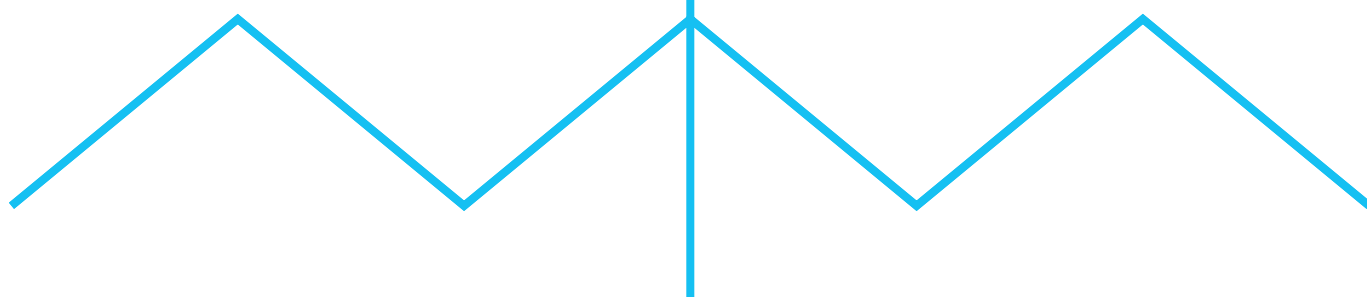


MAH grafted polyolefins



Tecnofilm[®]
thermoplastic compounds

1972 - 2012

TECNOFILM SPA

Company



Mission

Founded in 1972, **TECNOFILM** is a leading producer of thermoplastic compounds for the shoe industry and technical articles and functionalized polyolefins.

We aim to satisfy all our client's needs, focusing on product innovation and service quality.

Our guiding principals are:

- preeminent customer service
- quality products
- industry knowledge
- product innovation

Our success is based on intense research and development, into new products, production processes and applications, based on the background and experience of our collaborators and technicians. Our team of marketing and product specialists continuously monitors industry events to be proactive and solution oriented with our customers.

Polyolefins are the most important class of commercial polymers and are used in a wide range of applications.

Dispite their versatility, they suffer from certain drawbacks that exert a limiting influence on their fields of applications.

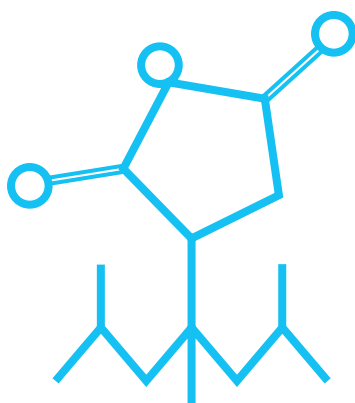
Because their non polarity they have a poor dispersibility with inorganic fillers, poor miscibility in blends and alloys with polarity, polymers and poor adhesion to metals.

Free radical grafting of maleic anhydride (MAH) onto polyolefins has gained wide industrial applications; MAH modified polyolefins are an essential part of many industrial formulations.

The main field of applications of polyolefins functionalized by maleic anhydride are:

- chemical coupling agents between polyolefins and mineral flame retardant fillers in halogen free compounds
- impact modifiers in engeneering thermoplastic (PA, PET etc) formulations
- compatibilizers in reinforced systems as PP and glass fibers
- adhesives in multilayers pipes
- compatibilizers in composites between wood an polyolefins.

Introduction



Description

TECNOBOND CFA-S is a LLDPE modified by maleic anhydride through a new continuous process of high grafting efficiency which guarantees a very low content of free maleic anhydride and the absence of cross-linked material.

Applications

TECNOBOND CFA-S is particularly recommended for the production of halogen-free flame retardant compounds for wires and cables where high stiffness is required and when fillers as magnesium hydroxide and aluminium trihydroxide are used.

TECNOBOND CFA-S is used as coupling agent in many compounds between polyolefin polymers and high content of inorganic fillers as magnesium and calcium carbonate, talc and kaolin etc.

