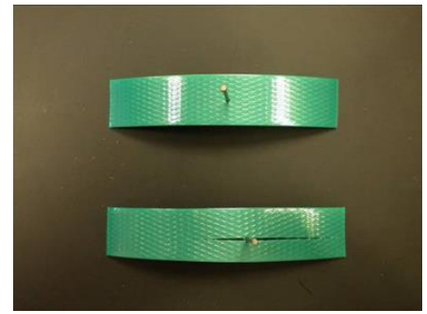
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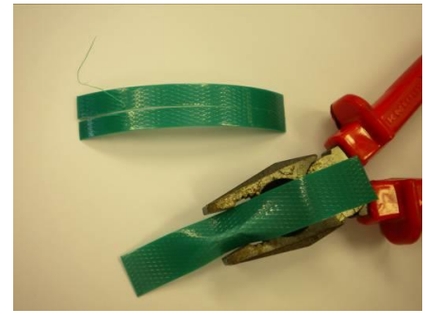
# Benefits by using TEGOMER Grades in orientated Films & Strapping Tapes

## TEGO® XP 21025 / TEGOMER ® H-Si 6441P

- Increased impacted strength
  - Easy replacement of steel hoops even at low temperatures
- Splice prevention
  - reduces blockages of automatic strapping devices
- Improved mechanical properties
- Cut elongation prevention
- Improved IV in polyesters
  - reduced raw costs as higher amounts of re-PET can be used
- Good welding properties







Cut elongation prevention with 2% TEGO® XP 21025

Folding Test and Nail/Pin Test

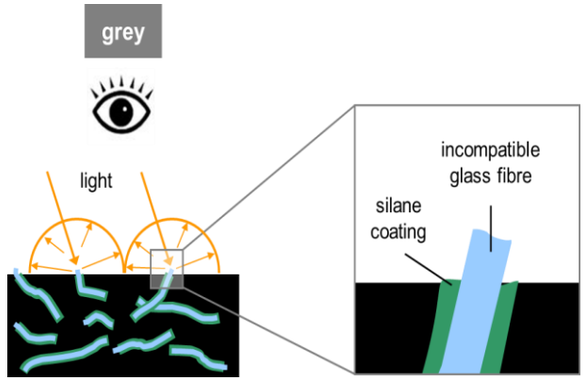
Tape is Folded in the direction of the orientation.

No cut or reduced length of cut occurred or by using TEGOMER Additives



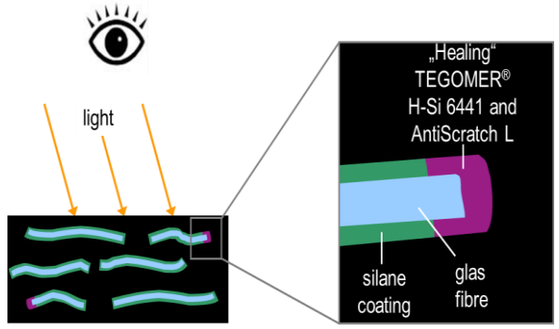
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# TEGOMER® for the Embedding of Fibers and Fillers in Thermoplastics



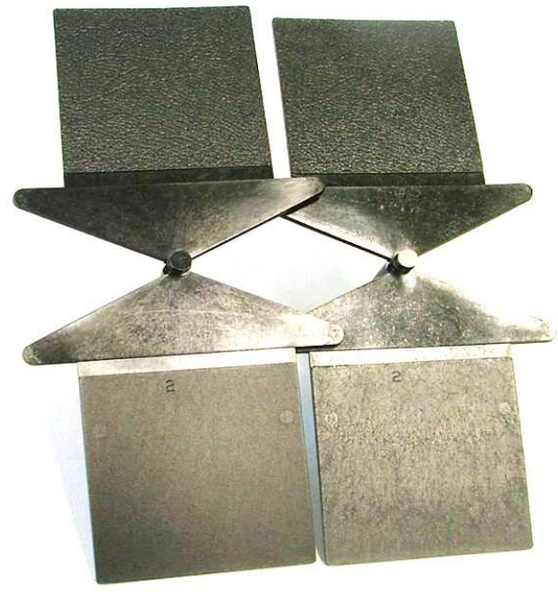

- Silane coated glass fibers break during processing may appear
- Broken, uncoated fiber ends are incompatible to polymer matrix
- Fiber ends cause scattering & reflection of light

