

PA3800

Parylene C – Parylene Coating Material

Parylene C is known for its biocompatibility and exceptional resistance to moisture, vapor, and corrosive gases. Its robust chemical resistance makes it suitable for a wide range of applications, from medical devices to personal computers, due to its strong anti-corrosion properties and valuable combination of attributes. As a result, Parylene C is the preferred choice for providing protective conformal coatings for most products that require them.

FEATURE

- Good electric material with particularly low dielectric loss
- High insulation strength and dielectric constant
- Good self-lubrication
- True pinhole free cover isolation
- Compliance with Reach & RoHS

TYPICAL PROPERTIES

Properties	PA3800
Dielectric strength DC (V/mil)	5600
Product resistance $\Omega \cdot \text{cm}$ 23°C 50%RH	1.4×10^{17}
Surface resistance	10^{13}
Dielectric constant	
60Hz	3.15
1 kHz	3.10
1 MHz	2.95
Dielectric loss	
60Hz	0.02
1kHz	0.019
1mHz	0.013
1GHz	0.0043
10GHz	0.0032
Young's modulus, Mpa	3200
Tensile strength, Mpa	70
Elongation at break, %	200
Water absorption, %24h	<0.1
Hardness	R80

Properties	PA3800
Coefficient of friction	
Static	0.29
Dynamic	0.29
Melting point, °C	290
Use in the air, °C	-200 ~ 120
Coefficient of linear expansion, 25°C	3.5
Thermal conductivity $10^{-4} \text{ cal/(s} \cdot \text{cm} \cdot ^\circ\text{C)}$	2.0
Specific heat 20°C $\text{Cal/g} \cdot ^\circ\text{C}$	0.17
Water vapor penetration, 37°C 90% RH, g.mil/100in ² /day	0.21

PROTECTION PERFORMANCE

Properties	PA3800
Nitrogen	0.95
Oxygen	7.1
Carbon dioxide	7.7
Hydrogen sulfide	13
Chlorine	11
Sulfur dioxide	0.35
Water vapor transmission 2-24 hours atmospheric pressure at 23°C	0.14

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THERMAL PROPERTIES

Properties	PA3800
Melting point, °C	290
Linear expansion coefficient (10~5°C)	3.5
Thermal conductivity (cm ² ·°C/cm)	2.0

PHYSICAL AND MECHANICAL PROPERTIES

Properties	PA3800
Tensile strength, PSI	10,000
Tensile modulus, MPa	69
Yield strength, PSI	8,000
Elongation at yield, MPa	3,200
Elongation at break, %	200
Density, g/cm ³	1.289
Coefficient of friction, static	0.29
Coefficient of friction, dynamic	0.29
Water absorption, % (24 hrs)	0.06
Refractive index, Nd ²³	1.639

SOLVENT RESISTANCE

Thickness change (%) of 0.5-1.5mil film after being immersed in various solvents for 90 minutes at room temperature (infrared measurement method)

Properties	PA3800
Isopropanol	0.1
Isooctane	0.4
Pyridine	0.5
Mixed xylene	2.3
Trichloroethylene	0.8
Chlorobenzene	1.5
Dichlorobenzene	3.0
Trichlorotrifluoroethane	0.2
Acetone	0.9
Pentylenedione	1.4
Deionized water	0

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ALTERNATING HUMIDITY AND HEAT EXPERIMENT OF COATED CIRCUIT BOARD

Parylene C Thickness (in)	Initial measurement 23°C 50%RH	Pre-loop 23°C 90%RH	Loop 3 the fifth step 65°C 90%RH	Loop 7 the fifth step 65°C 90%RH	Loop 10 the fifth step 65°C 90%RH	Loop 10 Seventh step 25°C 90%RH
0.002	2.0×10^{14}	1.8×10^{13}	2.3×10^{12}	2.5×10^{11}	1.4×10^{11}	7.5×10^{12}
0.0015	5.0×10^{14}	2.4×10^{13}	8.6×10^{11}	1.9×10^{11}	1.1×10^{11}	5.2×10^{12}
0.001	2.0×10^{14}	9.2×10^{12}	8.1×10^{11}	3.4×10^{11}	1.3×10^{11}	6.3×10^{12}
0.0005	5.0×10^{14}	2.3×10^{13}	4.1×10^{12}	2.4×10^{11}	1.1×10^{11}	4.7×10^{12}
0.0003	5.0×10^{14}	2.7×10^{13}	4.4×10^{12}	9.0×10^{10}	4.7×10^{10}	2.9×10^{12}
0.0001	5.0×10^{14}	3.2×10^{10}	1.3×10^{11}	1.1×10^{11}	6.4×10^{10}	2.3×10^{12}

GAS AND MOISTURE ISOLATION

Gas permeability at 25°C {cm ³ (STP)·mil} {100in ² /d·atm}							90%RH 37°C (water vapor) g*mi/100in ² -d	
	H2	N2	O2	CO2	SO2	H2S	CL2	
Parylene N	540	7.7	39	214	1 890	795	74	1.50
Parylene C	110	1.0	7.2	7.7	11	13	0.35	0.21
Parylene D	240	4.5	32	13	4.75	1.45	0.55	0.25
Epoxy resin	110	4	5-10	8				6.6
Silicone resin	45000		50000	300000				220
Polyurethane		80	200	3000				20.2
Polyacrylate		152	716	1433				27.8

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GAS AND MOISTURE ISOLATION

Thickness change (%) of 0.5-1.5mil film after being immersed in various reagents at room temperature for 90 minutes (measured by infrared method)

Reagent varieties	Concentration	Parylene C(%)
Salt acid	10%	0.0
Concentrated hydrochloric acid	37%	0.0
Sulfuric acid	10%	0.3
Concentrated sulfuric acid	95-98%	0.4
Nitric acid	10%	0.1
Concentrated nitric acid	71%	0.2
Chromic acid	10%	0.1
Concentrated chromic acid	74%	0.0
Strong base (NaOH)	10%	0.0
Weak base (NH4OH)	10%	0.2

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