SILFIT Z 91

Field of application: Thermoplastics

1. Description

SILFIT Z 91 is a natural combination of corpuscular silica and lamellar kaolinite, which has been subjected to a heat treatment. The components and the thermal process lead to a product that offers special performance benefits as a functional filler.

Characteristics

Appearance		free-flowing powder
Color CIELAB scale:	L* a* b*	96.5 - 0.2 1.0
Residue > 40 µm		10 mg/kg
Volatile matter at 105 °C		0.2 %
Densitiy		2.6 g/cm³
Particle size distribution	D_{50} D_{97}	2.1 µm 9.5 µm
Surface area BET		10 m²/g
Oil absorption		65 g/100 g
Equilibrium moisture content at 23 °C: 50 % relative humidity 80 % relative humidity 90 % relative humidity		 0.12 % 0.22 % 0.54 %

Packaging

Paper bags	á 25 kg
EVA bags	≤ 20 kg
Big Bags	600 - 900 kg
Bulk	on demand

Shelf life

Unlimited if stored properly under dry conditions.

2. Applications

In thermoplastics SILFIT Z 91 is used as a functional filler either by itself or in combination with other fillers or reinforcing fibers.

Information on compliance with certain regulations/recommendations and other safety-related aspects: Product safety information

Fields of application

SILFIT Z 91 should be considered whenever low warpage, perfect surface finish and scratch resistance are as important as good melt flow, high strain at break and high impact strength.

The addition of maleic anhydride-grafted polypropylene (MAPP) enhances the performance of SILFIT Z 91 in PP compounds resulting in improved tensile strength as well as flexural strength and particularly additional improvement of scratch resistance. For higher requirements the Aktifit AM is recommended.

In wood plastic composites (WPC) SILFIT Z 91 improves mechanical and surface properties including scratch resistance. For higher requirements the Aktifit AM is recommended.

In white pigment masterbatches SILFIT Z 91 replaces up to 30 % relative of the TiO_2 concentration, largely maintaining opacity and amplifying bluish undertone of the TiO_2.

In films SILFIT Z 91 achieves very good results as an anti-blocking agent, in PET comparable to precipitated silicas: very good transparency and low haze combined with a low coefficient of friction and cost advantage.

Furthermore applying SILFIT Z 91 in infrared (IR) greenhouse and agricultural films it performs in very high light transmission and very low haze at medium IR absorption. The latter can be increased by using SILLITIN V 88.

In 3D printing using the FFF (filament) process of ABS, it significantly reduces warpage and maintains layer adhesion (yield stress in the Z-direction) at a high level.

Dosage:

Films:	Anti-blocking additive:	500 ppm (PET) to 1 % (LDPE)
	Functional filler in films:	5 to 15 %
WPC:		1 % to 10 %
White (TiO_2) masterbatches:		10 to 30 % rel. of TiO_2, ratio 1:1 to 1:2 m/m
3D-Printing FFF in ABS:		10 %
Compounds:		20 to 50 % without other fillers
		10 to 30 % in combination with glass fibers

3. Benefits

In comparison with the unfilled polymer, the use of SILFIT Z 91 will result in the following advantages:

- improved scratch resistance
- higher hardness
- higher stiffness (modulus)
- higher tensile and flex strength
- improved heat distortion temperature
- higher heat conductivity
- improved dimensional stability with varying humidity conditions (polyamides)

In comparison with other mineral fillers and anti-blocking agents, SILFIT Z 91 offers the following advantages:

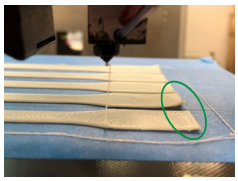
- very low sieve residues
- easy feeding and metering
- good wetting and dispersion properties
- high melt flow rates
- low warpage
- excellent surface finish
- higher scratch resistance
- high impact strength
- no graying of black-colored compounds
- good transparency
- high light transmission
- IR absorption
- low haze
- low coefficient of friction
- high opacity in TiO_2 pigmented films and compounds
- complies with the standards on articles in contact with foodstuffs of the BfR and FDA

4. Application examples

3D Printing in FFF-Process (Filament) of ABS, 10 % filler

Printing of Tensile Specimens

Print bed 100 °C, Print speed 55 mm/min



pure ABS

with 10 % Neuburg Siliceous Earth

detaches from print bed
Adjusted parameters necessary !