TECNOBOND CFA-S is also recommended to compatibilize polyethylene with wood (WPC).

Properties

| | Typical values | Test method |
|--|----------------|------------------------|
| Method flow index (g/10 min) 190°C; 2,16 kg | 1,0 - 2,0 | ASTM D 1238 |
| Anhydride maleic content % W/W | 0,8 - 1,0 | I.M. (1) |
| Density (g/cm ³) | 0,920 ± 0,002 | ASTM D 792 Method A |

(1) Internal Method by FTIR ANALYSIS

Description

TECNOBOND CEL is a blend of ethylene semicrystalline copolymers modified by maleic anhydride through a new process of high grafting efficiency which guarantees a very low content of free maleic anhydride and the absence of any cross-linked material.

Applications

TECNOBOND CEL is particularly recommended for the production of halogen free flame retardant compounds for wires and cables where high flexibility is required and when fillers such as magnesium hydroxide and aluminium trihydroxide are used.

TECNOBOND CEL is used as a coupling agent in many compounds of polyolefin polymers and high content of inorganic fillers such as magnesium, calcium carbonate, talc, kaolin etc.

Properties

| | Typical values | Test method |
|--|----------------|------------------------|
| Method flow index (g/10 min) 190°C; 2,16 kg | 1,0 - 2,0 | ASTM D 1238 |
| Anhydride maliec content % W/W | 0,6 - 0,8 | I.M. (1) |
| Density (g/cm ³) | 0,883 ± 0,003 | ASTM D 792 Method A |

(1) Internal Method by FTIR ANALYSIS

Description

TECNOBOND PP is a polypropylene functionalized by maleic anhydride through a new process of high grafting efficiency.

Applications

TECNOBOND PP, because of its good dispersion in the polypropylene matrix and high reactivity with functional groups, is used as a coupling agent to improve the adhesion between short glass fibres and polypropylene as a dispersant agent in compounds of polypropylene and mineral fillers (talc, calcium carbonate, etc.) .

TECNOBOND PP is recommended to compatibilize polypropylene and polyamide alloys and improves the adhesion properties of polypropylene to metal in plastic coatings as well as in tie layers for film applications.

Properties

| | Typical values | Test method |
|--|----------------|-------------|
| Method flow index (g/10 min) 230°C; 2,16 kg | 40 - 60 | ASTM 1238 |
| Anhydride malieic content % W/W | 0,6 - 0,8 | I.M. (2) |
| Melting point (°C) | 160 | DSC |

(1) Internal Method by FTIR ANALYSIS

Description

TECNOBOND PP/C is a polypropylene functionalized by maleic anhydride through a new process of high grafting efficiency.

Applications

TECNOBOND PP/C is used as a coupling agent to improve the adhesion between long glass fibres and polypropylene because of its good dispersion in the polypropylene matrix and high reactivity with functional groups.

TECNOBOND PP/C is also recommended to compatibilize polypropylene with wood (WPC) .

Properties

| | Typical values | Test method |
|--|----------------|-------------|
| Method flow index (g/10 min) 230°C; 2,16 kg | 100 - 120 | ASTM 1238 |
| Anhydride malieic content % W/W | 0,8 - 1,0 | I.M. (1) |
| Melting point (°C) | 160 | DSC |

(1) Internal Method by FTIR ANALYSIS

Description

TECNOBOND PA is a blend of ethylene semicrystalline copolymers modified through a new process of high grafting efficiency.

Applications

TECNOBOND PA, if well dispersed in a polyamide matrix, acts as an effective stress concentrator leading to excellent impact properties up to -20°C .

TECNOBOND PA is recommended to improve the toughness of some engineering thermoplastic materials such as PET, PBT, PC and to compatibilize their blends.

