DuPont High Performance Films

Kapton® JP

polyimide film for forming

Product Description

The Kapton® JP family of polyimide films has been designed to give optimum forming characteristics. JP films have higher elongations at elevated temperatures while maintaining the combination of excellent physical, electrical, and mechanical properties inherent in Kapton® HN and HA. JP polymer properties enable drawing deeper parts at lower temperatures and shorter cycle times. After forming, parts exhibit excellent shape retention and minimum shrinkage. Property comparisons are shown in **Table 1** and **Figures 1** and **2**.

Available Film Thicknesses

Kapton® Grade	mil	µm
100JP	1	25
200JP	2	50
300JP	3	75
500JP	5	125

Maximum width: 48 in

Application Examples

Parts may be formed from JP film that were previously difficult or impossible to form with Kapton® HN and HA:

- Diaphragms for automotive and heating and ventilating sensors and switches
- Speaker cones, domes, spiders, and surrounds
- Other applications including appliances, electronics, and aerospace

Table 1
Typical Properties of Kapton® JP Polyimide Film versus Kapton® 500HA

Property	100JP	200JP	300JP	500JP	500HA	Test Method
Physical						
Ultimate Tensile Strength, kpsi						ASTM D-882
at 23°C (73°F)	28.8	30.5	31.4	28.5	25.0	
at 200°C (392°F)	14.7	16.2	15.3	14.1	14.9	
Yield Point at 3%, kpsi						ASTM D-882
at 23°C (73°F)	10.9	10.6	11.4	10	9.5	
at 200°C (392°F)	5.5	5.6	4.6	4.2	4.8	
Stress to Produce 5% Elongation, kpsi						ASTM D-882
at 23°C (73°F)	14.7	14.4	15.1	13.9	15.0	
at 200°C (392°F)	7.2	7.3	6.9	6.3	6.8	
Ultimate Elongation, %						ASTM D-882
at 23°C (73°F)	89	99	115	120	115	
at 200°C (392°F)	142	148	155	170	126	
Tensile Modulus, kpsi						ASTM D-882
at 23°C (73°F)	412	410	405	370	400	
at 200°C (392°F)	205	220	188	173	204	
Density, g/cc or g/mL	1.3973	1.4001	1.3997	1.3999	1.4170	ASTM D-1505
Yield, ft^2/lb	137.8	68.9	45.9	27.6	27	
Thermal						
Coefficient of Linear Expansion, ppm/C	41	41	41	41	47	ASTM D-696
Specific Heat, J/g·K	1.21	1.19	1.23	1.28	1.26	Diff. Calor.
Glass Transition Temperature (Tg), C	300	300	300	300	420	Diff. Calor.
Dimensional Stability, MD/TD						
at 400°C (752°F)	—	—	2.34/1.89	2.78/2.10	2.66/2.22	ASTM D-5214
at 250°C (482°F)	0.18/0.13	0.30/0.24	0.24/0.20	0.31/0.22	0.28/0.16	
Electrical						
Dielectric Strength, V/mil	6870	5500	4300	3500	3500	ASTM D-149
Dielectric Constant, 50% RH,						
1 kHz at 25°C (77°F)	3.34	3.44	3.46	3.46	3.40	ASTM D-150
Dissipation Factor	0.0013	0.0011	0.0018	0.0019	0.0025	ASTM D-150
Chemical						
Moisture Absorption, %						
24 hr in boiling water	1.5	1.8	1.9	2.1	3.3	ASTM D-570

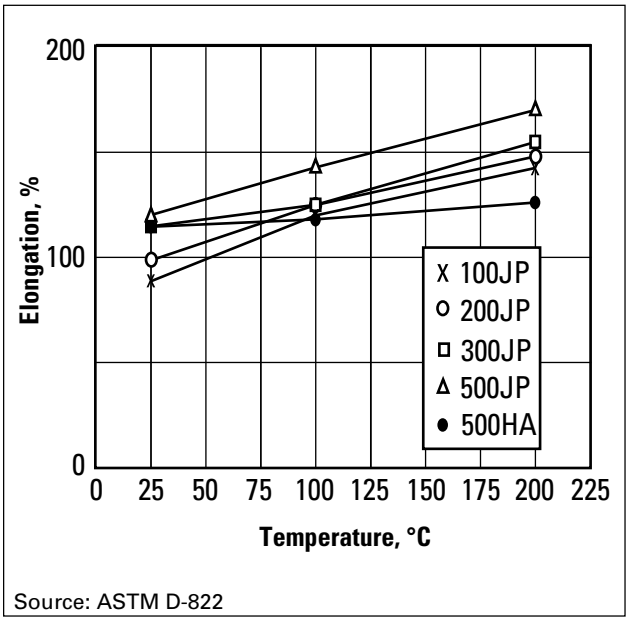
Forming Information

JP films can be thermoformed using high temperature forming technology developed by DuPont. JP films can be formed at temperatures approximately 93°C (200°F) lower than those needed to form conventional Kapton® films such as HN and HA.

Some guidelines for forming JP films include:

- forming temperature of 280–300°C (535–570°F)
- 400–500 psi pressure
- annealing of the part

Figure 1. Elongation of Kapton® JP Films as a Function of Temperature

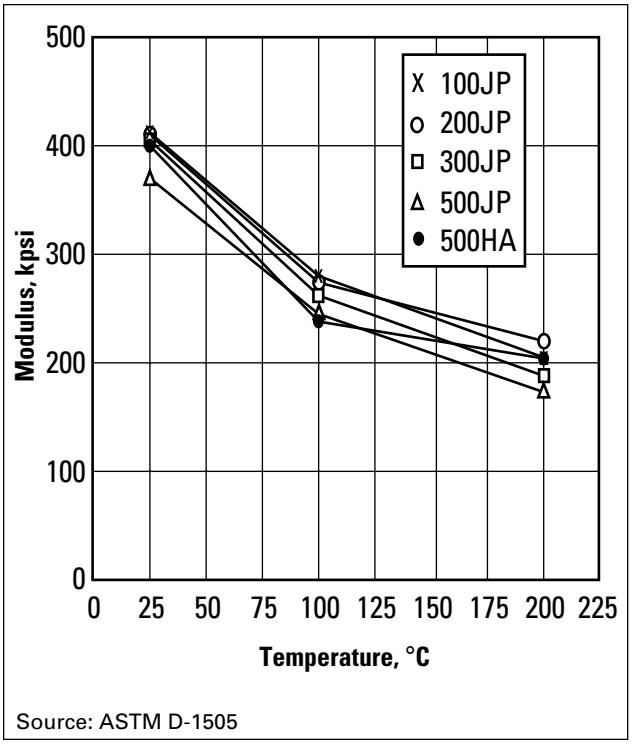


Source: ASTM D-822

Parts formed using optimum forming conditions have shrinkage of <4% after 8 hr exposure to temperatures up to 260°C (500°F).

DuPont can provide additional forming information for specific applications if requested. DuPont has also established a list of experienced forming partners to provide parts to customers.

Figure 2. Modulus of Kapton® JP Films as a Function of Temperature



Source: ASTM D-1505

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