



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 - 0.1 1.0 |
| Residue > 40 µm | | 10 mg/kg |
| Volatile matter at 105 °C | | 0.2 % |
| Density | | 2.6 g/cm ³ |
| Particle size distribution | D ₅₀ D ₉₇ | 2 µm 10 µm |
| Surface area BET | | 10 m ² /g |
| Oil absorption | | 65 g/100 g |
| Equilibrium moisture content at 23 °C: | | |
| 50 % relative humidity | | 0.12 % |
| 80 % relative humidity | | 0.22 % |
| 90 % relative humidity | | 0.54 % |

Packaging

| | |
|------------|--------------|
| Paper bags | à 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.

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 TiO₂ 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

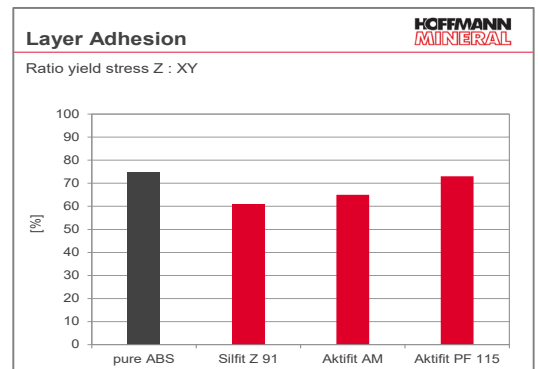
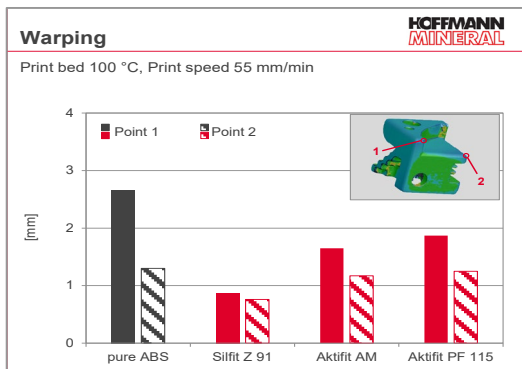
Printing of Tensile Specimens **HOFFMANN MINERAL**

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

pure ABS with 10 % Neuburg Siliceous Earth

detaches from print bed without problems
Adjusted parameters necessary !

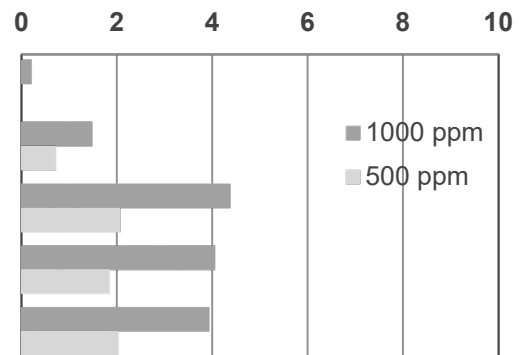
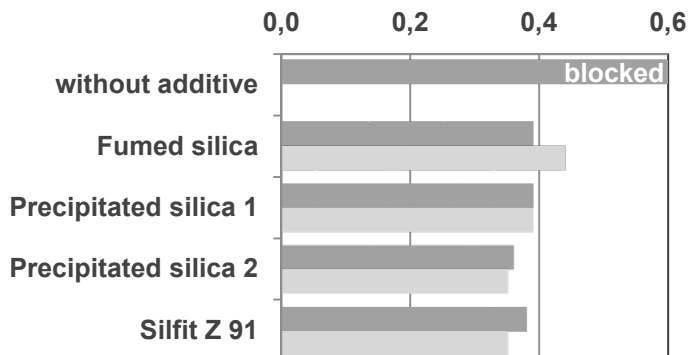
Adjustment for printing the tensile specimens made of pure ABS:
Print bed: 120 °C
Print speed: 45 mm/min



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

Coefficient of Friction film/film, static

Haze





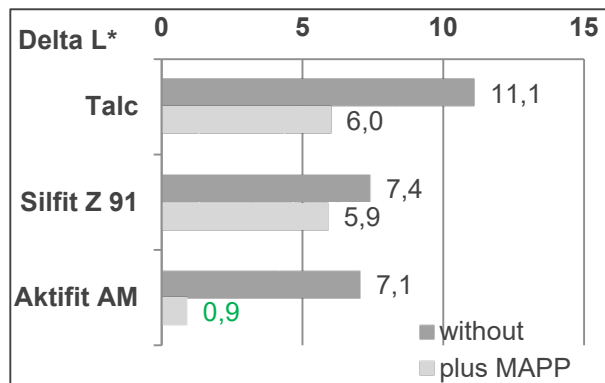
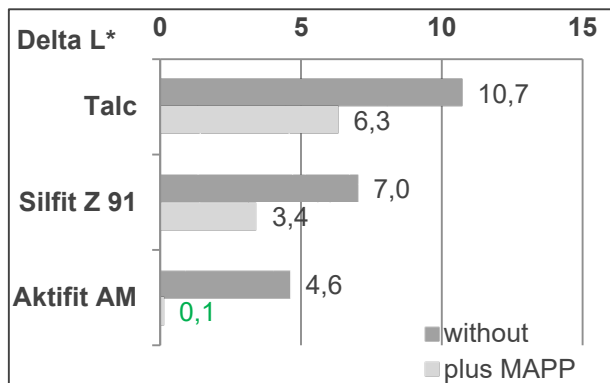
PP Compounds with enhanced scratch resistance, 40 % filler

Brightening delta L* of black compounds due to scratch pattern

Copolymer

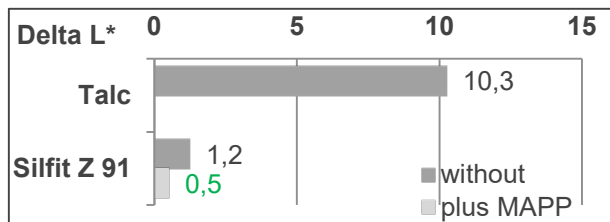
Fine grain surface (K31)

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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