Modified PPE Resin

Iupiace™ LEMALLOY™

2026.03 version

GLOBAL POLYACETAL

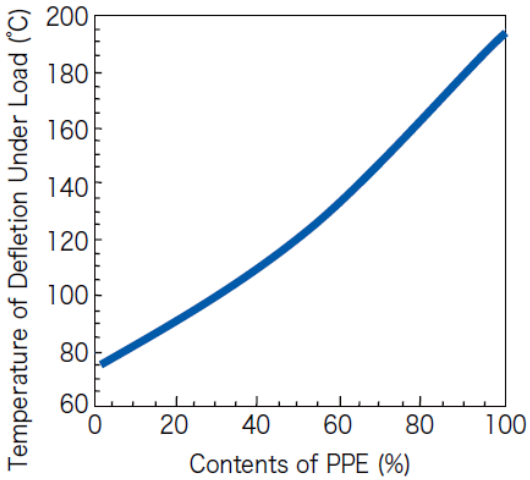
Introduction

What is Iupiace ™

Iupiace (modified PPE resin) is an amorphous engineering plastic, which is developed by Mitsubishi Gas Chemical Co., Inc., with its unique technologies and whose main components are the polyphenylene ether (PPE) and polystyrene (PS). It has a good balance of electric property, flame resistance, heat resistance, dimensional stability, moldability, and other properties. Additionally, its specific gravity is the lowest among engineering plastics. It is UL-approved and is used for the mechanism parts of home appliances and in electric/electronic office automation equipment, such as the chassis of office automation equipment. It is also used for a wide range of applications, such as automotive exterior parts and water related parts, including pumps by taking advantage of its hot water resistance.

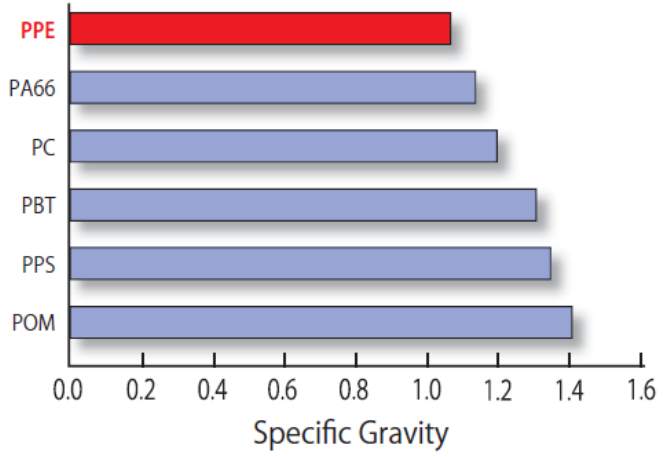
Wide range of heatproof temperature

Thermal deformation temperature can be adjusted widely by changing the mixing ratio of PPE and PS.



Low specific gravity

Iupiace has the lowest specific gravity among engineering plastics and enables weight saving.



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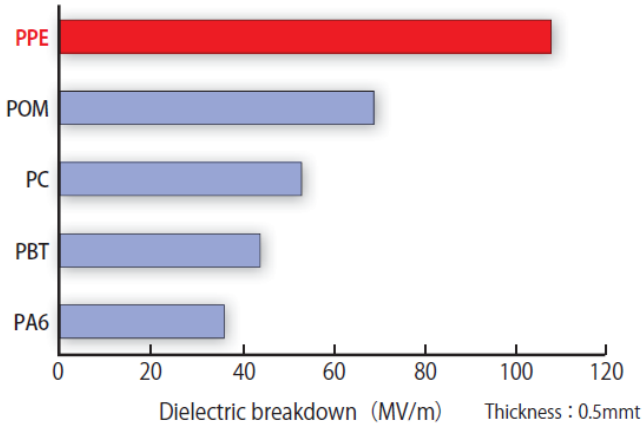
High electric property-1

The dielectric breakdown strength of Iupiace is the highest among engineering plastics and the insulation property is excellent.



High electric property-2

The electric permittivity and dielectric tangent of Iupiace are the lowest among engineering plastics.

	PPE	POM	PC	PBT	PA6
Dielectrical Constant	2.8	3.7	2.9	3.2	3.4
Dielectric Tangent (1E-3)	6	7	9	20	20

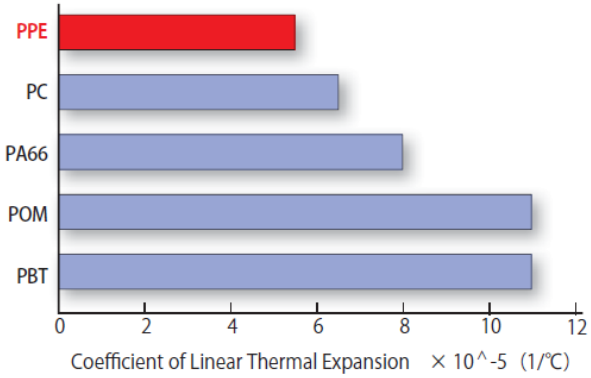
High self-extinguishing property

Iupiace has a high oxygen index and is easy to add flame resistance. A wide range of frame resistance grades (HB, V-1 and V-0) is available.

Resin	Oxygen Index
POM	15 ~ 16
PA66	22 ~ 25
PC	24 ~ 25
PPE	**27 ~ 29**
PS	18 ~ 19

High dimensional accuracy

Iupiace has the lowest linear expansion coefficient among engineering plastics and offers excellent dimensional accuracy.



