



VECTRA®

Liquid Crystal Polymer (LCP)

Grade Compositions

POLYPLASTICS CO., LTD.

A state-of-the art material allowing thinner-walled molding with higher plasticity / flowability

The liquid crystal polymer VECTRA® 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, VECTRA® can be said to be the epitome of next-generation advanced engineering plastics. Making full use of its mechanical properties in AV and OA equipment components, its vibration-absorbing characteristics in application such as CD pickups in IT and audio equipment, and its solder heat resistance in SMT components, application development is proceeding rapidly.

- 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.

			Glass fiber		Glass beads	Glass flakes	Carbon fiber	Glass/Inorganic compound		Silica	PTFE	
Grade name			A 130	A150	A150B	A150F	A230	A410	A470	A460	A430	
Properties			Standard	High stiffness	Low anisotropy	Low warpage		Low warpage/ High stiffness		Low anisotropy	Anti-friction/ anti-wear	
Item		Unit	Testing method	Standard								
Density		g/cm³	ISO 1183	1.61	1.81	1.81	1.81	1.49	1.84	1.81	1.71	1.50
Tensile strength [☆]		MPa	ASTM D638	210	180	100	110	200	155	160	105	175
Tensile elongation [☆]		%	ASTM D638	2.2	1.5	5.5	1.8	1.5	1.6	1.5	8.0	4.5
Flexural strength		MPa	ISO178	270	260	140	170	300	230	225	140	130
Flexural modulus		MPa	ISO178	15,000	20,500	10,000	15,500	29,000	18,500	20,000	9,000	6,800
Flexural strain		%	ISO178	3.0	1.8	4.3	2.2	1.7	2.0	1.7	2.1	6.5
Charpy impact strength		kJ/m²	ISO 179/1eA	35	12	7	5	12	7	6	15	50
DTUL@1.8MPa		℃	ISO75-1,2	240	240	210	220	240	235	240	160	190
Mold shrinkage ratio 80 mm sq × 1mmt	Flow	%	—	0.01	0.11	0.25	0.05	-0.06	0.10	0.08	0.16	-0.02
	TD	%	—	0.45	0.40	0.58	0.14	0.24	0.35	0.23	0.43	0.82
	Injection pressure	MPa	—	60	60	60	60	79	60	60	60	60
Volume resistivity		Ω · cm	IEC60093	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	—	1.0×10 ¹⁶	—	—	—
Surface resistivity		Ω	IEC60093	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	—	1.0×10 ¹⁶	—	—	—
Dielectric constant	1kHz	—	IEC60250	—	—	—	—	—	—	—	—	—
	1MHz	—		3.8	4.1	4.4	—	—	4.0	—	—	3.1
	10GHz	—	—	—	—	—	—	—	—	—	—	—
Dielectric dissipation factor	1kHz	—	IEC60250	—	—	—	—	—	—	—	—	—
	1MHz	—		—	—	—	—	—	—	—	—	—
	10GHz	—	—	—	—	—	—	—	—	—	—	—
Dielectric breakdown strength	(1mm)	kV/mm	IEC60243-1	45	44	44	—	—	66	—	—	45
	(3mm)			—	—	—	—	—	—	—	—	—
Tracking resistance		V	IEC60112	—	—	—	—	—	—	—	—	—
Arc resistance		S	—	137	180	180	—	—	163	—	—	94

All grades of VECTRA® 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.

Due to ongoing research and development, the data contained in this catalog is subject to change without notice.

