WACKER

CREATING TOMORROW'S SOLUTIONS

PLASTICS I PERFORMANCE ADDITIVES

UPGRADE YOUR PERFORMANCE COMPOUNDS

Case Study: Polyethylene, Ethylene-Vinyl Acetate Copolymers and Recycled Polyethylene

GENIOPLAST® PE50S08 – IMPROVING PROCESSING AND SURFACE QUALITY

Compounders and processors of thermoplastics such as polyethylene pay particular attention to how efficiently a material can be processed and – more recently – recycled. These factors are decisive in achieving an edge over the competition.

WACKER's GENIOPLAST® PE50S08 additive was specially developed for polyethylene, both to give the plastics industry more formulation leeway and to open up new dimensions of quality, whether with virgin plastics or recycled materials. This novel silicone gum masterbatch consists of a thermoplastic polymer, which is used as carrier for the silicone and is compatible with the thermoplastics to be modified (polyethylene and ethylene vinyl acetate).

Efficient Processes

As a processing aid, GENIOPLAST® PE50S08 improves the distribution of fillers in the plastic compound and the flowability of the polymer melt. At the same time, the silicone additive also reduces the effects of friction, making manufacturing and processing more efficient, increasing throughput and reducing energy consumption.
The active ingredient in GENIOPLAST® PE50S08 is a silicone and/or silicone polymer with an extremely high molecular weight dispersed in a low-density polyethylene. Because the active ingredient content is 50%, using even a small amount of material can have a positive impact on polyethene compounding.

High-Quality Surfaces

GENIOPLAST® PE50S08 optimizes the surface properties of plastic products made from molded compounds. Uniquely, the main properties of the polyethylene base polymer, such as tensile strength, hardness and thermostability, remain unchanged, even while impact strength is increased. Like typical silicone additives, GENIOPLAST® PE50S08 yields a smoother surface, both with virgin polyethylene and recycled materials. This, in turn, makes the plastic more resistant to scratching and abrasion (see graphs on the following two pages). The results are high-quality plastic products that meet the quality standards of industry and consumers alike.

Sustainable Use

The use of GENIOPLAST® PE50S08 also offers advantages for processing recycled polyethylene. While the silicone additive makes the properties of the recycled material more like those of virgin plastic, GENIOPLAST® PE50S08 also ensures a uniform and thus efficient extrusion process. In this way, GENIOPLAST® PE50S08 helps make the use of polyethylene sustainable, while supporting efforts to develop circular economic models.

Material

Polyethylene-based compounds and ethylene-vinyl acetate copolymers

Additive

GENIOPLAST® PE50S08

Dosage Form

Pellets

Dosage

1 – 3%

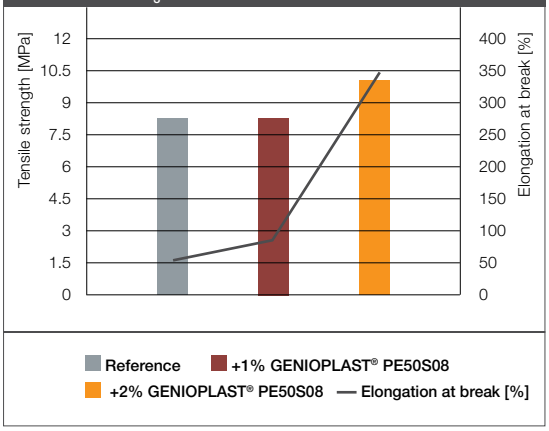
Applications

- Shoe soles
- Blown films
- Cable sheathing
- Polyethylene waste recycling
- Fiber ducts

Key Benefits

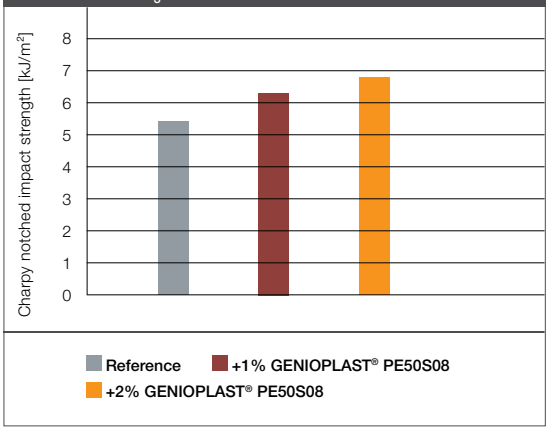
- Moderates the effects of friction
- Improves flowability
- Enables high throughput while keeping energy consumption low
- Results in a uniform process for recompounding recycled materials
- Improves material properties (such as impact strength and resistance to scratching and abrasion)

Tensile Strength and Elongation at Break (in 30% $CaCO_3$ Filled PE-HD)



The positive effects of adding GENIOPLAST® PE50S08 are readily apparent in the tensile test, where tensile strength and elongation at break were each higher in filled HDPE.