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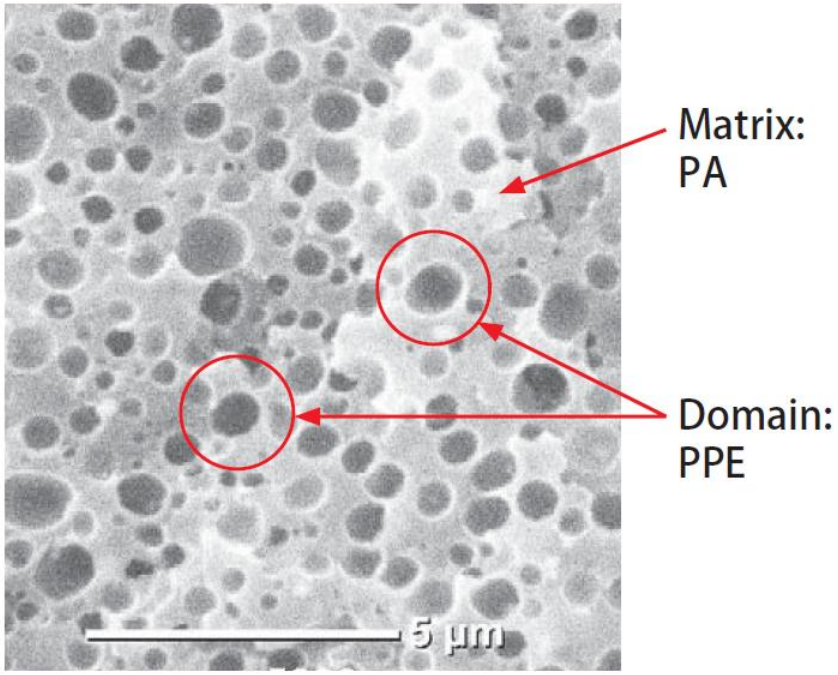
What is LEMALLOY ™

LEMALLOY has sea-island structure. Matrix phase is crystalline resin, such as a polyamide resin (PA) or polypropylene resin (PP) and domain structure (in the matrix phase) is polyphenylene ether resin (PPE). This resin has the chemical resistance and moldability/workability of a crystalline resin and the dimensional stability and stiffness at high temperature of an amorphous resin together. It is therefore used in various environments. In automotive applications, it is frequently used for electric components, such as the junction box and connectors in an engine compartment, by taking advantage of the chemical resistance of a crystalline resin and the characteristics of PPE, such as low specific gravity and low water absorption.

It is an alloy made of PPE and a crystalline resin, PA or PP.



		Moldability	Oil Durability	Dimensional Stability	Modulus at high-temperature
Crystalline resins(C)		◎	◎	△	△
Amorphous resins(A) lupiace		×～○	×～○	◎	◎
Alloy	(A) - (A)	△～○	△	◎	◎
	(C) - (C) LEMALLOY	○	◎	○	○

Because of the sea-island structure of alloying, the alloy has a better oil resistance than PPE/PS. Its features include higher stiffness at high temperature and lower water absorption rate than PA.

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Features

Grades for a wide range of heatproof temperature and various applications are available.

