

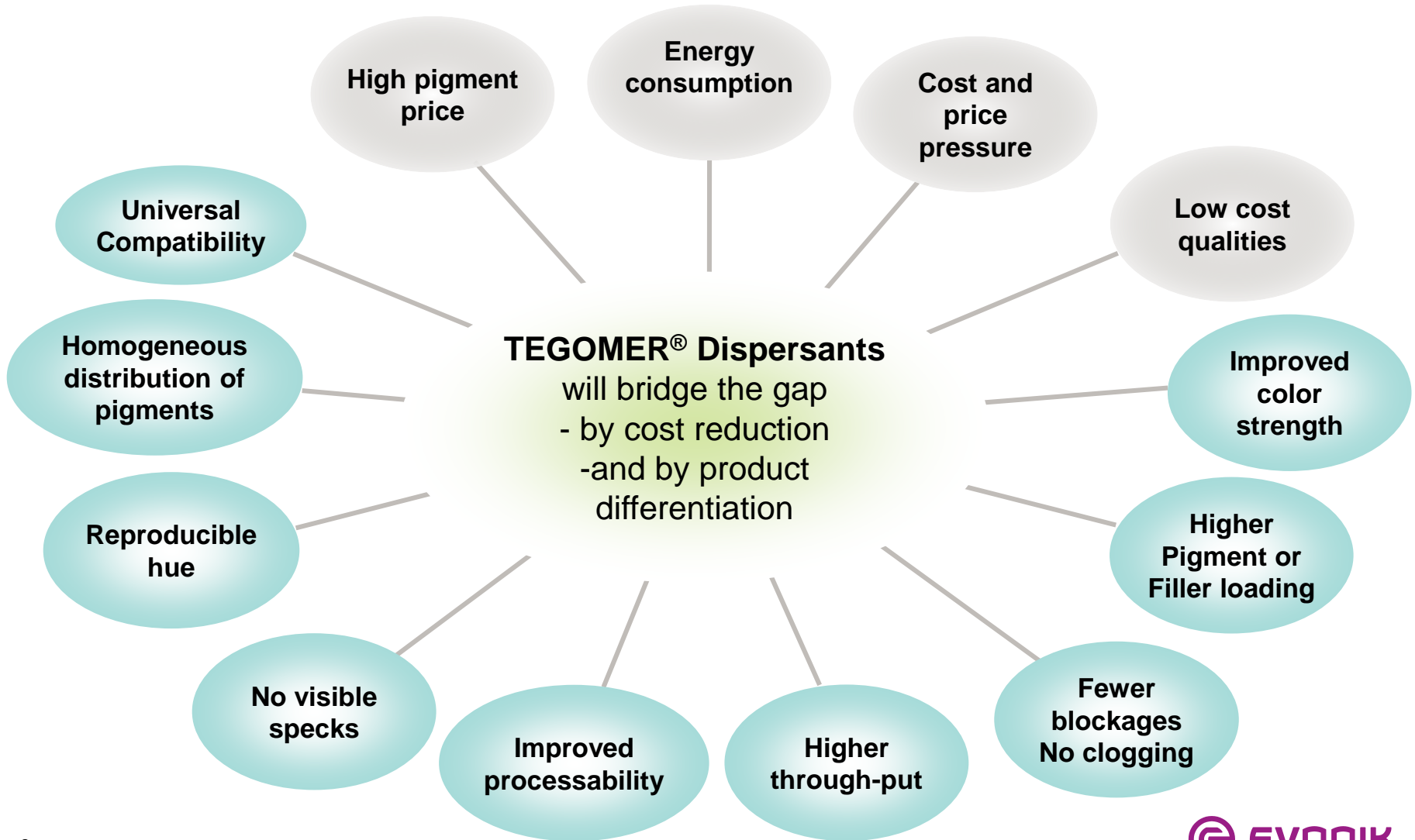
# Dispersing at its best

## TEGOMER® Dispersants for Masterbatches and Compounds

Evonik Nutrition &  
Care GmbH  
IM Interfaces &  
Performance  
Technical Service  
Polymers