Impact Strength (in 30% $CaCO_3$ Filled PE-HD)

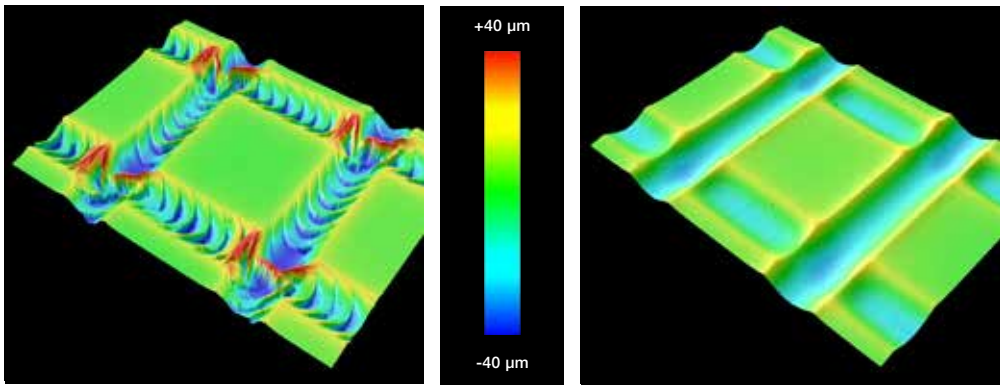


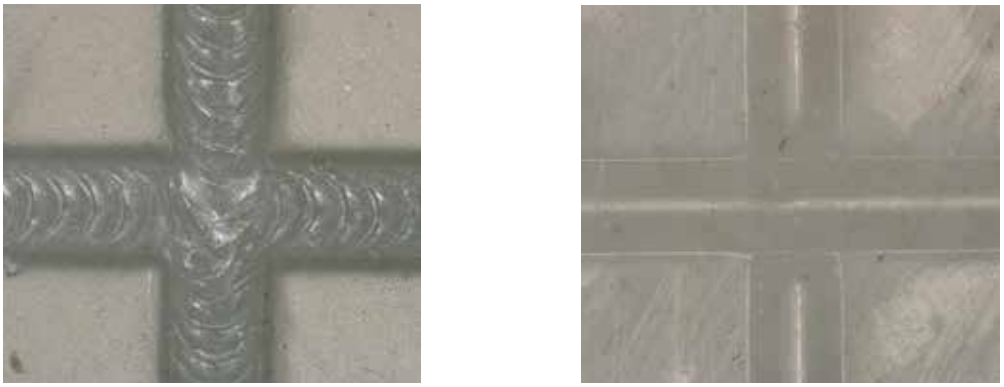
The new silicone additive not only improves polyethylene surface properties – it also makes the plastic more impact-resistant. Adding 2% GENIOPLAST® PE50S08 to filled, high-density polyethylene increased the impact strength by a good 20% in Charpy impact tests.

Scratch Depth of Recycled PE Compounds

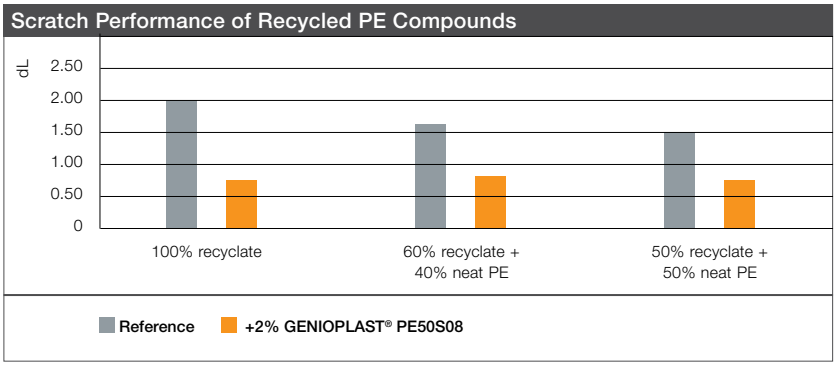
100% Ecoplast® NAV101 (PE-LD based)