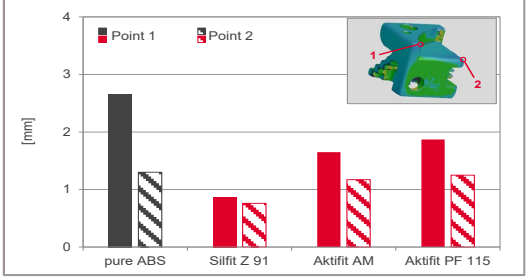
without problems

Adjustment for printing the tensile specimens made of pure ABS:

Print bed: 120 °C
Print speed: 45 mm/min

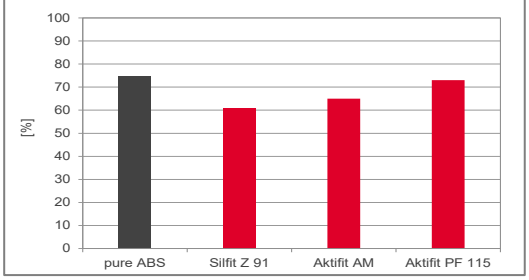
Warping

Print bed 100 °C, Print speed 55 mm/min



Layer Adhesion

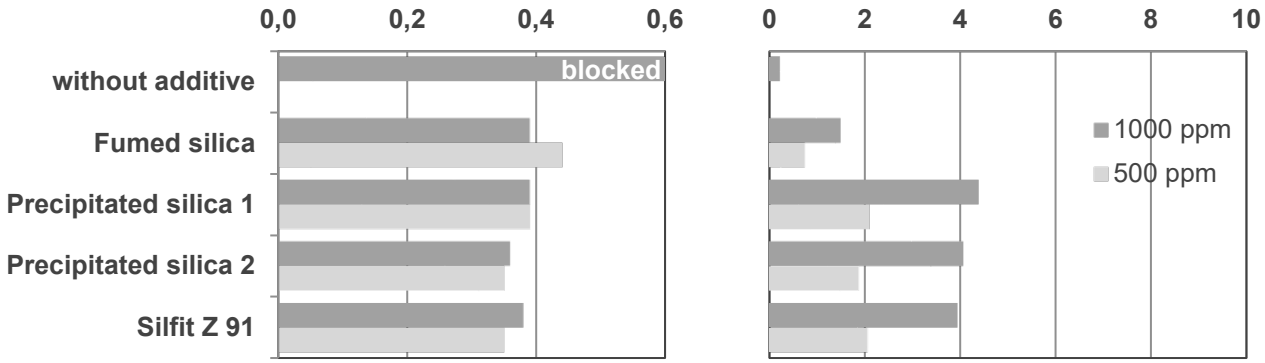
Ratio yield stress Z : XY



PET-Film, Anti-blocking, 15 µm film thickness

Coefficient of Friction film/film, static

Haze

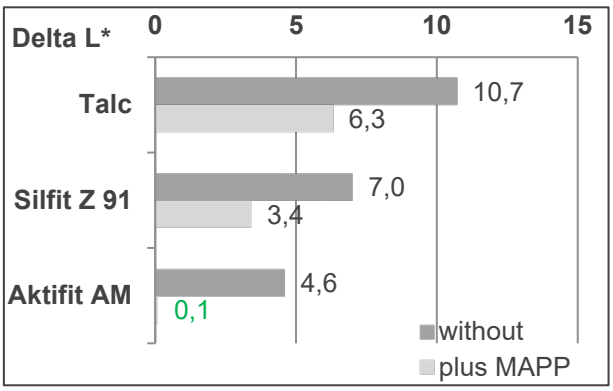


PP Compounds with enhanced scratch resistance, 40 % filler

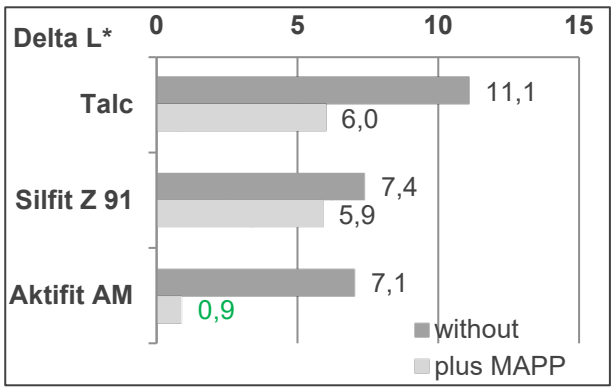
Brightening delta L* of black compounds due to scratch pattern

Copolymer

Fine grain surface (K31)

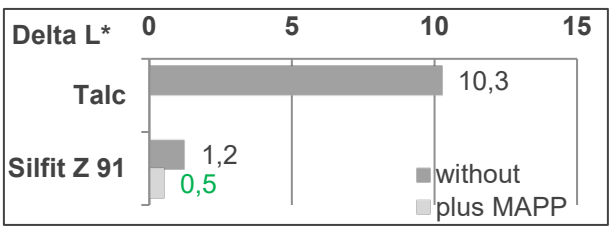


Coarse grain surface (K09)



Homopolymer

Fine grain surface (K31)



More information about Silfit Z 91 in thermoplastics at www.hoffmann-mineral.com.

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