



LAPEROS[®]

Liquid Crystal Polymer (LCP)

Grade Compositions

POLYPLASTICS CO., LTD.

Filler				Glass fiber		Carbon fiber	Glass/Inorganic compound		Glass fiber
Grade name				A130	A150	A230	A410	A470	E130i
Properties				Standard	High stiffness		Low warpage/High stiffness		Standard
Item		Unit	Test method	High strength/High toughness					Standard / For SMT
Density		g/cm³	ISO 1183	1.61	1.81	1.49	1.84	1.85	1.61
Tensile strength*		MPa	ASTM D638	210	180	200	155	160	175
Tensile elongation*		%	ASTM D638	2.2	1.5	1.5	1.6	1.5	2.0
Flexural strength		MPa	ISO178	270	260	300	230	225	220
Flexural modulus		MPa	ISO178	15,000	20,500	29,000	18,500	20,000	15,000
Flexural strain		%	ISO178	3.0	1.8	1.7	2.0	1.7	2.3
Charpy notched impact strength		kJ/m²	ISO 179/1eA	35	12	12	7	6	35
DTUL@1.8MPa		℃	ISO75-1,2	240	240	240	235	240	280
DTUL@0.45MPa		℃	ISO75-1,2	—	—	—	—	—	290
Mold shrinkage ratio 80 mm sq × 1mmt (Injection pressure 60MPa *79MPa)	FD	%	Our standard	0.01	0.11	-0.06*	0.10	0.08	0.02
	TD	%	Our standard	0.45	0.40	0.24*	0.35	0.23	0.54
Volume resistivity		Ω·cm	IEC60093	3×10 ¹⁶	1×10 ¹⁶	—	1×10 ¹⁶	6×10 ¹⁵	9×10 ¹⁵
Surface resistivity		Ω	IEC60093	1×10 ¹⁶	3×10 ¹⁶	—	9×10 ¹⁶	7×10 ¹⁵	1×10 ¹⁶
Relative permittivity	1kHz	—	IEC60250	4.1	4.5	—	4.4	4.3	4.3
	1MHz	—		3.7	4.1	—	4.0	3.9	3.8
Dielectric dissipation factor	1kHz	—	IEC60250	0.02	0.02	—	0.02	0.02	0.02
	1MHz	—		0.02	0.02	—	0.02	0.01	0.03
Electric strength	(1mmt)	kV/mm	IEC60243-1	45	44	—	66	—	44
	(3mmt)			24	28	—	22	25	24
Tracking resistance (CTI)		V	IEC60112	125	200	—	175	200	125
Arc resistance		s	ASTM D 495	137	180	—	163	123	130

All grades of LAPEROS® LCP possess flamer retardance rated at either V-0 or V-1 equivalent.

All figures in the table are the typical values of the material and not the minimum values of the material specifications.

For qualified values of UL (Underwriters Laboratories Inc.) refer to the yellow card (File No.E 106764) issued by UL.

*The ISO 527-1, 2 test method for tensile properties is not suitable for liquid crystal polymers, so the ASTM method is adopted instead.

All grades are subjected to Japan's Ministerial Ordinance for Export Trade Control.

The liquid crystal polymer **LAPEROS®** has a unique structure and performance untaught of in traditional plastics.
The thermotropic liquid crystal polyester is commonly known as LCP.

Besides possessing a mechanical strength in an entirely different class,
LCP has a unique attribute in that the thinner the product becomes, the greater the mechanical strength.
Moreover, it has a linear expansion coefficient close to that of metal.
In addition, despite its high elastic modulus, another trait is that LCP possesses superior vibration absorbing properties.

As an engineering plastic that transcends the common wisdom of traditional engineering plastics and approaches steel,
“**LAPEROS® LCP**” can be said to be the epitome of next-generation advanced engineering plastics.
Along with the progress of downsizing of IT equipment, its internal resin based electronic parts have
also been subjected to downsizing and wall thickness reduction.

“**LAPEROS® LCP**” is widely used for parts such as connectors and sockets due to its excellent
heat resistance and high fluidity.