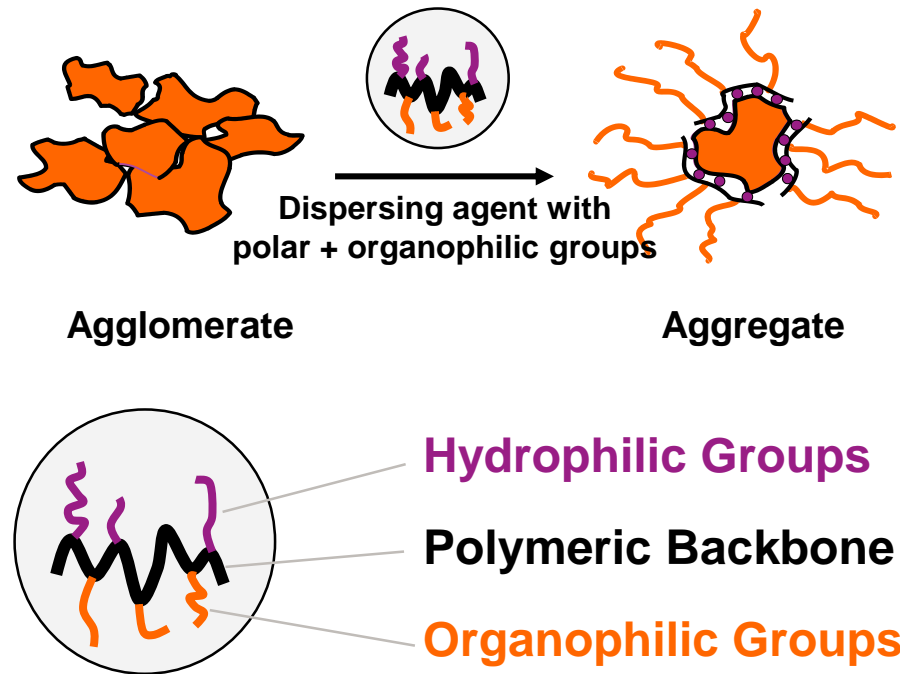
# Masterbatches – Requests and Demands



# TEGOMER® – Amphiphilic Additives Mode of Action

Due to their special chemical nature they -

- are highly temperature stable.
- will compatibilize the pigment/filler to the polymer matrix.
- are compatible to polyolefins and technical polymers.
- can interact with the pigment surface and will form a stable layer on it.



TEGOMER® Dispersants allow high flexibility in application and excellent efficiency due to high temperature stability and amphiphilic character

# TEGOMER® Dispersing Additives – Product Overview I

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## ➤ TEGOMER® E 525

- For PE based color concentrates and compounds
- For colorizing POM and PVC
- For carbon black, transparent iron oxides, inorganic fillers
- Outstanding clarity and reduction of specks in film applications
- Enhanced productivity and throughput in highly filled compounds
- For direct coloration of compounds



### Food contact status

**GB 9685:** TEGOMER® E 525 may be used in plastics based on PE, PP, PS, AS, ABS, PET, PC and PVC .

**European Regulation 10/2011:** TEGOMER® E 525 may be used in compliance with the EU-Regulation 10/2011 up to 3.2 % w/w in polyolefin materials and articles.

**FDA Regulations:** TEGOMER® E 525 may be used in compliance with FDA Regulation 21 CFR 177.1520 (Olefin polymers).

# TEGOMER® Dispersing Additives – Product Overview II

## ➤ TEGOMER® P 121

- For PP and technical polymers, e.g. PA, PBT/PET
- For all kind of pigments in demanding masterbatch application, e.g. blow films (PP, PA and PET) or molded appliances (PA, PBT, ABS)
- For carbon black and color pigments which are difficult to disperse used in masterbatches for dyeing of spin fibers
- For direct coloration of compounds
- Excellent thermal and color stability



### Food contact status

**GB 9685:** Less than 50 % of TEGOMER® P 121 may be used in in compliance with the GB 9685-2008 when used in adhesives. All other components may be used in plastics based on PE, PP, PS, AS, ABS and PC up to a level of 2.5 % and in PET up to a level of 0.5 % in compliance with the Chinese guideline GB 9685-2008.