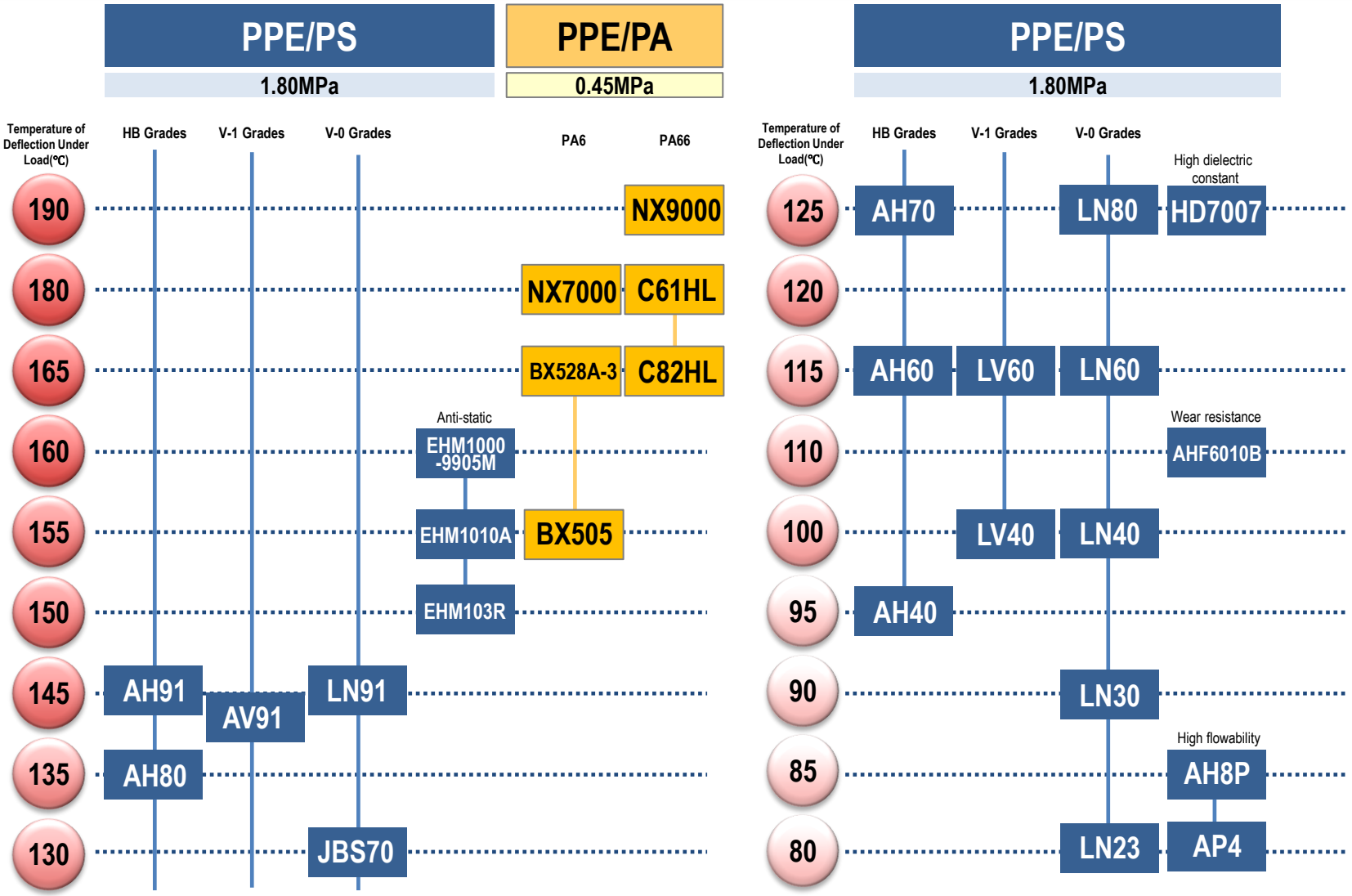
■Features of Iupiace

- Stiffness, impact resistance, fatigue resistance, and other properties are stable over a wide range of temperature.
- Because of excellent insulation property and low electric permittivity/dielectric tangent, it is optimal for electric applications that require insulation.
- It has a low water absorption rate while the change in physical properties at saturated water absorption is small.
- It has a high deflection temperature under load and excellent thermal stability while the decrease in physical properties due to heat treatment is small.
- Because of self-extinguish property and excellent flame resistance, it is optimal for electric applications.
- Weight saving is possible due to a low specific gravity.
- It is suitable for precision molding since its mold shrinkage factor is small and it is insusceptible to molding conditions.
- It covers a wide range of heatproof temperature.

■ Features of LEMALLOY

- LEMALLOY has a high deflection temperature under load of 150° C or higher (at 0.45 MPa) even for its unreinforced grade.
- It has an excellent impact resistance.
- It has a chemical resistance equivalent to that of a polyamide resin or polypropylene resin.
- LEMALLOY have better dimensional stability compared to polyamide.
- It has an excellent flow property.
- When compared to those of a polyamide resin, it has lower water absorption rate and specific gravity.

Unreinforced Grades



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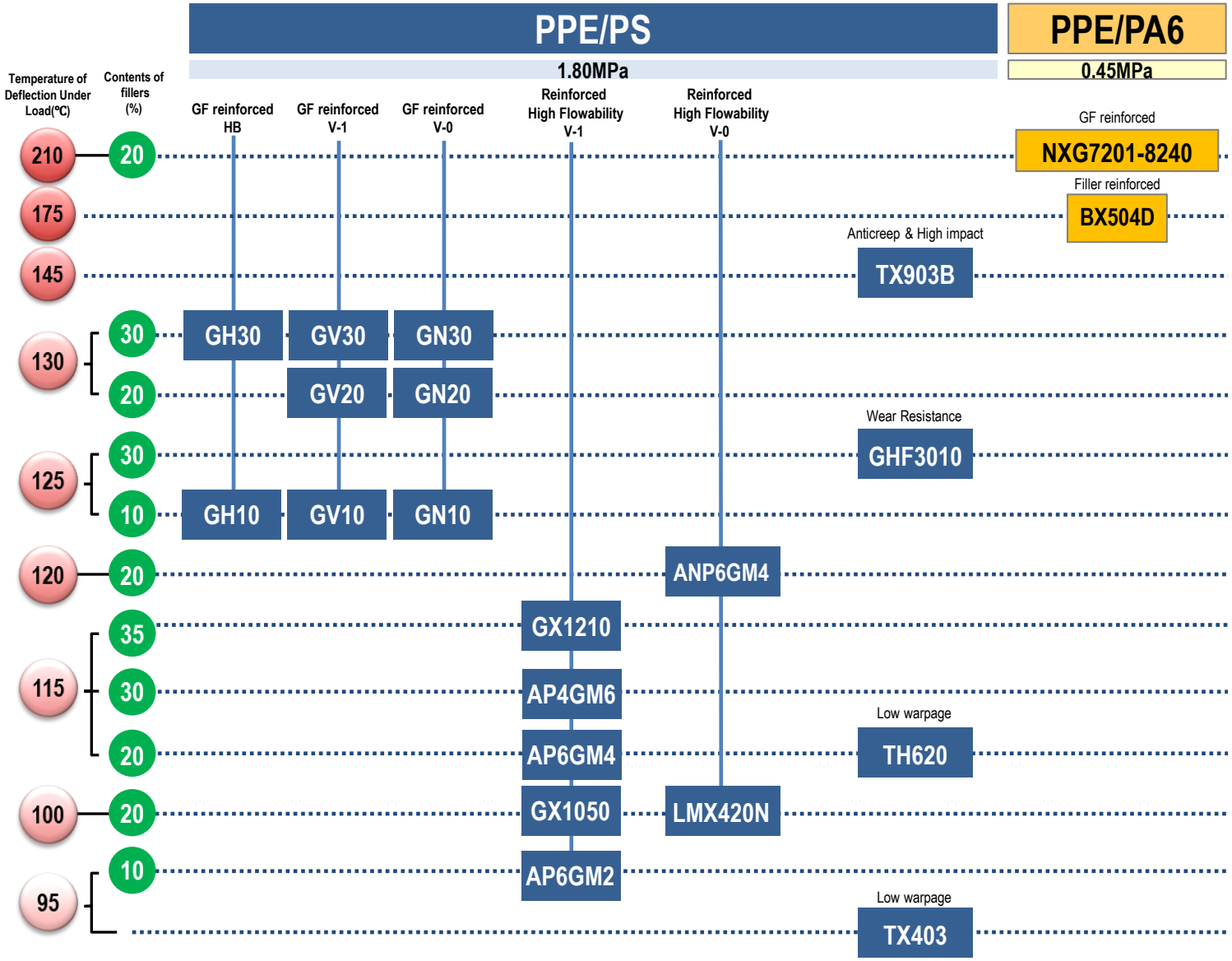
Reinforced Grades



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Applications

Iupiace and LEMALLOY are used in various fields from automobile parts to electric/electronic parts and medical devices.