98% Ecoplast® NAV101 (PE-LD based)
2% GENIOPLAST® PE50S08

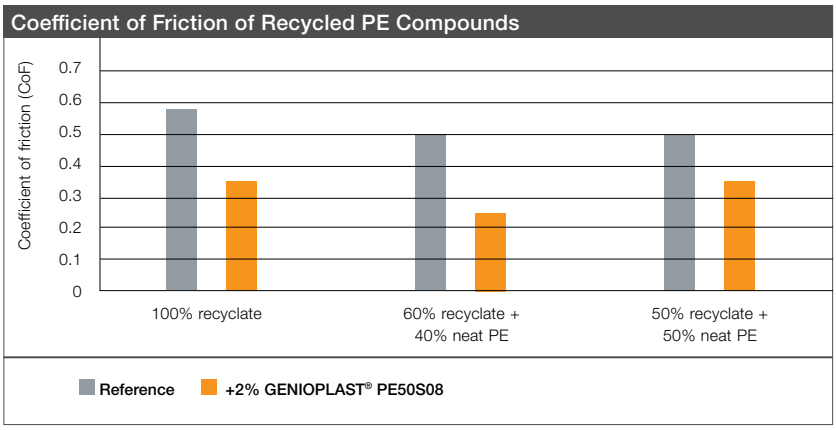




Addition of 2% GENIOPLAST® PE50S08 noticeably reduces scratch depth in recycled polyethylene compounds. At the same time, the scratches are also clearly less rough, therefore scattering incident light less and appearing duller. This makes the plastic surface seem more uniform and higher in quality.



Silicone additive GENIOPLAST® PE50S08 makes the surfaces of recycled polyethylene smoother. Smoother surfaces, in turn, improve the scratch resistance of the recycled polyethylene compound – regardless of whether the compound is made up of 100%, 60% or 50% recycled material.



GENIOPLAST® PE50S08 also reduces dynamic friction in the plastic: addition of 2% GENIOPLAST® PE50S08 even lowers dynamic friction in recycled materials to values below 0.25, depending on the proportion of the PE base polymer used. That makes unrolling films faster and easier, saving film manufacturers and packagers time and money.

GENIOPLAST® PE50S08 for Ethylene-Vinyl Acetate Compounds (ESCORENE® UL000119)					
	0% Silicone	**0.5% Silicone**	**1% Silicone**	**0.5% Silicone**	**1% Silicone**
Composition	100 % EVA	99% EVA 1% EVA based MB (Competitor)	98% EVA 2% EVA based MB (Competitor)	99% EVA 1% GENIOPLAST® PE50S08	98% EVA 2% GENIOPLAST® PE50S08
Abrasion [mg]	36	40	35	34	32
CoF (static)	1.01	0.62	0.36	0.48	0.33
CoF (kinetic)	0.98	0.52	0.30	0.45	0.31

Ethylene-vinyl acetate copolymers are among the polymers that can also be modified using GENIOPLAST® PE50S08. The effect of the silicone additive here is greatly dependent on the vinyl acetate content of the EVA. As this table shows, GENIOPLAST® PE50S08 offers somewhat better abrasion resistance than a high-modulus polyethylene masterbatch based on siloxane.

Performance Additives from a Single Source

The WACKER portfolio includes additional product solutions for compounding thermoplastics:

- **GENIOPLAST® Pellet S** is universally suitable for compounding all thermoplastics and is primarily used in flame-resistant cable sheathing.
- **GENIOPLAST® Pellet P Plus** was specially developed for modifying plastics in contact with food.
- **GENIOPLAST® PP50S12**, a silicone additive masterbatch, makes polypropylene more scratch-resistant in applications such as automobile interiors.
- **GENIOPLAST® Pellet 345** is a silicone-based additive for thermoplastic elastomers. Here it improves abrasion resistance and, when used in larger amounts, makes elastomeric plastic molded parts significantly more pleasant to the touch.

Because they are compatible with polyethylene, ethylene-vinyl acetate copolymers are also among the polymers that can be modified using GENIOPLAST® PE50S08. These copolymers are frequently used in the production of cable sheathing. Use of this silicone masterbatch can balance coefficients of dynamic friction, making cable components easier to assemble.

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