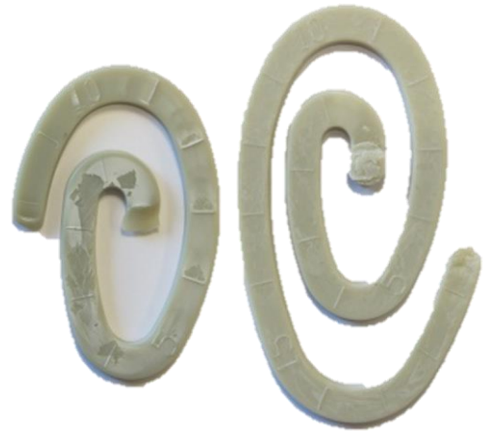
➔ Greyish color of compound instead of black surface




- Less damages of coated glass fibers during processing
- Uncoated ends of damaged fiber are „healed“ by additive
- Light is absorbed by black dyes or pigments
- No reflection or scattering

➔ Deep black color as desired by the customer





without additive 2% TEGOMER®



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# Antifogging Additiv – For a clear view on your meal





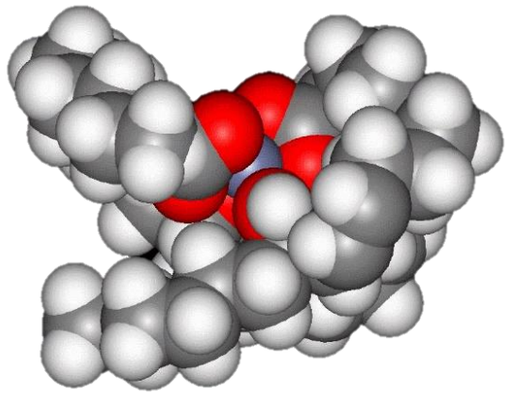
**TEGO® STS**
**Accurel® AF 401**
**Accurel® 450**

- Effective antifogging additives for polyolefines
- Whide food contact approval
- Suitable in food packlaging films and green hous films
- Easy to handel as supplied as a solid powder.



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# TEGO® Sorb PY 88 T.Q. – Giving the world a clean smelling back



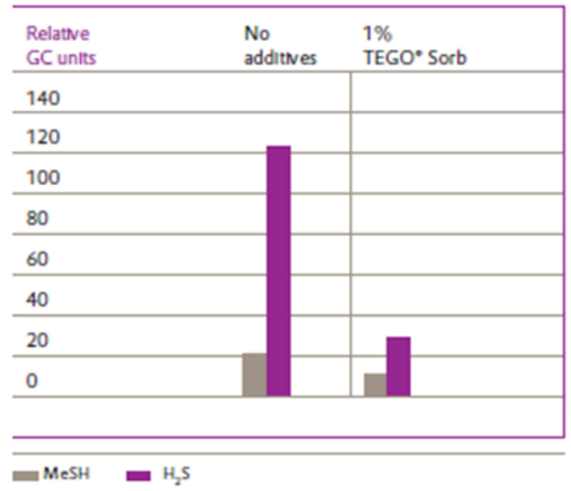
- TEGO® Sorb PY 88 T.Q. helps to meet critical organoleptic and olfactory demands
- Non reversible absorption of Sulphur and Nitrogen containing impurities creating malodor
- Suitable for preventing emission from recycled polymers, pigments, TPE's, PA….



## The benefits of TEGO® Sorb PY 88 T.Q. can be identified in the following manufacturing steps

- During Compounding to guarantee an malodor free production
- For reduced odor of the final product
- Especially effective for eliminating odors in recycling of thermoplastics and rubber production

Figure 19: Reduction of hydrogen sulfide and mercapto methane by TEGO® Sorb






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# Leverage know-how and foster exchange to create maximum performance today and tomorrow

WE MAKE A DIFFERENCE






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