

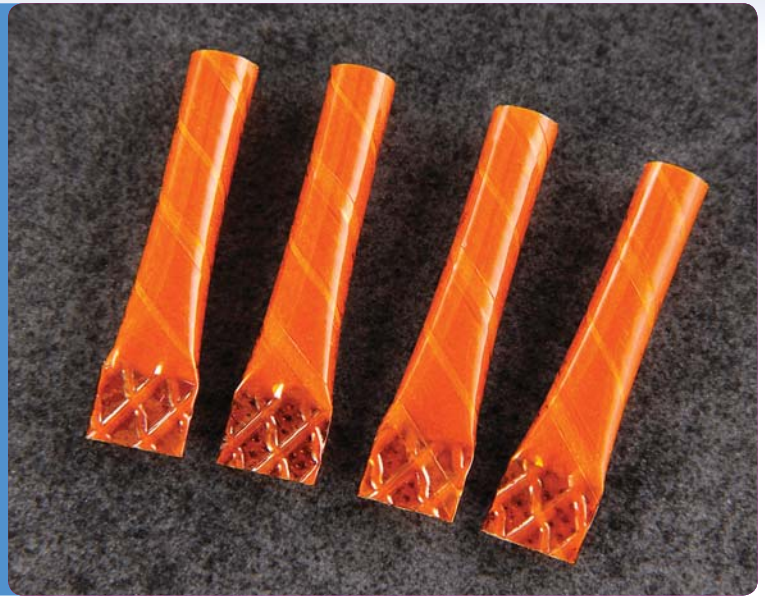
# Plamide Non-Shrink Endcaps with Varnish EnCapSure

Precision-wound protective and resistive Endcaps for high temperature (Class H) protection in varnish impregnated electric motors



## Key Benefits

- An effective component: consistently easy to apply
- Mechanical and dielectric performance improves with varnish impregnation
- Unique 5 layer DuPont™ Nomex® grade 411 and Kapton® HN construction provides excellent mechanical and dielectric strength
- Available with internal diameters from 2.0mm
- Suitable for Class H applications and temperatures up to 180°C



## Multilayered precision-wound protective Endcap made from DuPont™ Kapton® film and Nomex®.

Designed for use in varnish impregnated electrical motors, Plamide Endcaps maintain electrical resistivity, dimensional stability and strength at high temperatures and in the most demanding applications. Sonic welded seal is chemically resilient and further contributes to the robustness and reliability of the eventual product.

Plamide Non-Shrink Endcaps with Varnish EnCapSure are particularly suitable for application in bulk process engineering environments, where ease of fitting is required.

They are widely used to insulate joined ends in motor windings, in domestic appliances, aerospace and automotive applications.

## More features

- Constructed from UL recognised materials
- Maintains dielectric mechanical and cut-through strength across applications
- Endcaps of any diameter can be manufactured with a variety of wall thicknesses, from 0.350mm
- Available with internal diameters from 2.0mm
- Wall thickness from 0.350mm

## Lamina Varnish EnCapSure Technology

Lamina Varnish EnCapSure is a unique precision wound laminate technology that boosts the reliability and durability of varnish impregnated electric motors.

Two layers of DuPont™ Nomex® type 411 are bonded to a three-layer protective DuPont™ Kapton® sheath. The uncalendared inner insulator has the property of wicking varnish during the impregnation process, boosting its mechanical and dielectric properties and helping to secure the Endcap in position.



For more information or to order contact us:  
email: [sales@lamina.uk.com](mailto:sales@lamina.uk.com)  
tel: +44 (0) 1403 78 31 31

[www.lamina.uk.com](http://www.lamina.uk.com)

**Lamina**  
TUBULAR TECHNOLOGY

# Technical Data - DuPont™ Kapton® HN

## Electrical Properties

Property	Typical Value - 1 mil (25 µm) film			Test Condition	Test Method
	-195°C	25°C	200°C		
Short Term					
Dielectric strength (kV)	10.8	7.0	5.6	60 cycles	ASTM D 149-64
Dielectric Constant	-	3.5	3.0	1 kilocycle	ASTM D 150-64T
Dissipation Factor	-	0.003	0.002	1 kilocycle	ASTM D 150-64T
Volume Resistivity	-	10 <sup>16</sup> ohm/m	10 <sup>12</sup> ohm/m	-	ASTM D 257-61
Surface Resistivity	-	10 <sup>16</sup> ohm/sq	-	50% Relative Humidity	ASTM D 257-61
Corona Start Voltage	-	465 volts	-	50% Relative Humidity	ASTM D 1868-61T
Insulation Resistance	-	100000 megohm/µF	-		Based on 0.05 µF wound capacitor using 1-mil (25 µm) H film