**European Regulation 10/2011:** TEGOMER® P 121 in compliance with the EU-Regulation 10/2011 up to 4.5 % in the finished article.

**FDA Regulations:** TEGOMER® P 121 may be used as a dispersant for colorants at a maximum level of 0.166 % in polyolefin, in contact with all types of food, except foods containing greater than 13 % alcohol under conditions of use B ("Boiling water sterilized") through H ("Frozen or refrigerated storage: Ready-prepared foods intended to be reheated in container at time of use").

# TEGOMER® Dispersing Additives – Product Overview III

## ➤ TEGOMER® P 122

- Comparable application profile to TEGOMER® P 121:
- For PP and technical polymers, e.g. PA, PBT/PET
- For all kind of pigments in demanding masterbatch application, e.g. blow films (PP, PA and PET) or molded appliances (PA, PBT, ABS)
- For carbon black and color pigments which are difficult to disperse used in masterbatches for dyeing of spin fibers
- For direct coloration of compounds
- Excellent thermal and color stability
- It is delivered as a free flowing micro granulate for easy handling and quick dust free feeding



### Food contact status

**GB 9685:** TEGOMER® P 122 may be used in plastics based on PE, PP, PS, AS, ABS and PC up to a level of 5% and in PET up to a level of 0.5%.

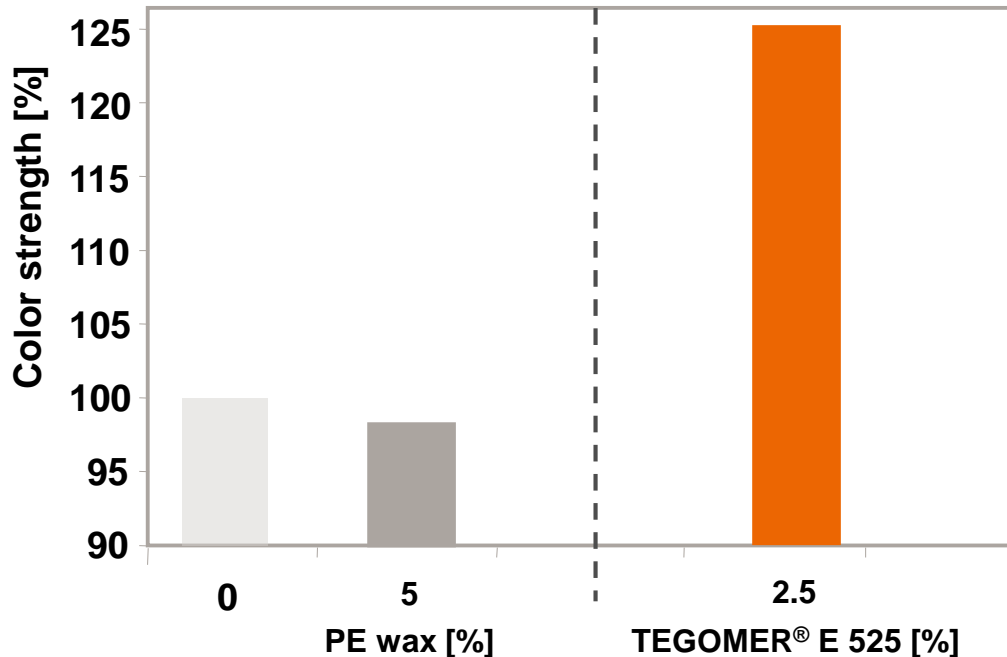
**European Regulation 10/2011:** TEGOMER® P 122 may be used without a specific migration limit (SML-value) in the Regulation 10/2011/EU

**FDA Regulations:** TEGOMER® P 122 may be used as a dispersant for colorants at a maximum level of 2 % in polyolefins. In all other types of plastics TEGOMER P 122 may be used as a dispersing additive up to 400 mg/sqm food contact area (e.g. 0.4% in a film with 100 g/sqm).