For housing equipment

- Photovoltaic parts
- Boiler parts
- Battery parts
- Water meter parts
- Piping parts
- Floor heating parts
- Washing toilet seat parts

For household use

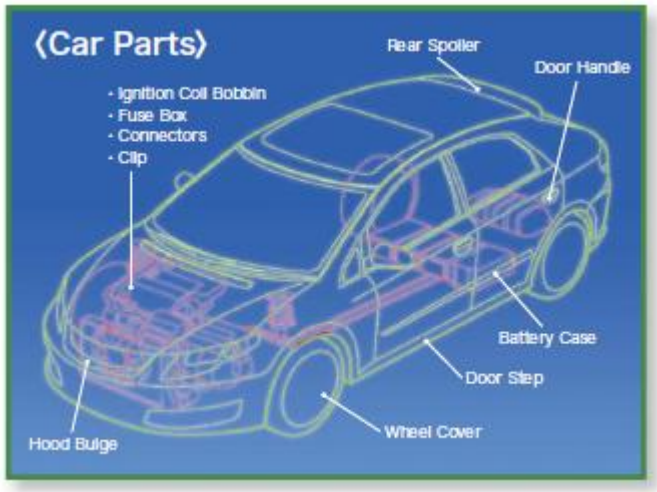
- Lighting parts
- TV housing
- Air conditioner parts
- Gaming machine parts
- Refrigerator parts
- Smartphone
- Air purification device parts
- NB personal computer parts
- AC adaptor
- Tablet
- Battery charger parts

For infrastructure/installation

- Underground piping parts
- Tunnel parts
- Road security parts
- Water purification equipment parts
- Automatic vending machine parts
- Elevator parts
- Medical device parts
- Semiconductor equipment parts
- Battery manufacturing facility parts
- Money changer parts
- Control instrument parts

For other applications

- Copier parts
- Printer parts
- Connector
- IC tray
- Insulating film
- Terminal block
- Sensor
- Motorboat parts
- Wire coating
- Inverter
- Pump parts
- Dish tray
- PC parts
- Inlet
- Scanner parts
- LED frame



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Property table of Iupiace™ Unreinforced V-0 grades

				Unreinforced V-0 Grades						
Properties	**Test Method**	**Terms**	**Units**	**LN23**	**LN30**	**LN40**	**LN60**	**JBS70**	**LN80**	**LN91**
Physical properties										
Density	ISO 1183	-	g/cm^3	1.10	1.10	1.10	1.10	1.10	1.11	1.10
Water absorption	-	23℃, 24hr, Underwater	%	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Rheological properties										
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	32 300 2.16	16 300 2.16	14 300 2.16	9.5 300 2.16	7.5 300 2.16	6.5 300 2.16	4.0 300 2.16
Mold shrinkage (3mmt)	GPAC method	MD TD	%	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7
Mechanical properties										
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	-	-	-	-	2400	2400	-
Yield stress			MPa	47	55	65	73	70	79	70
Yield strain			%	-	-	-	-	5	-	-
Nominal strain at break			%	25	25	25	25	20	20	55
Stress at break			MPa	-	-	-	-	-	-	-
Strain at break			%	-	-	-	-	-	-	-
Flexural strength	ISO 178	23℃	MPa	80	90	95	105	105	115	105
Flexural modulus			MPa	2400	2400	2500	2380	2400	2400	2700
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m^2	-	-	-	-	-	-	-
Charpy notched impact strength			kJ/m^2	11	13	12	7	26	6	7
Thermal properties										
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	80 95	90 105	100 115	115 130	130 145	127 140	145 160
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	5.5.E-05 5.8.E-05	5.5.E-05 5.8.E-05	5.5.E-05 5.8.E-05	5.5.E-05 5.8.E-05	5.5.E-05 5.8.E-05	5.5.E-05 5.8.E-05	5.5.E-05 5.8.E-05
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	- V-0 - -	V-0 - - 5VA	V-0 - - 5VA	V-0 - - 5VA	V-0 - 5VA	V-0 - - -	V-0 - - -
Electrical properties										
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	- -	- -	- -	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	- -	- -	- -	- -
Volume resistivity	IEC 60093	-	Ω·m	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14
Surface resistivity	IEC 60093	-	Ω	2.E+15	2.E+15	2.E+15	2.E+15	2.E+15	2.E+15	2.E+15
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -	- -	- -	- -	- -
Comparative tracking index	IEC 60112	-	V	-	-	-	-	250<	-	-

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Property table of Iupiace™ Unreinforced V-1, HB grades

