

# BPD3669

## Product Technical Information

LLDPE with enhanced properties for:

- Crosslinked low voltage cable insulation
- Base resin for high performance cable jacketing

### 1. LLDPE with enhanced properties for crosslinked low voltage cable insulation

#### Applications

**BPD3669** is a LLDPE copolymer containing hexene-1 as comonomer which, when compounded with suitable additives, is designed for silane crosslinked LV insulation. **BPD3669** can be used in a silane one step crosslinking process (Monosil<sup>®</sup> for example) and in a silane two step crosslinking process (Sioplas<sup>®</sup> process).

**BPD3669** has been developed specifically to provide enhanced crosslinking and extrusion performances, thanks to proprietary process and catalyst and fit for purpose product design.

#### Physical properties of compound

| Properties      | Conditions   | Test Methods | Values | Units             |
|-----------------|--------------|--------------|--------|-------------------|
| <b>Physical</b> |              |              |        |                   |
| Melt Flow Rate  | 190°C/2.16Kg | ISO 1133-1   | 3.3    | g/10min           |
| Density         | 23°C         | ISO 1183-2   | 926    | kg/m <sup>3</sup> |

#### Physical properties of crosslinked compound as cable

**BPD3669**, when grafted in the laboratory with 0.8 % of a suitable silane/peroxide mixture and 0.05 % of a tin condensation catalyst, typically gives the following results on a 1.5 mm<sup>2</sup> cable after curing 2h in water at 80°C

#### Mechanical

|                           |                        |               |     |     |
|---------------------------|------------------------|---------------|-----|-----|
| Tensile strength at Break | 23°C, 50 mm/min        | ISO 527-1     | 28  | MPa |
| Tensile strain at Break   | 23°C, 50 mm/min        | ISO 527-1     | 500 | %   |
| Hot set test              | 200°C, 15 min, 0.2 MPa | IEC 60811-507 | 60  | %   |

**Data should not be used for specification work**

#### Compliance to Regulations

**BPD3669** meets the following material specifications:

- ISO 1872/1-PE, KGN, 18-D045
- ASTM D 1248: Type I, Class A, Cat 3

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## Processing guidelines

**BPD3669** is a LLDPE base resin. A suitable antioxidant package should be added to the product in order to meet heat ageing requirements. Since LLDPE compounds exhibit different extrusion performances compared to conventional materials, modifying some extrusion parameters may be necessary to achieve optimum throughput rates. Typical melt temperature to obtain a smooth processing will be in the region of 220-230°C.

**BPD3669** can be run on existing Monosil® extruders. When correctly extruded, cables will present a smooth surface with minimal gel defects.

**BPD3669** must be extruded with 0.7 – 0.9 % of vinyl trimethoxysilane, a suitable peroxide and a crosslinking catalyst. Commercial mixtures can be used for this purpose.

Satisfactory surface aspects of extrudates will be obtained with melt temperatures in the region of 225-235°C.

On a commercial line 150mm - 30 L/D a typical temperature profile would be:

Barrel: 150-160-170-180-190-200-210°C    Head: 210-220-230°C    Die: 270°C    Screw cooling: 80°C

**Additional information for Sioplas® process:** the processing parameters depend on the additives introduced by the user (antioxidants), the grafting machine (first step) and the extruder (second step). Usually, 0.7 – 0.9 % of a vinyl trimethoxysilane and peroxide commercial solution is added to **BPD3669** during the grafting step.

Grafted **BPD3669** can be processed on existing extruders designed for polyethylene adding 0.03 - 0.07 of catalyst (DBTL). Commercial masterbatches can be used for this purpose.

## Storage

The product should be stored in a dry and dust free environment at a temperature below 50°C. Exposure to direct sunlight should be avoided as this may lead to product degradation. A maximum storage time of 1 year is recommended.

# BPD3669

## 2. LLDPE with enhanced properties for high performance cable jacketing

### Applications

**BPD3669** is a LLDPE which, when compounded with suitable additives, is designed for jacketing of cables, especially power cables.

**BPD3669** combines an enhanced environmental stress cracking resistance to excellent mechanical properties.

### Physical properties of compound:

| Properties  | Conditions                   | Test Methods  | Values | Units             |
|---|------------------------------|---------------|--------|-------------------|
| <b>Physical</b>                                       |                              |               |        |                   |
| Melt Flow Rate  | 190°C/2.16Kg                 | ISO 1133-1    | 3.3    | g/10min           |
| Density   | 23°C                         | ISO 1183-2    | 926    | kg/m <sup>3</sup> |
| <b>Mechanical</b>                                     |                              |               |        |                   |
| Tensile strength at Break                             |                              | ISO 527-1     | 30     | MPa               |
| Tensile strain at Break                               |                              | ISO 527-1     | 800    | %                 |
| Low Temperature brittleness                           |                              | ISO 974       | -76    | °C                |
| Shore D Hardness                                      | 1 second                     | ISO 868       | 56     | -                 |
| Environmental Stress Cracking Resistance (ESCR)       | 10 % "Igepal" F <sub>0</sub> | IEC 60811-406 | >1,000 | h                 |
| <b>Electrical</b>                                     |                              |               |        |                   |
| Dielectric constant                                   | 1 MHz                        | ASTM D 1531   | 2.3    | -                 |
| Dissipation factor                                    | 1 MHz                        | ASTM D 1531   | 70     | μrad              |
| <b>Data should not be used for specification work</b> |                              |               |        |                   |

### Compliance to Regulations

**BPD3669** meets the following material specifications:

- ISO 1872/1-PE, KGN, 18-D045
- ASTM D 1248: Type I, Class A, Cat 3

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## Processing guidelines

**BPD3669** is a LLDPE base resin. A suitable antioxidant package should be added to the product in order to meet heat ageing requirements.

**BPD3669** does not contain UV stabilization. For outdoor applications, a suitable anti-UV package should be added in order to fulfill the weatherability requirements. Since LLDPE compounds exhibit different extrusion behaviour compared to conventional materials and modifying some extrusion parameters may be necessary to achieve optimum throughput rates. Typical melt temperature to obtain a smooth processing will be in the region of 230°C

A typical extrusion temperature profile would be:

Barrel: 180-180-190-190-200-210 °C    Head: 220-220-230 °C    Die: 230°C

## Storage

The product should be stored in a dry and dust free environment at a temperature below 50°C. Exposure to direct sunlight should be avoided as this may lead to product degradation. A maximum storage time of 1 year is recommended.

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The product and uses described herein may be subject to specific requirements or limitations for use in certain applications like food contact, drinking water or medical devices. Further information may be obtained from the website [www.ineos.com](http://www.ineos.com) where a specific Regulatory Certificate is available for each grade under the heading "SDS & Regulatory Certificate".

Unless specifically indicated, the product mentioned herein is not suitable for applications in the medical or pharmaceutical sectors.

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The product described herein may require precautions in handling. The available product health and safety information for this material is contained in the Safety Data Sheet (SDS) that may be obtained from the website [www.ineos.com](http://www.ineos.com). Before using any material, a customer is advised to consult the SDS for the product under consideration for use.

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