## Physical Properties

Property	Typical Value - 1 mil (25 µm) film			Test Method	
	-195°C	25°C	200°C		
Ultimate Tensile Strength	(MD) kg/cm <sup>2</sup> MPa	2450 241	1750 172	1200 117	ASTM D 882-64T
Yield Point	(MD) kg/cm <sup>2</sup> MPa	-	700 69	420 41	ASTM D 882-64T
Stress to Produce 5% Elongation	(MD) kg/cm <sup>2</sup> MPa	-	910 90	600 59	ASTM D 882-64T
Ultimate Elongation	(MD) %	2	70	90	ASTM D 882-64T
Tensile Modulus	(MD) kg/cm <sup>2</sup> MPa	35800 3500	30000 2950	18200 1800	ASTM D 882-64T
Impact Strength	(D) kg/cm N/m	-	6 0.6	-	DuPont™ Pneumatic Impact Test
Folding Endurance	(MIT) cycles	-	10000	-	ASTM D 2176-63T
Tear Strength - Propagating (Elmendorf)	g mN	-	8 78	-	ASTM D 1922-61T
Tear Strength - Propagating (Graves)	g N	-	510 5	-	ASTM D 1004-61
Bursting Test (Mullen)	kg/cm <sup>2</sup> kPa	-	5.25 517	-	ASTM D 774-63T
Density	Mg/m <sup>2</sup>	-	1.42	-	ASTM D 1505-63T
Coefficient of Friction Kinetic (Film-to-Film)		-	0.42	-	ASTM D 1894-63
Refractive Index (Becke Line)		-	1.78	-	Encyclopaedic Dictionary of Physics, Volume 1
Area Factor	m <sup>2</sup> /kg	-	28	-	Calculation

## Thermal Properties

Property	Typical Value - 1 mil (25 µm) film	Test Condition	Test Method
Melting Point	None		
Zero Strength Temperature	815°C	1.4 kg/cm <sup>2</sup> (138 kPa) load for 5 secs	Hot Bar (DuPont™ Test)
Cut-through Temperature	435°C 525°C	25 µm 50-125 µm	Weighted Probe on Heated Film (DuPont™ Test)
Coefficient of Thermal Expansion	2.0 x 10 <sup>-5</sup> /K	-14°C to 38°C	ASTM D696-44
Coefficient of Thermal Conductivity	(cal) (cm) 3.72 x 10 <sup>-4</sup> (cm <sup>2</sup> ) (sec) (°C) (0.156 W/m/K) 3.89 x 10 <sup>-4</sup> (cm <sup>2</sup> ) (sec) (°C) (0.163 W/m/K) 4.26 x 10 <sup>-4</sup> (cm <sup>2</sup> ) (sec) (°C) (0.178 W/m/K)	25°C 75°C 200°C	Model TC-1000 Twin Heatmeter Comparitive Tester
Flammability	Self-extinguishing	-	-
Heat Sealable	No	-	-
Thermal Capacity	0.261 cal./g/°C (1092 J/kg/K)	40°C	Differential Calorimetry

# Inner Lamina: DuPont™ Nomex® Grade 411

## Electrical Properties

Property of Base Material	Material Thickness		Test Condition	Test Method
	0.130mm	0.180mm		
Dielectric Strength (kV/mm)	12	12	AC Rapid Rise	ASTM D149
Dielectric Constant	1.3	1.3	10 <sup>3</sup> Hz	ASTM D150
Dissipation Factor	0.005	0.005	10 <sup>3</sup> Hz	ASTM D150

## Physical Properties

Property of Base Material	Typical Value	Test Condition	Test Method
Tensile Strength (N/cm)			
MD	17	28	ASTM D828-60
TD	9	17	ASTM D828-60
Elongation			
MD	3.5	3.5	ASTM D828-60
TD	4.8	5	ASTM D828-60