

## PRODUCT DATA SHEET

25.04.2016 Ed.1



# 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 a VISICO base resin, and the catalyst, provides a highly scorch retardant compound with excellent thermal stability and good flame retardant properties. Visico FR4451/LE4439 contains a patented scorch retardant additive (SRA) that increases the processing window for a moisture crosslinking compound and minimizes the tendency for premature crosslinking in the extruder, head or die.

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

When properly mixed, 5 parts of LE4439 to 95 parts of FR4451, insulation with excellent thermo-oxidative stability, also in contact with copper and aluminium, is achieved.

### Application

Visico FR4451/LE4439 is designed for use as flexible single-core cables (cords) for use at the DC-side of photovoltaic systems with maximum permissible voltage of DC 1.8 kV.

### Specifications

Cables manufactured with FR4451/ LE4439 using sound extrusion practice comply with the following cable product standard TÜV 2 PFG 1169/08.2007, EN 50618 and EN 50363-5 EI5 type.

### Physical Properties

| Property                                          | Typical Value                                  | Test Method         |
|---------------------------------------------------|------------------------------------------------|---------------------|
| Data should not be used for specification work    |                                                |                     |
| Density                                           | 1190 kg/m <sup>3</sup>                         | 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<br>Permanent deformation | IEC 60811-507       |
| Pressure Test at High Temperature (140 °C, 240 h) | < 50 %<br>< 5 %<br>Pass                        | IEC 60811-508       |

### Electrical Properties

| Property                                       | Typical Value | Test Method |
|------------------------------------------------|---------------|-------------|
| Data should not be used for specification work |               |             |
| Volume Resistivity                             | 9 PΩcm        | IEC 60093   |
| Dielectric Strength                            | > 20 kV/mm    | IEC 60243   |

Visico is a trademark of the Borealis group.

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Relative permittivity 50 Hz  
Dissipation Factor (50 Hz)

3,13  
0,0126

IEC 60250  
IEC 60250

### Combustion Properties

| Property                        | Typical Value<br><small>Data should not be used for specification work</small> | Test Method  |
|---------------------------------|--------------------------------------------------------------------------------|--------------|
| Limiting Oxygen Index           | 32 %                                                                           | ISO 4589-2   |
| Corrosivity of Combustion Fumes | < 100 µS/cm<br>pH > 4,3                                                        | EN 50267-2-2 |
| Single Vertical Flame Test      | Pass                                                                           | IEC60332-1-2 |

### Processing Techniques

Following parameters should be used as guidelines:

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:

140 °C  
140 °C  
150 °C  
160 °C  
170 °C

### Crosslinking

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

For example, 0.7 mm thick insulation of Visico FR4451 and LE4439 will crosslink in a water bath of 90°C for a period of 2 to 4 hours giving a Hot Set Elongation of 60-70% (depending on conductor and reel size)

### Drying

Unopened packages of Visico FR4451 should not require drying however if the moisture level of opened packages rises to more than 400 ppm then drying for 4 hrs at 60°C in a dehumidifying type dryer is recommended. LE4439 should always be used from a fresh package and partially used packages resealed to prevent water ingress and potential pre-crosslinking during the extrusion step.

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 **Polyethylene**  
**Visico FR4451/LE4439****Packaging**

Visico FR4451 - Base material  
Package: Halfbins with Alu-liner  
LE4439 - Catalyst master batch  
Package: Bags

**Storage**

**Visico FR4451/LE4439** has a shelf life of 12 months from delivery date if stored in unopened original packages, under dry and clean conditions at temperatures between 10 - 30 °C (50 - 85 °F).

More information on storage is found in our "Safety data sheet" / "Product safety information sheet".

**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.

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