

Borstar® HE6067

Enhancing TKF's Fiber Optic Cables with Low Shrinkage

Customer

TKF was founded in 1930 and began producing optical fiber cables in 1986. Since then, it has evolved from being a local Dutch cable manufacturer to become an international cable technology leader.

Today, TKF serves customers within the international broadband market, providing single mode and multimode fiber cables to a wide range of European operators, installers, and end users. As part of the TKH Group, TKF forms part of an internationally operating group of companies that specialize in developing and delivering innovative telecom, building, and industrial solutions.

Challenge

Downsizing in the fast-growing fiber optic cable market
The fiber optic cable industry is seeing a clear trend towards cable miniaturization, particularly for cables that are installed by blowing them through ducts with compressed air. Typical installation blow lengths are over 1 km. Miniaturization offers enhanced installation efficiency, owing to lighter cable weights and increased duct capacity.

For cable manufacturers, this shift has a major impact on both product and process designs, necessitating the redesign of the tubes that house the fibers. Typically, a 2.4 mm tube for 12 fibers has to be reduced to just 1.6 mm, leaving very little space for the glass



Loose Tube Mini Cables



Test circuit for blown cable installation at TKF site

fibers. In loose tube cables, the lay length – the distance required for the strands to complete one twist – is calculated to ensure an optimal balance between excess fiber length and the required duct space across temperatures ranging from -30°C to $+70^{\circ}\text{C}$. Tube length variations due to cable shrinkage can instantly increase fiber attenuation, making material choice for jacketing a critical decision.

High-density polyethylene (HDPE) is often chosen for jacketing due to its low coefficient of friction, good hardness and abrasion resistance. However, conventional HDPE jacketing has a high shrinkage rate compared to MDPE, LDPE, or LLDPE alternatives. This shrinkage can exert substantial stress on the cable core leading to increased signal attenuation – a critical issue for cables of such compact dimensions.

Solution

A unique bimodal HDPE

TKF has selected Borstar® HE6067 for its exceptionally low shrinkage properties.

HE6067, along with its colorable version HE6068, is based on Borealis' patented Borstar® technology. Both compounds offer higher melt index and significantly lower viscosity than conventional unimodal and other Borstar® HDPE compounds. They also deliver rapid stress relaxation and lower extrusion temperatures, both of which contribute to very low cable shrinkage. Additionally HE6067, enables manufacturers to significantly increase production speeds for the same attenuation performance, while its lower melt temperature reduces energy requirements.

For colored jackets using Borstar® HE6068 (natural), we advise using a non-warping color masterbatch. This helps to prevent shrinkage due to excessive crystallization, which certain pigment masterbatches with nucleating agents can induce.

Benefits

Enhancing cable productivity and attenuation performance

In addition to high mechanical strength and excellent environmental stress crack resistance HE6067 improves productivity, allowing cable makers to meet the demands of the fast-growing fiber optic cable market without additional capital investment.

"HE6067 enables TKF to design fiber optic cables with the minimum dimensions. Processing at high line speeds does not negatively influence the post extrusion shrinkage. Installation performance is world class, with blowing distances of 1,800 m in one shot! (96xSM G.652D LTMC cable into 10-14 mm HDPE duct)" says Hans de Boer, TKF Head of Research and Development.

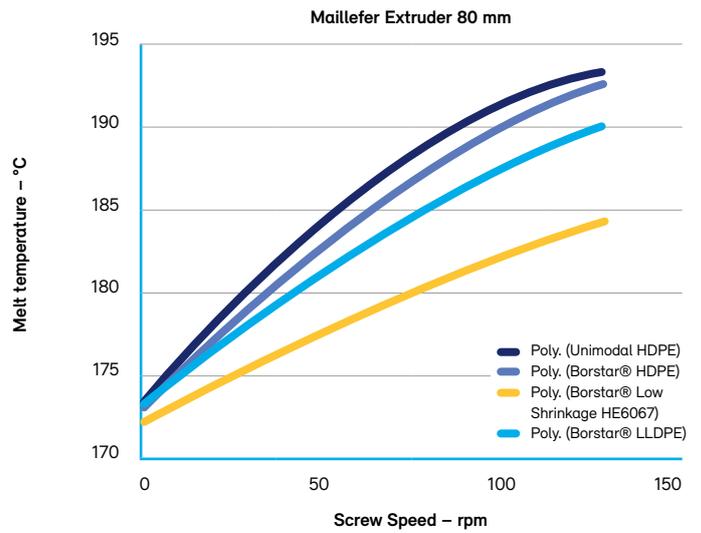


Chart 1: Speed versus melt temperature

Zones	Borstar® low shrinkage HDPE (°C)	Unimodal HDPE (°C)
Zone 1	140	170
Zone 2	170	180
Zone 3	175	190
Zone 4	175	200
Neck	175	210
Die	190	220

Table 1: Extrusion temperature setting comparison



All our grades are also available as the Borneables™, our portfolio of premium polyolefins produced with ISCC PLUS-certified renewable feedstock. These sustainable polyolefins offer the same high material performance as virgin polyolefins, yet decoupled from fossil-based feedstock and with reduced carbon emissions.

Learn more: www.borealisgroup.com/circular-economy/borneables

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Borealis GmbH
 Trabrennstraße 6–8, 1020 Vienna, Austria
 Tel +43 1 22 400 000
borealisgroup.com

Borouge Pte Ltd Sales and Marketing Head Office
 1 George Street #18–01 Singapore 049145
 Tel +65 6 27 541 00
borouge.com