Properties

| | Typical values | Test method |
|--|----------------|-------------|
| Method flow index (g/10 min) 190°C; 2,16 kg | 1,0 - 3,0 | ASTM 1238 |
| Anhydride maliec content % W/W | 0,6 - 0,8 | I.M. (1) |
| Glass transition temperature (°C) | < -40 | DSC |

(1) Internal Method by FTIR ANALYSIS

Description

TECNOBOND PA/LT is a blend of ethylene elastomers and plastomers modified by maleic anhydride through a new process of high grafting efficiency.

Applications

TECNOBOND PA/LT, if well dispersed in a polyamide matrix, acts as an effective stress concentrator leading to excellent impact properties up to -30 C° .

TECNOBOND PA/TL improves the toughness of engineering thermoplastic materials such as PET, PBT, PC and compatibilizes their blends.

Properties

| | Typical values | Test method |
|--|----------------|-------------|
| Method flow index (g/10 min) 230°C; 2,16 kg | 3 - 6 | ASTM 1238 |
| Anhydride malieic content % W/W | 0,6 - 0,8 | I.M. (1) |
| Glass trasion temperature (°C) | < -50 | DSC |

(1) Internal Method by FTIR ANALYSIS

Description

TECNOBOND PE/MLP is a PE modified by maleic anhydride through a new continuous process at high grafting efficiency suitable to assure a very low content of free maleic anhydride, the absence of cross-linked material and a completely random distribution of maleic anhydride inside the polyethylene chains .

Applications

Cross-linked polyethylene (PEX) is a non- corrosion, elastic, resistant to stress and chemicals material; aluminium has a minimal thermal expansion, good resistance to high temperature and pressure and dimension stability.

The combination of PEX and aluminium provides many advantages.

Unfortunately PE does not adheres to aluminium.

TECNOBOND PE-MLP is used as high performance adhesive layer in the composite pipe applications (multilayer pipe) based on cross-linked polyethylene (PEX) and containing aluminium as barrier layer.

TECNOBOND PE-MLP guaranties a very good adhesion to PEX as by a diffusion of polymer chains into the other materials (entangled chains) and a co-crystallization of two materials being both semi-crystalline. The adhesion of **TECNOBOND PE-MLP** to aluminium layer is essentially due to a chemical interaction between polar groups of tie layer and metal substrate.

Properties

| | Typical values | Test method |
|--|----------------|-------------|
| Method flow index (g/10 min) 190°C; 2,16 kg | 2 - 3 | ISO 1133 |
| Anhydride maliec content % W/W | 0,3 - 0,5 | I.M. (1) |
| Vicat softening point (°C) | 80 | ASTM D 1525 |
| Density (gr/cm3) | 0,91 | ASTM D 1505 |

A process melting temperature above 210 °C is recommended to assure a good adhesion between adherents.

All the chemical products content in **TECNOBOND PE-MLP** are listed as authorized in monomers/additives in the EU plastics directive 2002/72/EC and its amendments.

(1) Internal Method by FTIR ANALYSIS

Description

TECNOBOND PP-TLA is a random–block polypropylene copolymer modified by maleic anhydride through a new continuous process with high grafting efficiency which guarantees a very low content of free maleic anhydride .

Applications

TECNOBOND PP-TLA is particularly recommended as tie-layer adhesive in the co-extrusion processes, melt phase thermoforming, cast or blowing film or sheet.

TECNOBOND PP-TLA provides outstanding adhesion in the rigid packaging between non–polar layers as PP and polar barrier materials as EVOH or PA. In barrier co-extrusion covalent bonds are formed at **TECNOBOND PP-TLA** interface with EVOH or PA while entanglements are in melt phase of PP and **TECNOBOND PP-TLA**.

Properties

| | Typical values | Test method |
|--|----------------|-------------|
| Method flow index (g/10 min) 190°C; 2,16 kg | 3 - 5 | ASTM D 1238 |
| Anhydride maliec content % W/W | 0,2 - 0,4 | I.M. (1) |
| Melting point (°C) | 145 | DSC |

(1) Internal Method by FTIR ANALYSIS

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