SynFlex Elektro GmbH
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Kaladex 2000 PEN film

Kaladex® 2000 is a biaxially oriented polyethylene naphthalate (PEN) film. PEN is a high-performance polyester offering improved mechanical, thermal and chemical properties compared with conventional polyethylene terephthalate (PET) films, while maintaining good processing characteristics.

Attributes

Kaladex® 2000 combines high mechanical strength with excellent heat and hydrolysis resistance, good dimensional stability and low oligomer extraction. This balanced property profile makes the film suitable for applications with demanding thermal, mechanical and electrical requirements.

Application

Kaladex® 2000 is used in a wide range of electrical and electronic applications, including insulation for motors and transformers, capacitors, flexible printed circuits and fuel cells. PEN is particularly suitable for applications where conventional PET films reach their performance limits, but the full performance capabilities of polyimide (PI) films are not necessary. This makes PEN a cost-effective material solution for applications requiring a higher performance level than PET without the need for PI.

Standards

• Class F (155 °C) insulating material
• UL listed, File No. E93687
• RoHS compliant according to 2011/65/EU

Delivery forms

Total thickness in µm:

- 25, 38, 50, 75, 100

Kaladex® 2000 is available:

- in tapes from 6 mm width
- in rolls approx. 1,000 mm wide

Base

Polyethylene naphthalate (PEN)

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Updated 09/26

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Mechanical	Unit of measure					
Nominal thickness	µm	25	38	50	75	100
F5-value longitudinal (MD)	kg/mm²	15	15	15	15	15
F5-value, transversal (CMD)	kg/mm²	16	16	16	16	16
Tensile strength longitudinal (MD)	kg/mm²	25	25	25	25	25
Tensile strength transversal (CMD)	kg/mm²	28	28	28	28	
Elongation at break longitudinal	%	90	90	90	90	90
Elongation at break transversal	%	65	65	65	65	65
Density	g/cm²	1.36	1.36	1.36	1.36	1.36

Optical	Unit of measure	
Nominal thickness	µm	25
Haze	%	6

Optical	Unit of measure				
Nominal thickness	µm	38	50	75	100

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Optical	Unit of measure				
Haze	%	8	13	18	25

Thermal	Unit of measure					
Nominal thickness	µm	25	38	50	75	100
Fusion temperature	°C	269	269	269	269	269
Glass transition temperature	°C	121	121	121	121	121
Shrinkage longitudinal (MD) / 190 °C, 5 min	%	1.2	1.2	1.2	1.2	1.2
Shrinkage transversal (CMD) / 190 °C, 5 min	%	1.4	1.4	1.4	1.4	1.4
Shrinkage longitudinal (MD) / 150 °C, 30 min.	%	0.6	0.6	0.6	0.6	0.6
Shrinkage transversal (CMD) / 150 °C, 3 min.	%	0.6	0.6	0.6	0.6	0.6
Coefficient of thermal expansion longitudinal (MD)	10^-6/°C	13	13	13	13	13
Coefficient of thermal expansion transversal (CMD)	10^-6/°C	13	13	13	13	13

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Thermal	Unit of measure					
Hygroscopic expansion coefficient longitudinal (MD)	10^-6/%RH	11	11	11	11	11
Hygroscopic expansion coefficient transversal (CMD)	10^-6/%RH	11	11	11	11	11
Mechanical RTI	°C	160	160	160	160	160
Electrical RTI	°C	180	180	180	180	180

Electrical	Unit of measure	
Nominal thickness	µm	25
Dielectric strength	kV/mm	331

Electrical	Unit of measure				
Nominal thickness	µm	38	50	75	100
Dielectric strength	kV/mm	261	248	198	187

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