Filler				Glass fiber		Glass/Inorganic compound				Inorganic compound	Glass fiber	Glass/Inorganic compound	
Grade name				E480i	E130G	E471i	E473i	E463i	E481i	E525T	GA130	GA481	HA475
Properties				Good dimensional stability	Low injection pressure / High flow	Low warp/ Standard	Low warp/ High flow	Low warp/ Low anisotropy		Low Fibrillation	Standard	Low warp/ Low anisotropy	Low warp/ Super high flow
Item		Unit	Test method	Standard / For SMT							Standard / High flow / For SMT		
Density		g/cm³	ISO 1183	1.71	1.61	1.67	1.63	1.72	1.77	1.55	1.61	1.77	1.64
Tensile strength*		MPa	ASTM D638	160	170	140	125	110	115	145	150	100	110
Tensile elongation*		%	ASTM D638	1.8	3.5	2.3	2.8	3.0	1.6	3.8	1.6	1.3	2.1
Flexural strength		MPa	ISO178	200	170	195	160	130	160	155	200	145	140
Flexural modulus		MPa	ISO178	16,000	12,000	13,500	11,000	10,600	13,000	12,000	15,000	12,000	12,000
Flexural strain		%	ISO178	2.1	4.2	2.5	2.8	3.1	1.7	4.0	1.8	1.7	2.5
Charpy notched impact strength		kJ/m²	ISO 179/1eA	35	35	20	20	5	7	7	20	6	6
DTUL@1.8MPa		℃	ISO75-1,2	270	245	265	250	235	260	235	280	265	240
DTUL@0.45MPa		℃	ISO75-1,2	285	270	285	275	270	—	270	300	—	275
Mold shrinkage ratio 80 mm sq × 1mmt (Injection pressure 60MPa *79MPa)	FD	%	Our standard	0.04	0.06	0.06	0.03	0.09	0.06	0.03	0.10	0.07	0.02
	TD	%	Our standard	0.47	0.66	0.43	0.39	0.50	0.28	0.36	0.42	0.28	0.31
Volume resistivity		Ω·cm	IEC60093	1×10 ¹⁶	6×10 ¹⁵	2×10 ¹⁶	1×10 ¹⁶	1×10 ¹⁶	2×10 ¹⁶	3×10 ¹⁶	3×10 ¹⁶	1×10 ¹⁶	3×10 ¹⁶
Surface resistivity		Ω	IEC60093	4×10 ¹⁶	8×10 ¹⁵	9×10 ¹⁵	9×10 ¹⁵	2×10 ¹⁶	3×10 ¹⁷	8×10 ¹⁶	6×10 ¹⁶	6×10 ¹⁷	1×10 ¹⁷
Relative permittivity	1kHz	—	IEC60250	4.5	4.3	4.3	4.2	4.5	4.8	4.6	4.1	4.2	4.0
	1MHz	—		4.0	3.8	3.8	3.7	3.9	4.1	4.0	3.7	3.8	3.5
Dielectric dissipation factor	1kHz	—	IEC60250	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	1MHz	—		0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.03
Electric strength	(1mmt)	kV/mm	IEC60243-1	42	44	47	53	44	47	38	48	45	43
	(3mmt)			28	23	25	26	22	25	—	23	22	21
Tracking resistance (CTI)		V	IEC60112	150	125	150	150	200	200	150	175	175	150
Arc resistance		s	ASTM D 495	143	144	176	151	182	182	49	127	182	47

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- There is little entwining of molecules, and application of a slight shearing force orients them in one direction. Liquid crystal polymer's name comes from the fact that it exhibits crystalline properties as a liquid. Once cooled and solidified, it retains a stable state.
- Molecular chains align themselves when molded, and this generates a self-reinforcing effect, thereby resulting in extremely high strength and elastic modulus.
- Despite having a high elastic modulus, very much superior vibration absorbing characteristics are exhibited.
- Linear expansion coefficient in the flow direction in particular is very small, exhibiting a value an order of magnitude less than conventional plastics and on a par with steel.
- The thinner the product, the higher the proportion of the oriented surface layer, so greater strength and elastic modulus can be achieved the thinner the product.
- Because of its microcrystalline structure, LCP possesses superior deflection temperature under load, solder heat resistance, and continuous usage temperature, despite its relatively low melting point.

