

**B10.3****New polyethylene compounds for cable jacketing applications**

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New polyethylene compounds have been developed, and have been especially designed to combine excellent mechanical properties and processing behavior, compared to standard MDPE or HDPE jacketing compounds. The new polyethylene compounds have an excellent environmental stress crack resistance and also a very good abrasion resistance. In processing trials on a cable line it was found that high Shore D values of more than 60 can be found on cable. Shrinkage measurements on cable showed that values of less than 1.5 % make the material very suitable for jacketing of optical fiber cables.

The benefits of the new polyethylene compounds include processing at low extrusion temperatures as well as a high level of mechanical properties like ESCR and abrasion resistance or low shrinkage.

Introduction

Because of their inherent properties and their good price/performance balance polyethylene compounds are widely used in the wire & cable industry.

Under the Mirathen* trademark Dow BSL is offering a variety of compounds for the insulation and jacketing of power cables and telecommunication cables.

One of the development targets was to create new polyethylene compounds with property combinations that could not be achieved with standard materials.

A jacketing compound based on linear low density polyethylene (LLDPE) has been developed for the use in telecommunication cable jacketing.

In the field of compounds for jacketing applications our main focus was on the development of a material that combines excellent mechanical properties and processability. It should be able to meet all the different requirements given by the production, installation and use of the final cable.

In order to reach this challenging aim we've chosen linear polyethylenes with medium or high density (LMDPE).

LMDPE compounds can fulfil specific requirements to power cable jackets like high hardness and abrasion resistance, but exhibit also excellent environmental stress crack resistance and low shrinkage, what is especially needed for the use in optical fiber cable jacketing.

Results

We will present the material properties of two new LMDPE compounds in comparison with commercially available medium density polyethylene (MDPE) and high density polyethylene (HDPE) grades. They contain approximately 2.5 % carbon black.

The densities of the new compounds LMDPE 1 and LMDPE 2 are close to the borderline between medium and high density polyethylene and similar to the density of the other compounds in our comparison (table 1).

The melt index of the new compounds is higher compared to standard materials what results in improved processability. The mechanical properties measured on plaques show higher tensile strength for the new compounds.

Table 1 Property comparison for LMDPE, MDPE and HDPE compounds

Properties	Unit	Test method	MDPE	HDPE	HDPE 2	LMDPE 1	LMDPE 2
Melt index (190°C, 2.16 kg)	g/10min	ISO 1133	0.23	0.5	0.22	0.9	1.5
Density	g/cm ³	DIN 53479	0.945	0.954	0.951	0.950	0.952
Vicat softening point	°C	ISO 306 / A	113	-	113	121	122
Tensile strength	MPa	IEC 811-1-1	23	25	25	28	28
Elongation at break	%	IEC 811-1-1	600	800	800	750	800
Hardness, Shore D	-	DIN 53505	58	60	60	60	60
ESCR (10 % Ant., 50°C)	h	IEC 811-4-1	> 1000	> 1000	> 1000	> 5000	> 1500

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