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# DuPont Kapton Polyimide Film

## Non-Adhesive

**Product Description** HN Film can be metallized, punched, or formed. It is the recommended choice for applications that require polyimide film with an excellent balance of properties over a wide range of temperatures.

**Table 1**  
**Physical Properties of Kapton® HN at 23°C (73°F)**

Property	Unit	1 mil 25µm	5 mil 125µm	Test Method
Ultimate Tensile Strength at 23°C, (73°F) at 200°C (392°F)	psi (MPa)	33,500(231) 20,000(139)	33,500(231) 20,000(139)	ASTM D-882-91, Method A*
Ultimate Elongation at 23°C, (73°F) at 200°C (392°F)	%	72 83	82 83	ASTM D-882-91, Method A
Tensile Modulus at 23°C, (73°F) at 200°C (392°F)	psi (GPa)	370,000 (2.5) 290,000 (2.0)	370,000 (2.5) 290,000 (2.0)	ASTM D-882-91, Method A
Density	g/cc	1.42	1.42	ASTM D-1505-90
MIT Folding Endurance	cycles	285,000	5,000	ASTM D-2176-89
Tear Strength-propagating (Elmendorf), N (lbf)		0.07 (0.02)	0.58 (0.02)	ASTM D-1922-89
Tear Strength, Initial (Graves), N (lbf)		72 (1.6)	46.9 (1.6)	ASTM D-1004-90
Yield Point at 3% at 23°C, (73°F) at 200°C (392°F)	MPa (psi)	69 (10,000) 41 (6000)	69 (10,000) 41 (6000)	ASTM D-882-91
Stress to produce 5% elong. at 23°C, (73°F) at 200°C (392°F)	MPa (psi)	90 (13,000) 61 (9000)	90 (13,000) 61 (9000)	ASTM D-882-92
Impact Strength at 23°C, (73°F)	N•cm•(ft lbf)	78 (0.58)	78 (0.58)	DuPont Pneumatic Impact Test
Coefficient of Friction, kinetic (film-to-film)		0.48	0.48	ASTM D-1894-90
Coefficient of Friction, static (film-to-film)		0.63	0.63	ASTM D-1894-90
Refractive Index (sodium D line)		1.70	1.70	ASTM D-542-90
Poisson's Ratio		0.34	0.34	Avg. three samples, Elongated at 5, 7, 10%
Low temperature flex life		pass	pass	IPC-TM-650, Method 2.6.18



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**Table 2**  
**Thermal Properties of Kapton®HN Film**

Thermal Property	Typical Value	Test Condition	Test Method
Melting Point	None	None	ASTM E-794-85 (1989)
Thermal Coefficient of Linear Expansion	20 ppm/°C (11 ppm/°F)	-14 to 38°C (7 to 100°F)	ASTM D-696-91
Coefficient of Thermal Conductivity, W/m•K $\frac{\text{cal}}{\text{cm}\cdot\text{sec}\cdot\text{°C}}$	0.12 $2.87 \times 10^4$	296 K 23°C	ASTM F-433-77 (1987)
Specific Heat, J/g•K (cal/g•°C)	1.09 (0.261)		Differential calorimetry
Heat Sealability	not heat sealable		
Solder Float	pass		IPC-TM-650, method 2.4.13A
Smoke Generation	$D_n = <1$	NBS smoke chamber	NFPA-258
Shrinkage, % 30 min at 150°C 120 min at 400°C	0.17 1.25		IPC-TM-650 Method 2.2.4A; ASTM D-5214-91
Limiting Oxygen Index, %	37-45		ASTM D-2863-87
Glass Transition Temperature ( $T_g$ )	A second order transition occurs in Kapton® between 360°C(680°F) and 410°C(770°F) and is assumed to be the glass transition temperature. Different measurement techniques produce different results within the above temperature range.		

**Table 3**  
**Typical Electrical Properties of Kapton®HN Film at 23°C (73°F), 50% RH**

Property Film Gage	Typical Value	Test Condition	Test Method
<b>Dielectric Strength</b> 25 µm (1 mil) 50 µm (2 mil) 75 µm (3 mil) 125 µm (5 mil)	$\frac{\text{V}}{\text{m}}$ kV/mm 303 240 205 154 $\frac{\text{V}}{\text{mil}}$ (7700) (6100) (5200) (3900)	60 Hz 1/4 in electrodes 500 V/sec rise	ASTM D-149-91
<b>Dielectric Constant</b> 25 µm (1 mil) 50 µm (2 mil) 75 µm (3 mil) 125 µm (5 mil)	3.4 3.4 3.5 3.5	1 kHz	ASTM D-150-92
<b>Dissipation Factor</b> 25 µm (1 mil) 50 µm (2 mil) 75 µm (3 mil) 125 µm (5 mil)	0.0018 0.0020 0.0020 0.0026	1 kHz	ASTM D-150-92
<b>Volume Resistivity</b> 25 µm (1 mil) 50 µm (2 mil) 75 µm (3 mil) 125 µm (5 mil)	$\frac{\text{cm}}{\text{cm}}$ $1.5 \times 10^{17}$ $1.5 \times 10^{17}$ $1.4 \times 10^{17}$ $1.0 \times 10^{17}$		ASTM D-257-91



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Figure 1. Residual Shrinkage vs. Exposure Temperature and Thickness, Kapton® HN and VN Films

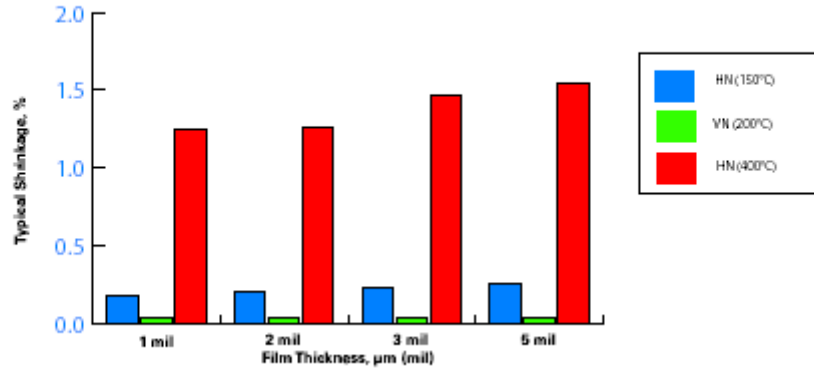


Table 4  
 Thermal Coefficient of Expansion,  
 Kapton® HN Film, 25 µm (1 mil),  
 Thermally Exposed

Temperature Range, °C, (°F)	ppm/°C
30-100 (86-212)	17
100-200 (212-392)	32
200-300 (392-572)	40
300-400 (572-752)	44
30-400 (86-752)	34

NOTE:

1. When applying pressure sensitive adhesive films to any surface, be sure that the surface is free from oil or other surface contaminants such as powder, dust or release agents. Adhesive performance should be carefully checked when used on substrates containing plasticizers..
2. The above values are "Typical Values" which have a nominal range about them and are not intended for specification purposes.