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Technical data sheet

DIPLAST® L 11

Version: June 2015

Chemical composition Diundecyl phthalate, branched and linear
CAS number 85507-79-5
EINECS number 287-401-6

Specifications

Characteristics	Unit	Value	Test method	
Density at 20°C	g/ml	0.950 - 0.955	GM 012	ASTM D 4052-96
Refractive index n^{20}_{D}		1.481 - 1.483	GM 020	ASTM D 1045-95
Colour	Pt-Co	60 max.	PL02F	ASTM D 1045-95 ASTM D 1209-00
Acidity	mgKOH/g	0.07 max.	PL02C	ASTM D 1045-95
Water content	%	0.05 max.	GM 010	ASTM E 203-96
Viscosity at 20°C	mPa·s	75 - 90	GM 022	ASTM D 445-96
Ester content	%	99.5 min.	PL10C	G.C.

DIPLAST® L 11 is a clear liquid, anhydrous and practically odourless. It is miscible with common organic solvents but immiscible with water.
The product **DIPLAST® L 11** due to its nature does not have a shelf life. However it can be stored in appropriate containers at a temperature of approximately 25°C and the exclusion of humidity for at least 1 year, without loosing its chemical properties.

Liquid Properties

Temperature (°C)	Brookfield Viscosity LV DVII+ (mPa·s)
-10	650
0	310
10	155
20	80
30	49
40	30
50	20
60	9

Volume resistivity at 23°C (ASTM D 1169-95)	$1.0 \cdot 10^{11}$ Ohm·cm
Fogging DIN 75201 reflectometric (3 hours at 100°C)	90%

The figures above are typical values and are not intended as specification limits.

For further information on the characteristics and properties of **DIPLAST® L 11** in the liquid state, see the relevant EC-standard Materials Safety Data Sheet.

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Characteristics and applications

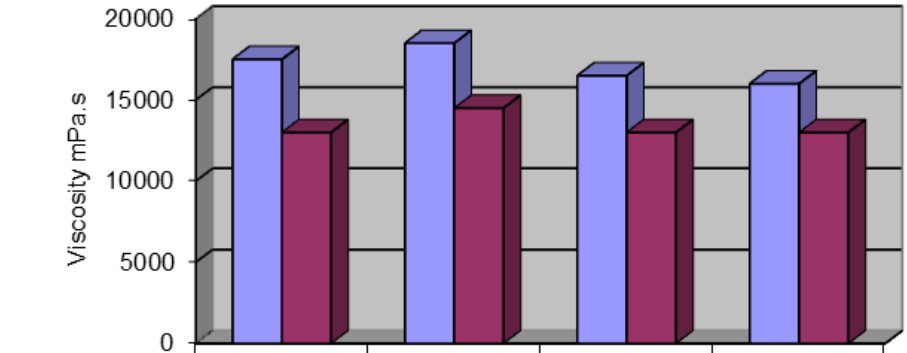
DIPLAST® L 11 is a plasticizer for PVC based on Phthalic Anhydride and on a blend of C_{11} alcohols with a high percentage of linearity which allows to obtain a low viscosity ester in comparison with its molecular weight.
Its main characteristics are low volatility, good efficiency and resistance to both high and low temperatures.
Due to its low viscosity, **DIPLAST® L 11** is particularly designed for the production of plastisols.

DIPLAST® L 11 can be used in a wide range of applications and in particular:

- medium and high temperatures cables in compliance with many of the specifications of the sector with particular reference to automotive cables (class B or T2)
- "anti-fogging" vinyl sheets for car interior components:
- whenever compounds with characteristics of low volatility and low temperatures resistance are required.

Plastisol Viscosity

Plastisol Viscosity - Brookfield RVF - 23°C - 20rpm



	2hours	24hours	48hours	72hours
DIPLAST L 11	17500	18500	16500	16000
DIPLAST NS	13000	14500	13000	13000

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General properties in PVC compounds

The properties of **DIPLAST® L 11** were evaluated using the following formulation:

Formulation	1 - (parts by weight)	2 -(parts by weight)
PVC K70	100	100
Plasticizer	50	47
Ca/Zn	1.2	8
Stearic acid	0.3	-
Calcium carbonate	-	15
Calcium stearate	-	0.5

The specimens were prepared by calendering and moulding to obtain the thickness required for the different test methods.

Results

	Test method	DIPLAST® L 11 1	DIPLAST® L 11 2
Shore "A" hardness (15")	ISO 868	88.5	
Shore "D" hardness (15")			38.5
Cold flex °C (Clash & Berg)	ISO/R 458	-35	-27
Solution Temperature °C (*)	DIN 53408	145	
Thermal stability at 200°C **(Min. value 120')**	CEI 20-34		5h15'
Extraction resistance % weight loss- (48h at 70°C)	ISO 175		
• Water		-0.2	
• Aqueous soap 1%		0.0	
• Olive oil		-10	
• Mineral oil		-7.9	
• n-Hexane (24h at 23°C)		-28.8	
Volatility (% weight loss 7days at 100°C)	ISO 176	-1.9	
Rheological properties			
• Dryblending time 83°C (Mixer P-600 : 100 RPM)	Brabender Plasticorder	5'00''	3'50"
• Gel time 88°C (Mixer W-50 : 40 rpm. 48 g)	Brabender Plasticorder	30'06''	
• Fusion Temperature (°C) (Mixer W-50, 5°C/min, 40rpm)	Brabender Plasticorder	146	

(*) Solution temperature determined with dispersion of resin: two grams of PVC are placed in 48 grams of plasticizer and the solution is heated at 1°C/min.

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Ageing resistance

DIPLAST® L 11 with antioxidant **(DIPLAST® L 11/ST**) shows a good resistance to thermal ageing which enables the production of cables capable of passing specifications such as CEI 20-11, BS 6746, VDE 0207, UL 62.

Hereunder we summarize the variation of mechanical properties on specimens with a thickness of 1 mm aged for 10 days at 130°C (Accelerated ageing for class II or B automotive cables).

Mechanical properties	DIPLAST® L 11/ST formulation 2
ORIGINAL SPECIMENS:	
Tensile strength MPa	21.7
Elongation at break %	293
Modulus 100%	13.2
Cold Flex°C (clash & Berg)	-27
AFTER AGEING CONDITIONS:	
SPECIMENS AGED 10 days at 130°C **Accelerated ageing test for class II**	
Tensile strength Variation %	-2.3
Elong at break Variation %	-12.3
Modulus 100% Variation %	31.8
Cold Flex °C (Clash & Berg)	-26
Cold Flex Variation %	-3.7
Weight loss (mg/cm^2)	-4.68

In the tests, compounds were aged in an oven with forced ventilation.