Polyethylene

Visico™ FR4451/LE4439

Silane Crosslinkable Insulation Compound

Description

Visico FR4451/LE4439 is a natural UV stabilized, halogen free moisture-induced crosslinkable polyethylene compound that is designed for use in photovoltaic cables.

The combination of Visico FR4451 base resin, and LE4439 catalyst, provides a highly scorch retardant compound system with excellent thermal stability and good flame retardant properties. Visico FR4451/LE4439 contains a patented scorch retardant additive that increases the processing window for a silane crosslinkable compound and minimizes the tendency for premature crosslinking in the extruder, head or die.

Cable insulation with a proper mixture of Visico FR4451 (95 parts) and LE4439 (5 parts) exhibits excellent thermo-oxidative stability in contact with aluminum or copper.

Visico FR4451/LE4439 can be readily pigmented to a variety of colors using standard wire & cable color concentrates designed for thermoplastic or crosslinked polyethylene.

Applications

Visico FR4451/LE4439 is recommended for use as insulation and jacket of flexible single-core cables (cords) at the DC-side of photovoltaic systems with maximum permissible voltage of DC 1.5 kV.

Specifications

Visico FR4451/LE4439 in combination meets the applicable requirements as below when processed using sound extrusion and testing procedure:

TÜV 2 PfG 1169/08.2007	EN 50363-5 EI5
EN 50618	EN 50290-2-26

Physical Properties

Property		Typical Value Data should not be used for specification work	Test Method
Density (Visico FR4451)		1190 kg/m³	ISO 1872-2/ISO 1183
Density (LE4439)		940 kg/m³	ISO 1872-2/ISO 1183
Melt Flow Rate (190 °C/2,16 kg)		0,5 g/10min	ISO 1133
Flexural Modulus		100 MPa	ISO 178
Tensile Strain at Break		400 %	IEC 60811-501
Tensile Strength		16 MPa	IEC 60811-501
Hardness, Shore D (15 s)		40	ISO 868
Hot Set Test (200 °C, 0,2 MPa)	Elongation under load	< 50 %	IEC 60811-507
	Permanent deformation	< 5 %	
Hot Set Test (250 °C, 0,2 MPa)	Elongation under load	< 100 %	IEC 60811-507
	Permanent deformation	< 5 %	
Pressure Test at High Temperature (140 °C, 240 h)		Pass	IEC 60811-508

HongRong Engineering Plastics Co.,Ltd.
Head Office Tel. +85-2-6957-5415
Research Center Tel.+188 1699 6168

BOREALIS

Polyethylene

Visico FR4451/LE4439

Electrical Properties

Property	Typical Value Data should not be used for specification work	Test Method
Dielectric constant (50 Hz)	3	IEC 60250
DC Volume Resistivity	10 PΩcm	IEC 60093
Dielectric Strength	> 20 kV/mm	IEC 60243

Combustion Properties

Property	Typical Value Data should not be used for specification work	Test Method
Limiting Oxygen Index	32 %	ISO 4589-2
Corrosivity of Combustion Fumes	< 10 µS/mm pH > 4,3	IEC 60754-2
Single Vertical Flame Test	Pass	IEC60332-1-2

Processing Techniques

The actual conditions will depend on the type of equipment used.

Visico FR4451/LE4439 are typically mixed directly in the extruder hopper using a volumetric or gravimetric masterbatch feeder. Most equipment designed for PVC or PE extrusion is equally suitable for Visico FR4451/LE4439.

A conductor preheater is required to ensure good mechanical properties and this should be at approximately 100°C.

Typically the following process conditions are used:

Barrel 1	130 °C 266 °F
Barrel 2	140 °C 284 °F
Barrel 3	150 °C 302 °F
Barrel 4	160 °C 320 °F
Barrel 5	170 °C 338 °F

HongRong Engineering Plastics Co.,Ltd.
Head Office Tel. +85-2-6957-5415
Research Center Tel.+188 1699 6168

Polyethylene

Visico FR4451/LE4439

Crosslinking
These products can be crosslinked in room temperature, by immersion in hot water or exposed to low pressure steam with a typical temperature range of 60°C to 90°C. This time period may be varied due to the humidity, thickness of insulation, reel size and temperature.

Drying
Unopened packages of Visico FR4451 should not require drying. Once packages of Visico FR4451 have been opened, aluminum liner needs to be resealed as soon as possible to prevent the moisture uptake. However, if the moisture level of opened packages rises to more than 400 ppm, then drying for 4 hours at 60°C in a dehumidifying type dryer is recommended.
LE4439 should not be dried. It should always be used from a fresh package. Once the package of LE4439 has been opened, it needs to be resealed as soon as possible to prevent the moisture uptake which can cause potential pre-crosslinking during the extrusion step.

Packaging

Visico FR4451 - Base material
Package: Smallbins
LE4439 - Catalyst master batch
Package: Bags

Storage

Visico FR4451/LE4439 is advised to be stored as follows:
Visico FR4451 and LE4439 can be stored for 18 months after production, at 10-30°C (50-85°F) in unopened original packages, without significant deterioration in the quality of the material. Visico FR4451 and LE4439 should be stored in dry conditions and protected from direct sunlight. LE4439 is sensitive to moisture and is therefore delivered with low moisture content, ready to be used. Pre-drying is not recommended, as it will destroy the drying agent that has been added to prevent the material to take up moisture. The bags must be properly resealed between uses, as even short periods of storage in humid conditions may cause scorch during extrusion.

Safety

Please see our "Safety data sheet" / "Product safety information sheet" for details on various aspects of safety, recovery and disposal of the product. For more information, contact your Borealis representative.

HongRong Engineering Plastics Co.,Ltd.
Head Office Tel. +85-2-6957-5415
Research Center Tel.+188 1699 6168

Polyethylene

Visico FR4451/LE4439

Disclaimer

The product(s) mentioned herein are not intended to be used for medical, pharmaceutical or healthcare applications and we do not support their use for such applications.

To the best of our knowledge, the information contained herein is accurate and reliable as of the date of publication; however we do not assume any liability whatsoever for the accuracy and completeness of such information.

Borealis makes no warranties which extend beyond the description contained herein. Nothing herein shall constitute any warranty of merchantability or fitness for a particular purpose.

It is the customer's responsibility to inspect and test our products in order to satisfy itself as to the suitability of the products for the customer's particular purpose. The customer is responsible for the appropriate, safe and legal use, processing and handling of our products.

No liability can be accepted in respect of the use of any Borealis product in conjunction with any other products and/or materials. The information contained herein relates exclusively to our products when not used in conjunction with any other material unless as specifically provided for in the test methods stated above.

HongRong Engineering Plastics Co.,Ltd.
Head Office Tel. +85-2-6957-5415
Research Center Tel.+188 1699 6168