				Unreinforced V-1 Grades			Unreinforced HB Grades				
Properties	**Test Method**	**Terms**	**Units**	**LV40**	**LV60**	**AV91**	**AH40**	**AH60**	**AH70**	**AH80**	**AH91**
Physical properties											
Density	ISO 1183	-	g/cm^3	1.10	1.09	1.08	1.06	1.06	1.07	1.07	1.07
Water absorption	-	23℃, 24hr, Underwater	%	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Rheological properties											
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	16 300 2.16	8.5 300 2.16	3.4 300 2.16	13 300 2.16	8.1 300 2.16	5.9 300 2.16	4.0 300 2.16	3.0 300 2.16
Mold shrinkage (3mmt)	GPAC method	MD TD	%	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7
Mechanical properties											
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	-	-	2500	2500	2500	2500	2600	2700
Yield stress			MPa	60	60	73	40	50	58	63	70
Yield strain			%	-	-	6.5	3.2	5	5.4	5.5	5.5
Nominal strain at break			%	20	25	20	34	30	24	25	25
Stress at break			MPa	-	-	-	-	-	-	-	-
Strain at break			%	-	-	-	-	-	-	-	-
Flexural strength	ISO 178	23℃	MPa	97	100	109	76	95	102	110	118
Flexural modulus			MPa	2550	2650	2550	2500	2500	2500	2600	2700
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m^2	-	-	-	153	119	NB	150	140
Charpy notched impact strength			kJ/m^2	12	12	13	14	16	20	18	15
Thermal properties											
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	100 115	115 130	141 -	95 110	115 130	125 140	135 150	145 160
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	6.3.E-05 6.6.E-05	6.3.E-05 6.6.E-05	- -	6.7.E-05 7.1.E-05	6.6.E-05 6.9.E-05	6.6.E-05 6.9.E-05	6.6.E-05 6.9.E-05	6.6.E-05 6.9.E-05
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	V-1 - - -	V-1 - - -	V-1 - - -	HB - - -	HB - - -	HB - - -	HB - - -	HB - - -
Electrical properties											
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	- -	- -	- -	- -	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	- -	- -	- -	- -	- -
Volume resistivity	IEC 60093	-	Ω·m	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14
Surface resistivity	IEC 60093	-	Ω	2.E+15	2.E+15	2.E+15	2.E+15	2.E+15	2.E+15	2.E+15	2.E+15
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -	38 20	- -	44 >65	- -	- -
Comparative tracking index	IEC 60112	-	V	-	-	-	-	275	-	-	-

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Property table of Iupiace™ High flowability V-0 grades

				High Flowability Grade (V-0)	
Properties	**Test Method**	**Terms**	**Units**	**AP4**	**AH8P**
Physical properties					
Density	ISO 1183	-	g/cm^3	1.11	1.10
Water absorption	-	23℃, 24hr, Underwater	%	0.07	0.06
Rheological properties					
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	85 280 5	18 280 5
Mold shrinkage (3mmt)	GPAC method	MD TD	%	0.5 - 0.7 0.5 - 0.7	0.5 - 0.7 0.5 - 0.7
Mechanical properties					
Tensile modulus Yield stress Yield strain Nominal strain at break Stress at break Strain at break	ISO 527-1, 527-2	23℃	MPa MPa % % MPa %	2000 49 3.2 45 - -	2600 56 3.2 20 - -
Flexural strength Flexural modulus	ISO 178	23℃	MPa MPa	82 2000	93 2400
Charpy impact strength Charpy notched impact strength	ISO 179-1, 179-2	23℃	kJ/m^2 kJ/m^2	- 9	- 7
Thermal properties					
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	80 90	85 95
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	- -	6.0.E-05 6.0.E-05
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	- V-0 - -	- V-0 - -
Electrical properties					
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -
Volume resistivity	IEC 60093	-	Ω·m	3.E+14	3.E+14
Surface resistivity	IEC 60093	-	Ω	2.E+15	2.E+15
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -
Comparative tracking index	IEC 60112	-	V	-	-

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Property table of Iupiace™
Glass fiber reinforced V-0, V-1, HB grades

Properties	Test Method	Terms	Units	Fiber Reinforced V-0 Grades			Fiber Reinforced V-1 Grades			Fiber Reinforced HB Grades		
				GN10	**GN20**	**GN30**	**GV10**	**GV20**	**GV30**	**GH10**	**GH20**	**GH30**
				GF	GF	GF	GF	GF	GF	GF	GF	GF
				10%	20%	30%	10%	20%	30%	10%	20%	30%
Physical properties												
Density	ISO 1183	-	g/cm^3	1.17	1.24	1.33	1.15	1.22	1.31	1.14	1.22	1.31
Water absorption	-	23℃, 24hr, Underwater	%	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Rheological properties												
Melt volume flow rate	ISO 1133	-	cm^3/10min	7.0	5.0	2.9	5.5	3.6	3.0	5.0	4.4	2.7
		Temperature	℃	300	300	300	300	300	300	300	300	300
		Load	kg	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16
Mold shrinkage (3mmt)	GPAC method	MD	%	0.2 - 0.4	0.1 - 0.3	0.1 - 0.2	0.2 - 0.4	0.1 - 0.3	0.1 - 0.2	0.2 - 0.4	0.1 - 0.3	0.1 - 0.2
		TD		0.3 - 0.5	0.2 - 0.4	0.2 - 0.4	0.3 - 0.5	0.2 - 0.4	0.2 - 0.4	0.3 - 0.5	0.2 - 0.4	0.2 - 0.4
Mechanical properties												
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	4200	6700	9000	4200	6500	8400	4500	6600	8900
Yield stress			MPa	-	-	-	-	-	-	-	-	-
Yield strain			%	-	-	-	-	-	-	-	-	-
Nominal strain at break			%	-	-	-	-	-	-	-	-	-
Stress at break			MPa	83	99	110	83	103	110	75	89	103
Strain at break			%	2.5	2.5	1.5	2.5	2.5	1.5	2.6	1.5	1.3
Flexural strength	ISO 178	23℃	MPa	140	160	180	135	161	170	130	154	170
Flexural modulus			MPa	4000	6200	8500	4100	6300	8300	4000	6400	8400
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m^2	-	-	-	-	-	-	-	-	-
Charpy notched impact strength			kJ/m^2	7	7	7	8	7	9	6	7	8
Thermal properties												
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa	℃	125	130	130	125	130	130	125	130	130
		0.45MPa		130	135	137	135	137	140	135	140	142
Coefficient of linear thermal expansion	ISO 11359-2	MD	1/℃	4.5.E-05	3.0.E-05	2.5.E-05	4.5.E-05	3.0.E-05	2.5.E-05	4.5.E-05	3.0.E-05	2.5.E-05
		TD		7.5.E-05	6.8.E-05	6.0.E-05	7.5.E-05	6.8.E-05	6.0.E-05	7.5.E-05	6.8.E-05	6.0.E-05
Flammability	UL94	0.75mmt	-	V-0	V-1	V-1	V-1	V-1	V-1	HB	HB equiv.	HB
		1.5mmt	-	-	V-0	V-0	-	-	-	-	-	-
		2.0mmt	-	5VA	5VA	5VA	-	-	-	-	-	-
		3.0mmt	-	-	-	-	-	-	-	-	-	-
Electrical properties												
Relative permittivity	IEC 60250	100Hz	-	-	3.4	-	-	3.2	-	-	-	-
		1MHz	-	-	3.3	-	-	3.2	-	-	-	-
Dissipation factor	IEC 60250	100Hz	-	-	0.0045	-	-	0.0021	-	-	-	-
		1MHz	-	-	0.0055	-	-	0.0027	-	-	-	-
Volume resistivity	IEC 60093	-	Ω·m	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14	3.E+14
Surface resistivity	IEC 60093	-	Ω	2.E+15	2.E+15	2.E+15	2.E+15	6.E+15	6.E+15	6.E+15	6.E+15	6.E+15
Electric strength	IEC 60243−1	1mmt	MV/m	-	25	-	-	26	-	34	32	30
		3mmt		-	17	-	-	17	-	20	17	17
Comparative tracking index	IEC 60112	-	V	200	225	200	200	200	200	175	175	150