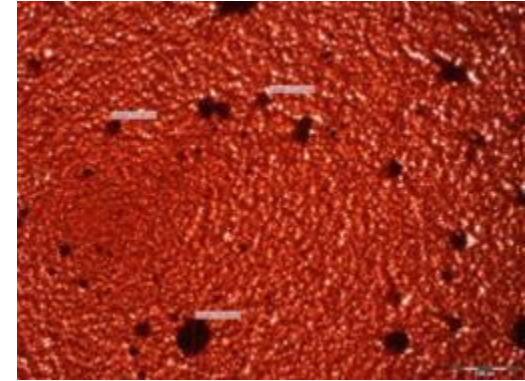
# TEGOMER® E 525 – Effect on Inorganic Pigment

## Formulation

Additive:	0 - 5 %
Iron Oxide Red P.R. 101:	20 %
PE-LD (MFI 15):	75 - 80 %



Concentrate was heightened with TiO<sub>2</sub> to determine the color strength Pigment:TiO<sub>2</sub>-ratio 1:10



With PE WAX



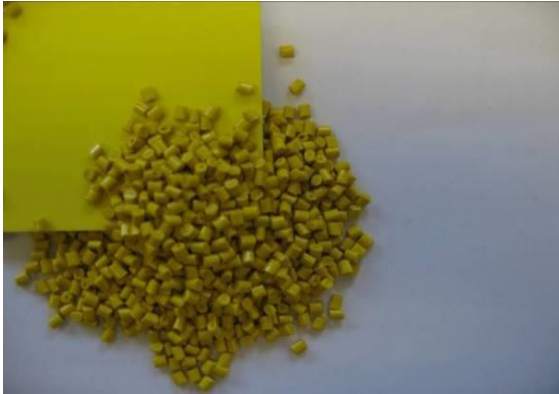
With TEGOMER® E 525

**TEGOMER® E 525 – highly efficient even at low dosages**

# TEGOMER® P 121 & P 122 - Designed for use in Masterbatches and Films

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## ➔ Masterbatches



### TEGOMER® P 121/ P 122

- Higher pigment loadings
- Improved color strength
- Positive influence on rheology
- Excellent thermal and color stability even in technical polymers

## ➔ PP Films



### TEGOMER® P 121/ P 122

- Speck free and high transparent films are obtained
- No reflockulation in down streaming
- Avoid film fracture

**Outstanding performance in masterbatching and direct coloration of technical polymers and PP**



# TEGOMER® P 121 & P 122 - Designed for Colorizing Technical Polymers

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## ➔ Mass dyeing of Polyester fibers