Filler				Glass fiber			Glass/inorganic compound		
Grade name				S135	S150	S140M	S471	S475	S478
Properties				Standard	High stiffness	Low injection pressure/ High flow	Low warp/ Standard	Low warp/ Super high flow	
Item		Unit	Test method	High heat resistance / High temperature stiffness					
Density		g/cm ³	ISO 1183	1.66	1.81	1.70	1.77	1.65	1.72
Tensile strength*		MPa	ASTM D638	155	150	120	130	140	100
Tensile elongation*		%	ASTM D638	1.3	1.3	2.1	2.0	1.8	1.8
Flexural strength		MPa	ISO178	220	210	190	180	180	135
Flexural modulus		MPa	ISO178	16,000	20,000	12,900	12,700	12,500	10,000
Flexural strain		%	ISO178	2.0	1.3	2.8	2.0	2.5	2.2
Charpy notched impact strength		kJ/m ²	ISO 179/1eA	12	9	9	6	4	3
DTUL@1.8MPa		℃	ISO75-1,2	340	330	310	315	305	290
DTUL@0.45MPa		℃	ISO75-1,2	340	—	—	335	—	—
Mold shrinkage ratio 80 mm sq × 1mmt (Injection pressure 60MPa *79MPa)	FD	%	Our standard	0.08	0.17	0.12	0.10	0.10	0.08
	TD	%	Our standard	0.52	0.52	0.76	0.33	0.39	0.39
Volume resistivity		Ω·cm	IEC60093	2×10 ¹⁶	3×10 ¹⁶	4×10 ¹⁶	1×10 ¹⁶	2×10 ¹⁶	3×10 ¹⁶
Surface resistivity		Ω	IEC60093	1×10 ¹⁶	4×10 ¹⁶	3×10 ¹⁶	3×10 ¹⁶	2×10 ¹⁶	4×10 ¹⁷
Relative permittivity	1kHz	—	IEC60250	3.9	4.7	4.0	4.1	3.9	4.4
	1MHz	—		3.8	4.6	3.8	4.0	3.7	4.0
Dielectric dissipation factor	1kHz	—	IEC60250	0.01	0.01	0.01	0.01	0.01	0.02
	1MHz	—		0.01	0.01	0.01	0.01	0.01	0.02
Electric strength	(1mmt)	kV/mm	IEC60243-1	40	32	37	40	40	38
	(3mmt)			20	20	18	20	19	—
Tracking resistance (CTI)		V	IEC60112	150	125	150	150	150	200
Arc resistance		s	ASTM D 495	138	172	154	183	100	183

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Grade Line Up Table

Due to ongoing research and development,
the data contained in this catalog is subject to change without notice.
The latest data can be found on our Website.
Please download from the following address.

<https://www.polyplastics.com/en/product/>

Filler	Properties		A	Ei	GA/HA	S
			High strength/ High toughness	Standard / For surface mount technology (SMT) processes	Standard/ High flow/For SMT process	High heat resistance/ High T stiffness
Glass fiber	Standard		A130	E130i	GA130	S135
	High stiffness		A150			S150
	Good dimensional stability			E480i		
	Low injection pressure/ High flow			E130G		S140M
Carbon fiber			A230			
Glass/ Inorganic compound	Low warpage/ High stiffness		A410 A470			
	Low warpage	Standard		E471i		S471
		High flow		E473i		
		Low anisotropy		E463i E481i	GA481	
		Super high flow			HA475	S475 S478
Inorganic compound	Low Fibrillation			E525T		

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NOTES TO USERS

- All property values shown in this brochure are the typical values obtained under conditions prescribed by applicable standards and test methods.
- This brochure has been prepared based on our own experiences and laboratory test data, and therefore all data shown here are not always applicable to parts used under different conditions. We do not guarantee that these data are directly applicable to the application conditions of users and we ask each user to make his own decision on the application.
- It is the users' responsibility to investigate patent rights, service life and potentiality of applications introduced in this brochure.
Materials we supply are not intended for the implant applications in the medical and dental fields, and therefore are not recommended for such uses.
- For all works done properly, it is advised to refer to appropriate technical catalogs for specific material processing.
- For safe handling of materials we supply, it is advised to refer to the Safety Data Sheet "**SDS**" of the proper material.
- This brochure is edited based on reference literature, information and data available to us at the time of creation. The contents of this brochure are subject to change without notice upon achievement of new data.
- Please contact our office for any questions about products we supply, descriptive literatures or any description in this brochure.

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