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Property table of Iupiace™
High flowability reinforced grades

Properties	Test Method	Terms	Units	Reinforced High Flowability Grades (V-1)							Reinforced High Flowability Grades (V-0)	
				GX1050	**GX1210**	**AP6GM2**	**AP6GM4**	**AP4GM6**	**CTGM6**	**HCT20V**	**ANP6GM4**	**LGX420N**
				GF+Filler	GF+Filler	GF+Filler	GF+Filler	GF+Filler	GF+Filler	GF+Filler	GF+Filler	GF
				20%	35%	10%	20%	30%	30%	20%	20%	20%
Physical properties												
Density	ISO 1183	-	g/cm³	1.25	1.38	1.16	1.23	1.32	1.38	1.22	1.27	1.30
Water absorption	-	23℃, 24hr, Underwater	%	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Rheological properties												
Melt volume flow rate	ISO 1133	- Temperature Load	cm³/10min ℃ kg	24 300 2.16	9.0 300 2.16	28 280 5	31 280 5	25 280 5	27 280 5	26 280 5	29 280 5	50 280 5
Mold shrinkage (3mmt)	GPAC method	MD TD	%	0.2 - 0.4 0.3 - 0.5	0.1 - 0.3 0.2 - 0.4	0.3 - 0.5 0.3 - 0.5	0.2 - 0.4 0.3 - 0.5	0.1 - 0.3 0.2 - 0.4	0.3 0.4	0.5 0.7	0.2 - 0.4 0.3 - 0.5	0.2-0.4 0.2-0.4
Mechanical properties												
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	6100	10500	4000	5700	7800	-	-	6100	6200
Yield stress			MPa	-	-	-	-	-	-	-	-	-
Yield strain			%	-	-	-	-	-	-	-	-	-
Nominal strain at break			%	-	-	-	-	-	-	-	-	-
Stress at break			MPa	75	115	65	80	91	86	68	94	67
Strain at break			%	2.7	2	2.9	2.7	3.1	3	5	2.7	4
Flexural strength	ISO 178	23℃	MPa	122	175	116	132	145	140	108	140	120
Flexural modulus			MPa	6000	10500	3800	5500	7300	8000	3400	5800	6000
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m²	-	-	-	-	-	-	-	-	-
Charpy notched impact strength			kJ/m²	5	5	6	6	6	5	6	5	3
Thermal properties												
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	105 -	115 -	95 -	115 -	115 -	109 -	117 -	121 -	103 -
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	3.7.E-05 6.8.E-05	- -	4.7.E-05 5.8.E-05	3.7.E-05 6.8.E-05	2.6.E-05 6.1.E-05	2.1.E-05 4.0.E-05	4.5.E-05 6.5.E-05	3.7.E-05 6.8.E-05	4.0.E-05 5.5.E-05
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	- V-1 - 5VB	- V-1(1.0mm) - 5VB(2.7mm)	- V-1 - -	- V-1 - -	- V-1 - -	- V-1 - -	- V-1 - -	- V-0 - -	- V-0 - -
Electrical properties												
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	3.2 3.1	3.5 3.3	3.5 3.3	3.2 3.1	3.2 3.1	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	0.0057 0.0067	0.0092 0.0077	0.013 0.0049	0.009 0.0039	0.0057 0.0067	- -
Volume resistivity	IEC 60093	-	Ω·m	5.E+13	-	5.E+13	5.E+13	2.E+13	4.E+13	2.E+14	5.E+13	2.E+14
Surface resistivity	IEC 60093	-	Ω	1.E+15	-	1.E+15	1.E+15	3.E+15	7.E+14	1.E+16	1.E+15	2.E+15
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -	35 18	34 17	47 18.8	49 24	35 18	- -
Comparative tracking index	IEC 60112	-	V	175	-	200	200	150	175	600	200	-

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Property table of Iupiace™
Filler reinforced grades

