Product information

HPTE insulation solutions for MV power cables

A thermoplastic alternative to XLPE

The industry challenge - The need for advanced insulation

High-quality plastics play a crucial role in insulating medium voltage (MV) power cables. For many years, cross-linked polyethylene (XLPE) has been the go-to material in the industry, thanks to its proven performance. However, XLPE presents several challenges:

- High energy consumption during production
- As a thermoset insulation material, XLPE is difficult to recycle
- Stagnation of XLPE in the extruder, cross-head, and especially in filter packs increases the risk of scorch and amber formation, which can compromise cable quality
- XLPE is processed using Continuous Vulcanization (CV) systems under high temperature and pressure, followed by lengthy degassing before screens and sheaths are applied

The solution- HPTE insulation

Polypropylene-based HPTE (High-Performance Thermoplastic Elastomer) insulation stands out as a future-ready alternative to XLPE. LyondellBasell (LYB), with a long history of innovation in polypropylene, supplies HPTE for MV power cables. Our offerings include:

- HDPE sheathing compounds
- HPTE insulation produced using proprietary *Catalloy* technology, which creates a PP/EPR alloy directly in our polymerization reactors. This results in fine, uniform rubber dispersion, providing high flexibility combined with polypropylene's strength and exceptional thermo-mechanical properties.
- Semiconductive materials through a collaboration with Premix

Key benefits of HPTE insulation

- Operating temperatures up to 110°C for TPO
- TPO insulations are free from cross-linking by-products
- Superior electrical performance, with no space charge formation caused by residues of peroxide
- Enhanced mechanical performance
- Compact manufacturing footprint, reducing space requirements and costs

The collaboration of Premix and LYB provides cable manufacturers with a complete, integrated materials solution covering semiconductive compounds, insulation, and jacketing with consistent material quality, outstanding electrical and thermo-mechanical properties, and solutions that align with the needs of modern power grids.

Process advantages of using HPTE insulation

- No degassing required, eliminating methane emissions and enabling one-step cable production, including screening and outer sheathing
- No amber formation, which avoids the scorch phenomena common in XLPE and improves extrusion quality
- Enhanced filtration capabilities, as HPTE can be filtered at high levels without degradation
- TPO insulations are free from cross-linking by-products

Proven and validated technology

Polypropylene-based insulation is included in HD 620 standards for MV cables, confirming HPTE ability to meet stringent performance requirements. This positions HPTE as the next-generation solution for power cable systems.

Comparison of HPTE and XLPE

Benefit Area	HPTE	XLPE
Thermo-mechanical	High strength & flexibility. TPO insulations can handle peak temperatures up to 130°C	Typical continuous rating ~90°C. Requires crosslinking (hot-set control)
Material & process	No crosslinking or degassing. One-shot inline production possible. Recyclable. Lower energy consumption.	Requires CCV/VCV crosslinking. Multi-day degassing. Potential methane/by-products. Filtration limits due to scorch.
Electrical performance	No space charge formation created by residues of peroxide, since no cross-linking is required.	DC operation can be limited by space-charge accumulation. Water-treeing susceptibility.
Application in MVAC/MVDC	Robust for MVAC. Favorable for MVDC due to cleanliness and thermoplastic uniformity.	Dominant in MVAC. MVDC feasible but design must mitigate DC stress/space charge.
Sustainability	Thermoplastic can be recyclable where facilities exist depending on their ability to accept the finished product for recycling.	Thermoset (difficult to recycle)

Why LYB?

- Pioneer in polyolefin innovation
- Proprietary *Catalloy* technology
- Integrated material portfolio for MV cable systems
- Collaboration with Premix for semiconductive excellence
- Global technical support and application expertise

Contact us at wireandcable@lyondellbasell.com to discover how HPTE can transform your MV cable production.

About us

We are LyondellBasell (LYB) – a leader in the global chemical industry creating solutions for everyday sustainable living. Through advanced technology and focused investments, we are enabling a circular and low carbon economy. Across all we do, we aim to unlock value for our customers, investors and society. As one of the world's largest producers of polymers and a leader in polyolefin technologies, we develop, manufacture and market high-quality and innovative products for applications ranging from sustainable transportation and food safety to clean water and quality healthcare. For more information, please visit www.lyb.com or follow @LyondellBasell on LinkedIn.