### TEGOMER® P 121/ P 122

- Improved color strength
- Reduced fiber fracture
- Low pressure index values

## ➔ Colorizing of PET

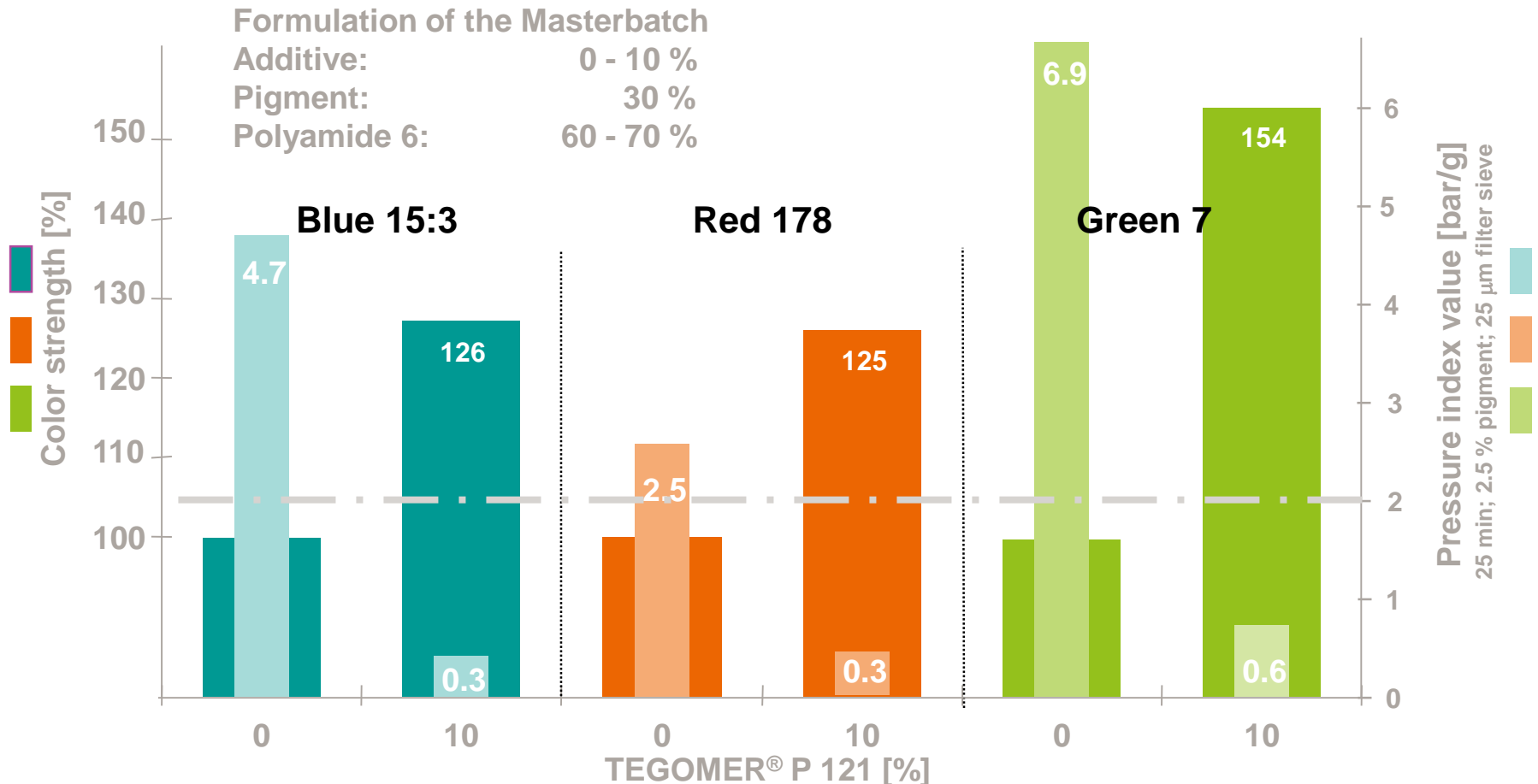


### TEGOMER® P 121/ P 122

- Excellent clarity with no haze
- High color yield

**First choice for PP and all kinds of technical polymers in high demanding applications where a superior pigment dispersion is essential**

