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Creating new cables for improved connections

Borealis Borcell™ cellular compound concept sets industry standards worldwide for high performance, reliability and quality

Borcell™ HE1123/LE1120 insulation material for antenna cables

> The new Borcell cellular compound concept meets the insulation challenge of radio frequency cables. The increasingly higher operating frequency of 3G mobile phone antennas places ever greater demands on the performance of insulation materials in the cables. In answer to this challenge Borealis has launched a new product combination that provides a good insulation with a lower signal attenuation than has been possible with earlier generation of physically foamed materials.

> The new insulation concept is based on Borcell HE1123 high density polyethylene and Borcell LE1120 low density polyethylene. These two compounds give excellent foaming in the gas injection extrusion process and offer a broad operating window enabling use in a variety of radio frequency cable designs.

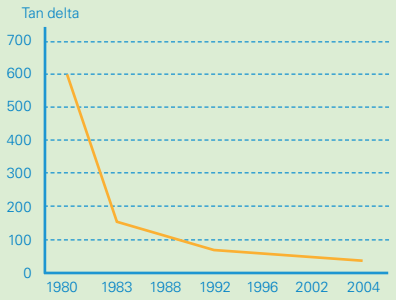
BOREALIS
SHAPING the FUTURE with PLASTICS

Meeting needs for new generation mobile phone systems

Borealis is a leading polyolefins supplier with long-term commitment to the telecom cable industry. We have almost 40 years of experience in this demanding market, and are now adding a new product to our already extensive portfolio to meet the need for higher frequency cables demanded by new generation mobile telephone systems.

New generation mobile telephone systems need higher frequency cables

1G	1981	Analogue	Voice	Increasing frequency for higher data rates
2G	1991	Digital	SMS	9.4 – 14.6 Kb/s
2.5G	2001	Digital	MMS	64 – 145 Kb/s
3G	2003	Digital	MMS	384 Kb/s – 2 Mb/s
4G	2011	Digital	WLAN	100 Mb/s



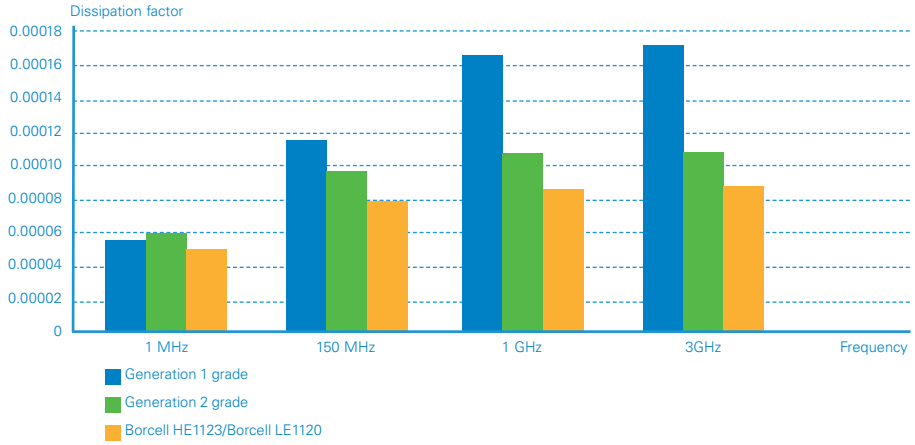


Figure 1
Demand for lower loss factor increases radio frequency cable performance

Borcell HE1123/LE1120 help maximize value and attain lower system costs in the competitive telecommunication industry

Step change in signal strength at high frequencies

> The dissipation factor for Borcell HE1123/ LE1120 insulation shows very little tendency to deteriorate as frequency increases. This advantage is particularly noticeable in comparison with the earlier generations of physically foamed grades as illustrated.

> The loss factor of the insulation is low across the frequency band due to its linear characteristics.