Properties	Test Method	Terms	Units	Filler Reinforced Grades		
				TX403	**TX903B**	**TH620**
				Low Warpage	Anticreep High Impact	Low Warpage
Physical properties						
Density	ISO 1183	-	g/cm^3	1.09	1.09	1.20
Water absorption	-	23℃, 24hr, Underwater	%	0.06	0.06	0.06
Rheological properties						
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	16 280 5	2.5 300 2.16	12 300 2.16
Mold shrinkage (3mmt)	GPAC method	MD TD	%	0.5 - 0.7 0.5 - 0.7	- -	0.3 - 0.4 0.3 - 0.4
Mechanical properties						
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	2600	2400	5200
Yield stress			MPa	51	60	-
Yield strain			%	2.6	-	-
Nominal strain at break			%	24	40	12
Stress at break			MPa	-	-	50
Strain at break			%	-	-	-
Flexural strength	ISO 178	23℃	MPa	80	90	100
Flexural modulus			MPa	2500	2350	5100
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m^2	NB	NB	-
Charpy notched impact strength			kJ/m^2	20	32	4
Thermal properties						
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	95 100	145 -	115 -
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	6.0.E-05 6.0.E-05	- -	- -
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	HB - - -	- - - -	HB - - -
Electrical properties						
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- -
Volume resistivity	IEC 60093	-	Ω·m	3.E+14	-	-
Surface resistivity	IEC 60093	-	Ω	2.E+15	-	-
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -
Comparative tracking index	IEC 60112	-	V	-	-	-

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Property table of Iupiace™
Anti-static grades

Properties	Test Method	Terms	Units	Anti-Static Grades		
				EHM1010A	**EHM1000 9905M**	**EHM103R**
				CB	CB	CB
Physical properties						
Density	ISO 1183	-	g/cm^3	1.16	1.14	1.16
Water absorption	-	23℃, 24hr, Underwater	%	-	-	-
Rheological properties						
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	- - -	9.0 320 5	- - -
Mold shrinkage (3mmt)	GPAC method	MD TD	%	0.5 - 0.7 0.5 - 0.7	0.7 - 0.9 0.7 - 0.9	0.9 - 1.1 0.9 - 1.1
Mechanical properties						
Tensile modulus Yield stress Yield strain Nominal strain at break Stress at break Strain at break	ISO 527-1, 527-2	23℃	MPa MPa % % MPa %	3700 - - - 64 2.2	2500 - - - 60 9	2600 - - - 62 8
Flexural strength Flexural modulus	ISO 178	23℃	MPa MPa	110 3860	102 2500	105 2700
Charpy impact strength Charpy notched impact strength	ISO 179-1, 179-2	23℃	kJ/m^2 kJ/m^2	20 3	100 -	40 -
Thermal properties						
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	155 165	161 -	150 160
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	5.3.E-05 5.5.E-05	- -	- -
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	- - - -	- - - -	- - - -
Electrical properties						
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- -
Volume resistivity	IEC 60093	-	Ω·m	-	-	-
Surface resistivity	IEC 60093	-	Ω	6.E+05	1.E+04	2.E+03
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -
Comparative tracking index	IEC 60112	-	V	-	-	-

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Property table of Iupiace™
Wear resistance, High dielectric grade

Properties	Test Method	Terms	Units	High Friction/Wear Resistance		High Dielectric
				AHF6010B	**GHF3010**	**HD7007**
				Unreinforced	Fiber Reinforced	-
				PTFE	PTFE+GF	-
				10%	10%	-
Physical properties						
Density	ISO 1183	-	g/cm^3	1.12	1.37	1.32
Water absorption	-	23℃, 24hr, Underwater	%	0.06	0.10	0.10
Rheological properties						
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	4.5 300 2.16	1.9 300 2.16	6.5 300 5
Mold shrinkage (3mmt)	GPAC method	MD TD	%	0.5 - 0.7 0.5 - 0.7	0.1 - 0.2 0.2 - 0.4	- -
Mechanical properties						
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	2400	9000	4900
Yield stress			MPa	51	-	-
Yield strain			%	5	-	-
Nominal strain at break			%	15	-	-
Stress at break			MPa	-	90	60
Strain at break			%	-	1.8	2
Flexural strength	ISO 178	23℃	MPa	84	140	95
Flexural modulus			MPa	2500	9000	4800
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m^2	-	-	12
Charpy notched impact strength			kJ/m^2	8	6	-
Thermal properties						
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	110 -	125 -	125 -
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	6.0.E-05 6.0.E-05	2.5.E-05 6.0.E-05	- -
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	- HB - -	- HB - -	- - - -
Electrical properties						
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- 8(1GHz)
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- 0.006(1GHz)
Volume resistivity	IEC 60093	-	Ω·m	3.E+14	2.E+14	-
Surface resistivity	IEC 60093	-	Ω	6.E+15	2.E+15	-
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -
Comparative tracking index	IEC 60112	-	V	-	-	-

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Property table of Iupiace™ PA alloy grades

Properties	Test Method	Terms	Units	Unreinforced PPE/PA6 Alloy	Fiber Reinforced PPE/PA6 Alloy	Unreinforced PPE/PA66 Alloy
				NX7000	**NXG7201 8240**	**NX9000**
				-	GF	-
				-	20%	-
				dry(50%RH)	dry(50%RH)	dry(50%RH)
Physical properties						
Density	ISO 1183	-	g/cm^3	1.10	1.26	1.11
Water absorption	-	23℃, 24hr, Underwater	%	0.6	0.5	0.5
Rheological properties						
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	5.5 275 2.16	6.0 275 2.16	1.8 275 2.16
Mold shrinkage (3mmt)	GPAC method	MD TD	%	1.2 - 1.4 1.1 - 1.3	0.3 - 0.5 0.4 - 0.6	1.1 - 1.3 1.1 - 1.3
Mechanical properties						
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	2500 (1600)	6000 (4100)	2500 (-)
Yield stress			MPa	65 (46)	- (73)	65 (-)
Yield strain			%	4.1 (9.9)	- (5.1)	4.5 (-)
Nominal strain at break			%	20 (143)	- (11)	50 (-)
Stress at break			MPa	-	97 (-)	-
Strain at break			%	-	2.2 (-)	-
Flexural strength	ISO 178	23℃	MPa	102 (59)	171 (73)	100 (-)
Flexural modulus			MPa	2500 (1500)	5700 (4100)	2500 (-)
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m^2	-	-	-
Charpy notched impact strength			kJ/m^2	30 (77)	6 (9)	25 (-)
Thermal properties						
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	- 180	- 210	- 190
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	9.0.E-05 -	3.0.E-05 -	7.0.E-05 -
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	- - - -	- - - -	- - - -
Electrical properties						
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- -
Volume resistivity	IEC 60093	-	Ω·m	-	-	-
Surface resistivity	IEC 60093	-	Ω	-	-	-
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -
Comparative tracking index	IEC 60112	-	V	-	-	-

