

Polyparylene:

Parylene – polymer layers

To the product group we count the following product designations:

- Parylene N
- Parylene C and C with UV-tracer
- Parylene D
- Parylene F
- Parylene AF4

These various polymer layers have fundamentally similar appearance in their appearance and are comparable in their nature as a coating on various substrates. The direct differences are listed under the technical data.

Product description:

Polyparylene are chemical vapor deposited (CVD) polymers, which in their simplest form are based on para-xylylene. The poly-p-xylylenes thus produced are also called parylene N in your application. By substitution of single hydrogen atoms with chlorine or fluorine, the parylene types C, D, F and AF4 can be formed.

Polyparylene in the form of a coating is an almost chemically inert layer with high protective properties against external environmental influences. In comparison to alternative coating methods, with comparatively thin layer thicknesses, protection properties against moisture, acids, lyes, fuels, in vivo applications, pressure differences, and other environmental influences which would damage uncoated substrates are achieved.

The coefficients of friction of polyparylenes comparable with PTFE surfaces are applied to substrates to reduce the frictional forces on various surfaces. In addition to the use of polyparylenes for friction reduction and for corrosion protection or protection against aggressive environmental influences, these layers are also used as a dielectric or as insulation protection for electronic components.

Possible layer thicknesses on substrates which are coated with polyparylenes start in the nanometer range and end at up to about 100 micrometers per coating run.

## Technical Data Polyparylene:

Typical thermal properties	N	C C-UV	D	F	AF4
Melting point (° C)	410	290	380	>460	>500
Linear expansion coefficient (ppm / K)	69	35	38	36	36
Thermal conductivity at 25 ° C (W / mK)	0,120	0,082	n/a	0,096	0,096
Continuous temperature resistance (° C)	90	125	160	190	350
Temporary peak temperature (° C)	120	200	300	300	450
Typical physical and mechanical properties	N	C	D	F	AF4
Tensile strength (psi)	6.500	10.000	11.000	7.500	7.500
Tensile strength (MPa)	45	69	76	52	52
Yield point (psi)	6.300	8.000	9.000	5.000	5.000
Yield point (MPa)	43	55	62	34	34
Tensile modulus (psi)	350.000	400.000	380.000	370.000	370.000
Tensile modulus (MPa)	2.400	3.200	2.800	2.500	2.500
Elongation at break (%)	250	200	200	200	200
Flow elongation (%)	2,5	2,9	3,0	2,0	2,0
Density (g / cm <sup>3</sup> )	1,110	1,289	1,418	1,320	1,320
Friction coefficient static	0,25	0,29	0,33	0,14	0,14
Friction coefficient dynamic	0,25	0,29	0,31	0,13	0,13
Water absorption (% / 24h)	0,01	0,06	<0,1	<0,009	<0,01
Refractive index (ND <sup>23</sup> )	1,661	1,639	1,669	1,559	1,559
Typical electrical properties	N	C	D	F	AF4
Short term dielectric strength (V / mil at 1 mil)	7.000	5.800	5.500	5.500	5.500
Volume resistance at 23 ° C / 50% RH (Ωcm)	1x10 <sup>17</sup>	6x10 <sup>16</sup>	2x10 <sup>16</sup>	2x10 <sup>17</sup>	2x10 <sup>17</sup>
Surface resistance (Ω)	1x10 <sup>15</sup>	1x10 <sup>15</sup>	5x10 <sup>16</sup>	5x10 <sup>15</sup>	5x10 <sup>15</sup>
Dielectric constant: 60Hz	2,65	3,15	2,84	2,25	2,21
Dielectric constant: 1.000Hz	2,65	3,10	2,82	2,10	2,20
Dielectric constant: 1,000,000Hz	2,65	2,95	2,80	2,16	2,17
Dielectric loss factor: 60Hz	0,0002	0,020	0,004	0,0002	0,0002
Dielectric loss factor: 1,000Hz	0,0002	0,019	0,003	0,0020	0,0020
Dielectric loss factor: 1,000,000Hz	0,0006	0,013	0,002	0,0010	0,0010
Typical barrier properties	N	C	D	F	AF4
gas permeability at 23°C (cm <sup>3</sup> x mm)/(m <sup>2</sup> x 24h x bar)					
Nitrogen (N <sub>2</sub> )	7,70	0,37	1,77	4,85	4,80
Oxygen (O <sub>2</sub> )	11,8	2,8	12,6	23,5	23,5
Carbon dioxide (CO <sub>2</sub> )	84,25	3,03	5,12	95,60	95,40
Hydrogen sulfide (H <sub>2</sub> S)	313,0	5,1	0,6	n/a	n/a
Sulfur dioxide (SO <sub>2</sub> )	0,74	4,33	1,87	n/a	n/a
Chlorine (Cl <sub>2</sub> )	29,13	0,14	0,22	n/a	n/a
Hydrogen (H <sub>2</sub> )	212,6	43,3	94,5	n/a	n/a
Moisture permeability (cm <sup>3</sup> x mm) / (m <sup>2</sup> x 24h) at 37 ° C / 90% RH	0,59	0,06	0,10	0,23	0,22

This information is informative and based on our knowledge and experience. The user must independently check whether the products are suitable for the respective applications. Subject to change. Liability can not be based on these instructions or verbal advice, unless we are guilty of intent or gross negligence. With the publication of this technical data sheet, all previous issues lose their validity

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