# TEGOMER® P 121 – Colorizing PA 6



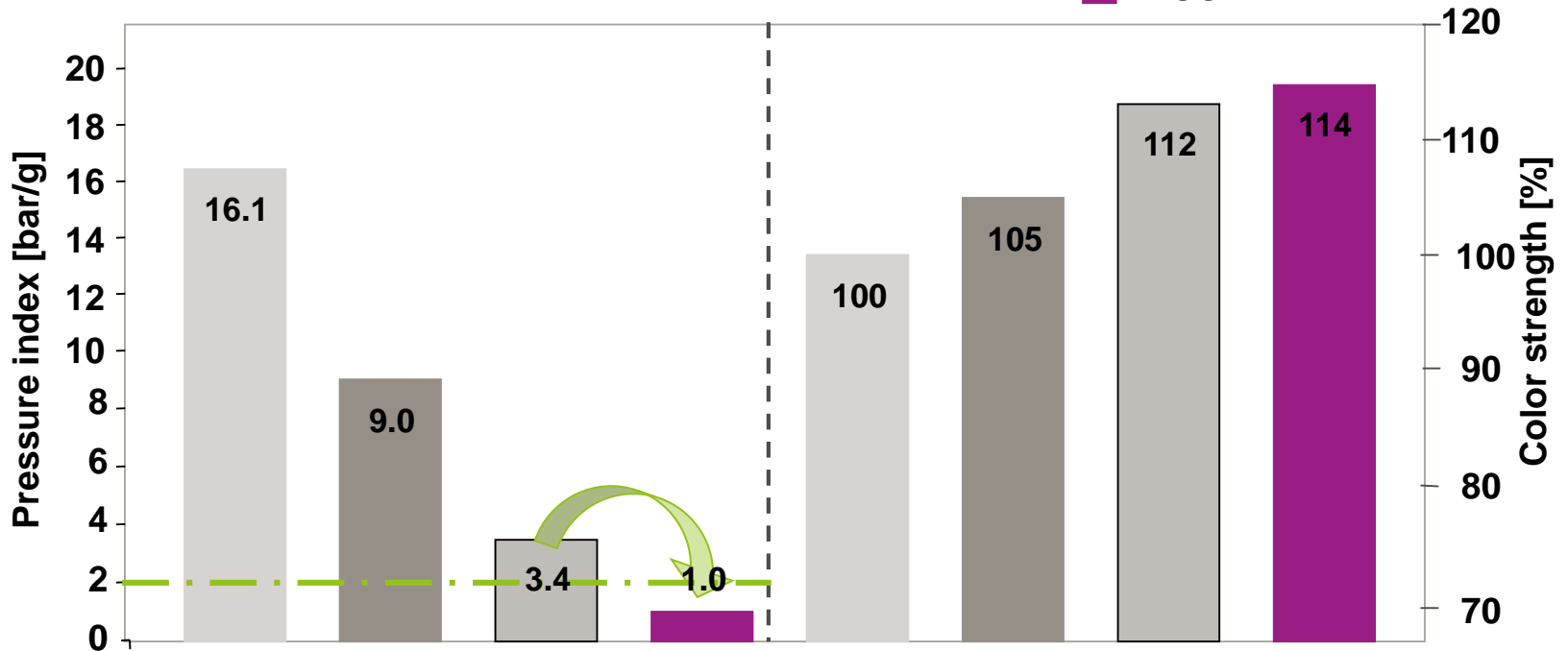
**By using TEGOMER® P 121 a tremendous reduction of the pressure index value (< 2 bar/g for fiber grades) and a significant increased color strength is obtained**

# TEGOMER® P 121 - in Comparison to Waxes with Pigment Yellow 155

## Formulation

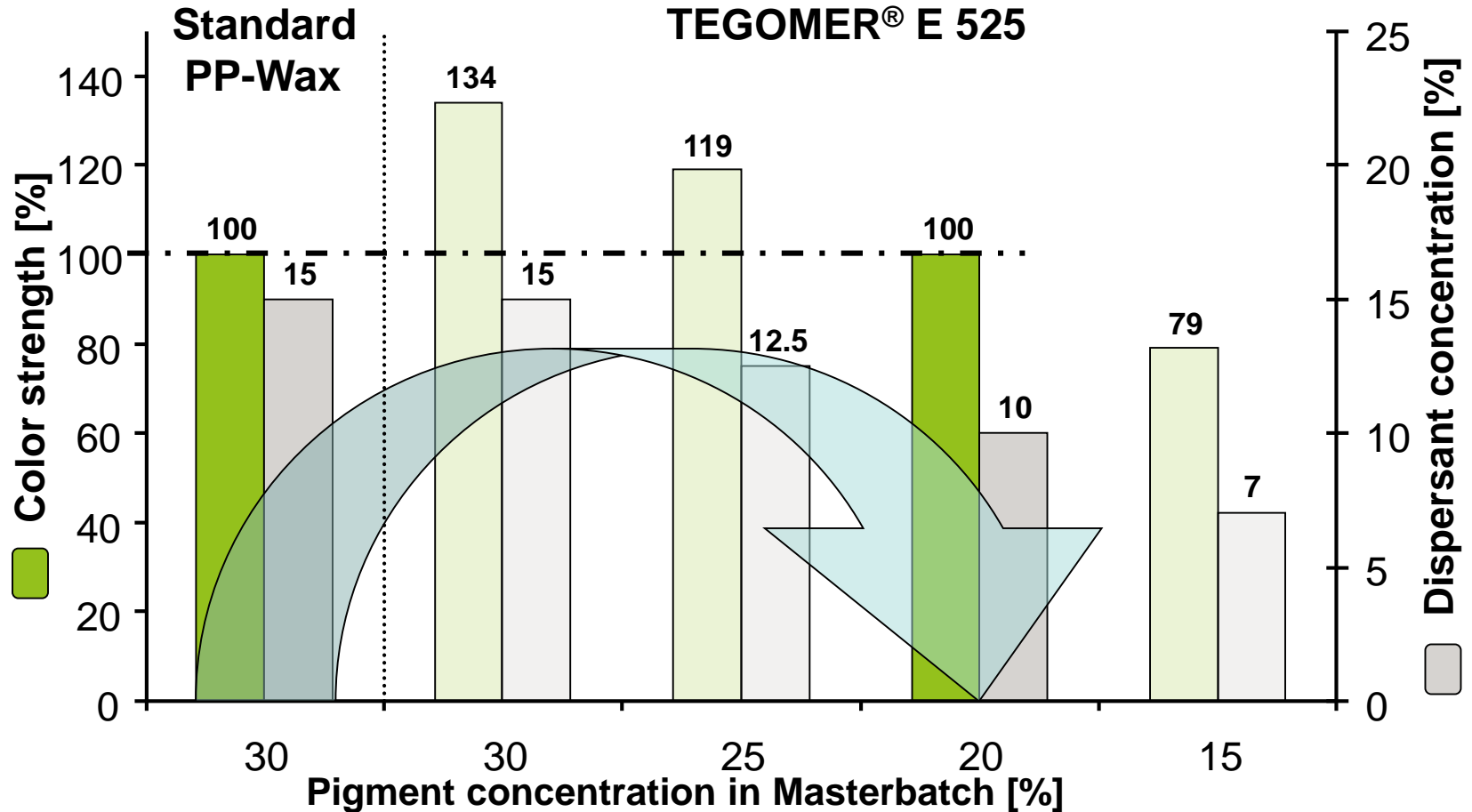
Additive:	15 %
Pigment Yellow 155 :	30 %
PP (MFI = 50 g/10 min.)	55 %

