



Polyethylene

# Visico™ LE4421 / Ambicat™ LE4476

Compound for silane crosslinkable cables

## Description

**Visico LE4421 / Ambicat LE4476** is a silane crosslinkable natural compound system designed for insulation of low voltage energy cables.

Visico LE4421 is a low density polyethylene, copolymerised with vinyl silane. Ambicat LE4476 is an ambient crosslinking catalyst masterbatch specially designed to be used with Visico base resins. The system is highly active and crosslinks quickly at ambient conditions, in sauna or in hot water.

Cable insulation with a proper mixture of Visico LE4421 (95 parts) and Ambicat LE4476 (5 parts) exhibits excellent thermo-oxidative stability. The combination is suitable for both copper and aluminum conductors. If the insulation is designed to meet the thermo-oxidative ageing demand required by IEC 60502 at 150°C in contact with copper, the addition of 9 parts Ambicat LE4476 to Visico LE4421 is recommended.

## Applications

**Visico LE4421 / Ambicat LE4476** is designed for:

Insulation of low voltage energy cables, range up to 6 kV

## Specifications

**Visico LE4421 / Ambicat LE4476** in combination meets the applicable requirements as below when processed using sound extrusion and testing procedure:

ASTM D 1248 Type I, Class A, Category 4  
HD 603 S1  
HD 604 S1  
IEC 60502-1

NEMA WC 70/ ICEA S-100-685  
NEMA WC 71/ ICEA S-96-659  
EN 50290-2-29

The standards referred to above is a selection and is not complete coverage of all applicable standards. Contact your Borealis representative for additional information.

## Special Features

**Visico LE4421 / Ambicat LE4476** insulation system offers:

Excellent processing properties  
Low scorch allowing long runs and more frequent tooling changes  
Environmentally friendly (free from heavy metals)  
Less smell, more consistent quality (no volatiles)

Outstanding curing speed  
No drying prior to extrusion  
Excellent surface finish  
Excellent storage stability

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

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The addition of metal soaps and basic (high pH) components, like some fillers, stearates and UV-stabilisers, will deactivate the catalyst and is not suitable together with Ambicat. To prevent deactivation of the catalyst during colouring, Ambicat compatible colour masterbatches are needed. Please contact your Borealis representatives for additional information.

## Physical Properties

Property	Typical Value	Test Method
Data should not be used for specification work		
Density (mixture 95:5)	923 kg/m <sup>3</sup>	ISO 1183-1, Method A
Melt Flow Rate (190 °C/2,16 kg)	1,0 g/10min	ISO 1133
Tensile Strain at Break (250 mm/min)	> 300 %	IEC 60811-501
Tensile Strength (250 mm/min)	> 15 MPa	IEC 60811-501
Change of Tensile Properties, Addition of 5 % Catalyst, after ageing. (240 h, 135 °C) <sup>1</sup>	<= 25 %	IEC 60811-401
Change of Tensile Properties, Addition of 9 % Catalyst, after ageing. (168 h, 150 °C) <sup>1</sup>	<= 30 %	IEC 60811-401
Brittleness temperature	< -76 °C	ASTM D 746
Environmental Stress Crack Resistance (50 °C, Igepal 10 %, F20)	> 96 h	IEC 60811-406
Hardness, Shore D (1 s)	52	ISO 868
Hot Set Test (200 °C, 0,20 MPa)	Elongation under load 60 % Permanent deformation 0 %	IEC 60811-507

<sup>1</sup> These values are based on sufficient crosslinked/cured Visico. If Visico is not sufficiently crosslinked the material will continue to crosslink during the ageing procedure and a larger change between values before and after ageing may occur.

## Electrical Properties

Property	Typical Value	Test Method
Data should not be used for specification work		
Dielectric constant (50 Hz)	< 2,3	IEC 60250
DC Volume Resistivity	> 10 PΩcm	IEC 60093
Dielectric Strength	> 22 kV/mm	IEC 60243

## Processing Techniques

Visico LE4421 / Ambicat LE4476 are suitable for most equipment designed for PVC/PE extrusion.

### Extrusion

Typically the following process conditions are used:

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Barrel 1	150 °C
Barrel 2	170 °C
Barrel 3	170 °C
Barrel 4	170 °C
Die head	170 °C

The temperature of the melted polymer during extrusion should preferably not exceed 200 °C. Having the above set temperature profile, a stable extrusion process and a cable having smooth glossy appearance should be achieved. On-size pressure or draw down tube-on tooling is preferred. The use of a gradient cooling bath will improve the cable insulation physical properties further.

Conductor preheating up to 100°C is recommended when producing cables with a conductor up to 16 mm<sup>2</sup> for good mechanical properties.

## 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.

Example: Visico LE4421 / Ambicat LE4476. Time to reach Hot Set elongation value of 100% at different insulation thickness.

Thickness	Time	
0,7 mm	1,5 Days	23°C, 50 % humidity, in air.
1,8 mm	6 Days	23°C, 50 % humidity, in air.
0,7 mm	< 15 min	90°C, Sauna or water bath.
1,8 mm	1 h	90°C, Sauna or water bath.

## Packaging

Visico LE4421 - Base material is protected from moisture ingress

Package: Octabins  
Smallbins

Ambicat LE4476 - Catalyst master batch is protected from moisture ingress

Package: Bags



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## **Storage**

**Visico LE4421 / Ambicat LE4476** has excellent storage stability.

Visico LE4421 can be stored for 18 months and Ambicat LE4476 for 15 months after production, at 10-30 °C (50-85 °F) in unopened original packages, without significant deterioration in the quality of the material. Visico LE4421 and Ambicat LE4476 should be stored in dry conditions and protected from direct sunlight. Improper storage can initiate degradation, which results in odour generation and colour changes and can have negative effects on the physical properties of this product. Ambicat LE4476 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 products. For more information, contact your Borealis representative.