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Property table of LEMALLOY™

Properties	Test Method	Terms	Units	PPE/PA6 Alloy			PPE/PA66 Alloy			PPE/PP Alloy
				BX505	**BX528A-3**	**BX504D**	**C61HL**	**C82HL**	**CN51HL**	**PX603Y**
				Standards	High Strength	High Rigidity	Standards	High Flowability	V-0 Flame Returdance	-
				-	-	Filler	-	-	-	-
				dry(50%RH)	dry(50%RH)	dry(50%RH)	dry(50%RH)	dry(50%RH)	dry(50%RH)	dry(50%RH)
Physical properties										
Density	ISO 1183	-	g/cm^3	1.09	1.15	1.22	1.10	1.13	1.22	0.98
Water absorption	-	23℃, 24hr, Underwater	%	0.6	-	0.5	0.5	0.6	0.5	-
Rheological properties										
Melt volume flow rate	ISO 1133	- Temperature Load	$cm^3/10min$ ℃ kg	14.0 280 5	15.0 280 5	21 280 5	31 280 5	100 280 5	23 280 5	55 280 5
Mold shrinkage (3mmt)	GPAC method	MD TD	%	1.2 - 1.4 1.1 - 1.3	1.2 - 1.4 1.0 - 1.2	0.7 - 0.9 0.6 - 0.8	1.1 - 1.3 1.1 - 1.3	1.1 - 1.3 1.1 - 1.3	1.3 1.3	1.0 - 1.2 1.1 - 1.3
Mechanical properties										
Tensile modulus	ISO 527-1, 527-2	23℃	MPa	2200 (1200)	2500 (1400)	4200 (2200)	2500 (1600)	2600 (1500)	3000 (2000)	1900
Yield stress			MPa	54 (38)	62 (37)	- (42)	66 (51)	60 (45)	72 (52)	42
Yield strain			%	4.2 (18.8)	5.0 (14.9)	- (8.4)	5.3 (11.4)	4.8 (19.2)	4.0 (7.8)	-
Nominal strain at break			%	41 (115)	57 (140)	- (74)	42 (73)	47 (88)	17 (42)	-
Stress at break			MPa	-	-	62 (-)	-	-	-	-
Strain at break			%	-	-	6.1 (-)	-	-	-	-
Flexural strength	ISO 178	23℃	MPa	80 (47)	91 (60)	100 (57)	90 (71)	90 (60)	107 (70)	59
Flexural modulus			MPa	2000 (1200)	2300 (1400)	3650 (2100)	2300 (1700)	2400 (1500)	3000 (1900)	1900
Charpy impact strength	ISO 179-1, 179-2	23℃	kJ/m^2	-	-	-	NB (NB)	NB (NB)	-	NB
Charpy notched impact strength			kJ/m^2	22 (88)	26 (66)	6 (12)	20 (45)	20 (62)	5 (5)	5
Thermal properties										
Temperature of deflection under load	ISO 75-1, 75-2	1.80MPa 0.45MPa	℃	- 150	- 165	- 175	- 180	- 165	- 142	- 115
Coefficient of linear thermal expansion	ISO 11359-2	MD TD	1/℃	9.0.E-05 -	9.0.E-05 -	- -	9.0.E-05 -	- -	7.7.E-05 8.1.E-05	- -
Flammability	UL94	0.75mmt 1.5mmt 2.0mmt 3.0mmt	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- V-0 - -	- - - -
Electrical properties										
Relative permittivity	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	3.3 3.2	3.4 3.2	5.2 4.7	- -
Dissipation factor	IEC 60250	100Hz 1MHz	- -	- -	- -	- -	0.0040 0.0094	0.0050 0.012	0.011 0.015	- -
Volume resistivity	IEC 60093	-	Ω·m	-	-	-	1.E+14	2.E+13	7.E+13	-
Surface resistivity	IEC 60093	-	Ω	-	-	-	5.E+14	7.E+14	2.E+15	-
Electric strength	IEC 60243−1	1mmt 3mmt	MV/m	- -	- -	- -	30 17	33 18	36 20	- -
Comparative tracking index	IEC 60112	-	V	-	-	-	600	-	550	-

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WARNING

- The values described are typical values only.
- The usage examples indicated here do not guarantee results applicable to relevant uses of the products.
- It is the users' responsibility to investigate industrial property rights and the terms of use related to the uses and applications indicated here.
- For the handling (transport, storage, forming, disposal, etc.) of the products, it is advisable to refer to technical documents and the Safety Data Sheet (SDS) of the proper materials and grades. Please contact us for consultations when the products are used for the purpose of food containers and packaging, medical parts, safety equipment, and toys for children.
- In Japan, the colored products of each grade may contain chemicals subject to reporting requirements under the applicable law provided in Appendix 9 of Article 18-2 of the Enforcement Order, under Article 57-2 of the Industrial Safety and Health Act. For details, please contact us.
- For the export of our products and products incorporated with our products, please comply with the relevant laws and regulations, such as the Foreign Exchange and Foreign Trade Law.
- Please note that because of the chemical substance management systems in each country, the chemicals used in our products are subject to control, and separate applications might be required or are banned from imports and exports. It is advisable to inquire about the status of regulations in the relevant countries if you are exporting or importing our products.