Borcell HE1123/LE1120

Data cable

HE1102:
Standard applications; small constructions

Coaxial cable

HE1102:
Standard applications; small constructions

HE1105:
High demands on electrical properties; large cables

Radio frequency cable

HE1105:
Standard radio frequency applications

HE1123/LE1120:
High demands on electrical properties; high frequency

Borealis is adding a new range of compounds meeting the demand for high frequency cables

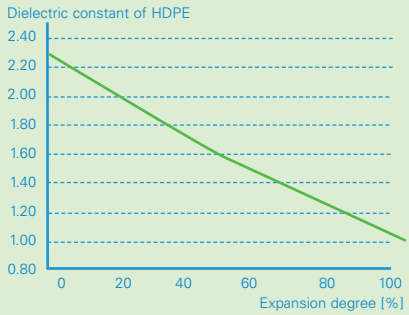


Figure 2
Dependence of dielectric constant, ε_r, of high density polyethylene (HDPE) on degree of expansion

Advantages of a broad operating window

> Borcell HE1123/LE1120 provide excellent foaming in the gas injection extrusion process of cables, with a broad operating window enabling their use in a variety of mobile antenna cable constructions. The grade combination gives excellent performance in many different extruder settings, hence many different cable constructions can be made with good results.

> By dry blending the pellets prior to extusion the Borcell HE 1123: Borcell LE1120 ratio can be optimised for each insulation thickness to give the lowest possible attenuation. Using optimised processing, cable producers benefit from high line speeds in combination with minimised capacitance variations. An expansion above 80% can be achieved. Low permittivity is an important factor for low attenuation.

Excellent foaming properties mean a good dielectric constant

> The dielectric constant ε_r, also called permittivity, is one of the most important design factors for cellular insulation materials. The dielectric constant is directly related to the degree of expansion D_{exp} of the foamed material.

Radio frequency cables withstand temperatures as low as -50°C

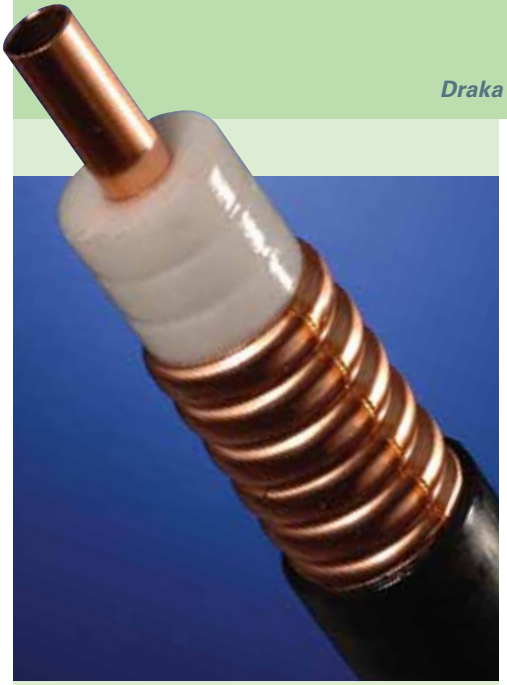
> Borcell HE1123/LE1120 allow installation and repair of radio frequency cables in very severe weather conditions and at very low temperatures.

Borcell HE1123/LE1120 PE cellular compounds are optimised to provide enhanced transmission properties through uniform and evenly distributed cells, essential to obtain high electrical performance

"Borcell HE1123/LE1120 are approved for use in all radio frequency cable constructions at Draka NK Cables, Finland. HE1123/LE1120 are easily processed and give excellent cell structure and very low attenuation values"

Vesa Tuunanen, R&D Manager at Draka Finland

Draka NK Cables is one of the world's leading companies producing radio frequency cables



Proven performance for radio frequency cables

Borealis, a leading, innovative provider of plastic solutions

> Borealis specializes in supplying advanced polyolefin plastics for the global Wire and Cable industry. Through the introduction of advanced polymer technologies Borealis has over 40 years established a leading position in the Wire and Cable market worldwide.

> Borealis believes that customer-driven innovation is the only way to achieve and sustain progress. In the Wire and Cable industry, besides our commitment to communication cables, Borealis has pioneered the development of advanced solutions for extruded EHV cables, production efficient XLPE materials for medium and high voltage cables along with cost efficient HFFR solutions for cable insulation and sheathing that have opened up new opportunities in both energy and communications cable applications. Through foresight and focus on customer needs, Borealis continues to provide innovative solutions for the Wire and Cable industry.

> Borealis believes that responsiveness is the foundation of fruitful customer partnerships. Borealis ensures this through its resources of strategically placed Borealis production sites: in Sweden, Austria, Belgium, USA and Abu Dhabi and through our Innovation Centre in Stenungsund, Sweden with an affiliate in Rockport, New Jersey, USA.

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