- PP-Wax
- PP-Wax, micronized wax
- Micronized wax, metallocene wax
- TEGOMER® P 121



**TEGOMER® P 121 enables to reduce the pressure index value below 2 bar/g which is essential for spun fine fiber qualities**

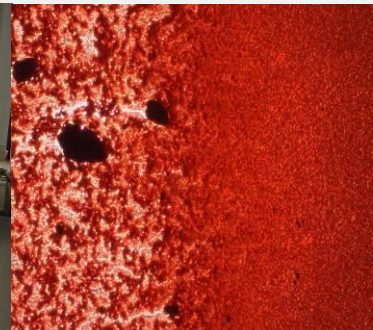
# Cost Saving by Pigment Reduction - PG 7 in PP with TEGOMER® E 525



Pigment reduction by 33%, dispersant reduction by 33%, increase of base polymer by 15%

# TEGOMER® Dispersants – Test Methods

- **Color Strength measurement**
- **Gloss**
- **Transparence**
- **Microscopy examination**
- **Filter pressure value**
- **Speck evaluation**
  - On blow films and molded plates
  - Press out method
- **Mechanical properties**
  - Impact strength
  - Elongation/ tensile strength...etc.



# TEGOMER® Dispersants – General dosage recommendations

Product	Suitable Polymers	Dosage in [%] AOP*			
		Organic Pigments	Inorganic Pigment	Carbon Black	Fillers
TEGOMER® E 525	PE, EVA, POM and PVC	30-50	3-5	50-100	2-4
TEGOMER® P 121	PP, PA, PET/PBT, ABS/PS and other technical polymers	30-50	2-4	40-100	
TEGOMER® P 122	PP, PA, PET/PBT, ABS/PS and other technical polymers	30-50	2-4	40-100	

\* % AoP: Additive calculated on Pigment in parts by weight

# TEGOMER® Dispersants – Polymer Recommendation

Product	Polymer types						
	PE / EVA	PP	POM	PA	PET / PBT	ABS / PS	PVC
TEGOMER® E 525	■	○	■				■
TEGOMER® P 121	○	■	○	■	■	■	○
TEGOMER® P 122	○	■	○	■	■	■	○

■ highly recommended  
○ suitable



**EVONIK**  
**INDUSTRIES**