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Filler		Glass fiber	Carbon fiber	Glass/Inorganic compound	Glass fiber		Chopped glass fiber	Glass/Inorganic compound				
Grade name		B130	B230	C400	E130i	E480i	E130G	E471i	E472i	E473i	E463i	E481i
Properties		Standard		High reflection ratio/For LEDs	Standard	Good dimensional	Low injection pressure /High flow	Low warpage				
Item		High stiffness		Special	High heat resistance/High flow			Standard	High stiffness	High flow	Low anisotropy	
Density		1.61	1.49	1.96	1.61	1.71	1.61	1.67	1.67	1.63	1.72	1.77
Tensile strength☆		220	245	110	175	160	170	140	155	125	110	115
Tensile elongation☆		1.2	0.9	0.9	2.0	1.8	3.5	2.3	2.5	2.8	3.0	1.6
Flexural strength		300	300	145	220	200	170	195	220	160	130	160
Flexural modulus		20,000	30,000	13,500	15,000	16,000	12,000	13,500	15,000	11,000	10,600	13,000
Flexural strain		1.8	1.1	1.2	2.3	2.1	4.2	2.5	2.4	2.8	3.1	1.7
Charpy impact strength		13	6	15	35	35	35	20	25	20	5	7
DTUL@1.8MPa		240	240	250	280	270	245	265	270	250	235	260
Mold shrinkage ratio 80 mm sq X 1mmt	Flow	-0.05	-0.05	0.22	0.02	0.04	0.06	0.06	0.04	0.03	0.09	0.06
	TD	0.25	0.18	0.52	0.54	0.47	0.66	0.43	0.46	0.39	0.50	0.55
	Injection pressure	60	79	60	60	60	60	60	60	60	60	60
Volume resistivity		1.0×10 ¹⁶	—	—	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	—	—
Surface resistivity		1.0×10 ¹⁶	—	—	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	—	—
Dielectric constant	1kHz	—	—	—	4.3	4.5	4.3	4.3	4.2	4.2	—	—
	1MHz	—	—	5.1	3.8	4.0	3.8	3.8	3.8	3.7	—	—
	10GHz	—	—	—	3.6	3.7	3.6	3.7	3.6	3.6	—	—
Dielectric dissipation factor	1kHz	—	—	—	0.017	0.014	0.017	0.018	0.017	0.019	—	—
	1MHz	—	—	—	0.032	0.029	0.033	0.032	0.032	0.034	—	—
	10GHz	—	—	—	0.007	0.009	0.009	0.007	0.007	0.007	—	—
Dielectric breakdown strength	(1mm)	—	—	—	44	42	44	47	40	53	—	—
	(3mm)	—	—	—	24	28	23	25	25	26	—	—
Tracking resistance		—	—	—	125	150	125	150	150	150	—	—
Arc resistance		—	—	181	130	143	144	176	130	151	—	—

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Grade name		T130	T150	S135	S150	S140M	S471	S475
Properties		Standard	High stiffness	Standard	High stiffness	Low injection Pressure/High flow	Low warpage	
Item		High heat resistance /High MP		High heat resistance /High T stiffness			Standard	Ultra-high flow
Density		1.61	1.81	1.66	1.81	1.70	1.77	1.65
Tensile strength [☆]		165	125	155	150	120	130	155
Tensile elongation ^{☆ 0}		2.0	1.1	1.3	1.3	2.1	2.0	2.3
Flexural strength		220	200	220	210	190	180	180
Flexural modulus		14,800	19,500	16,000	20,000	12,900	12,700	12,500
Flexural strain		2.3	1.6	2.0	1.3	2.8	2.0	2.5
Charpy impact strength		20	12	12	9	9	6	4
DTUL@1.8MPa		300	295	340	330	310	315	305
Mold shrinkage ratio 80 mm sq X 1mmt	Flow	0.07	0.06	0.08	0.17	0.12	0.10	—
	TD	0.51	0.42	0.52	0.52	0.76	0.33	—
	Injection pressure	60	60	60	60	60	60	—
Volume resistivity		1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	—	—	—	—
Surface resistivity		1.0×10 ¹⁶	1.0×10 ¹⁶	1.0×10 ¹⁶	—	—	—	—
Dielectric constant	1kHz	4.2	4.7	—	4.7	—	4.1	3.9
	1MHz	3.8	4.3	3.8	4.6	—	4.0	3.7
	10GHz	3.6	3.8	—	—	—	—	—
Dielectric dissipation factor	1kHz	0.014	0.012	—	0.008	—	0.009	0.010
	1MHz	0.030	0.024	—	0.007	—	0.007	0.008
	10GHz	0.007	0.010	—	—	—	—	—
Dielectric breakdown strength	(1mm)	47	40	40	—	37	—	—
	(3mm)	25	28	—	32	18	27	27
Tracking resistance		150	175	150	125	150	150	—
Arc resistance		153	155	138	172	154	183	—

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NOTES TO USERS

- All property values shown in this brochure are the typical values obtained under varying 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 the appropriate **"Technical Catalog"** for specific material processing.

For safe handling of materials we supply, it is advised to refer to the Material Safety Data Sheet **"MSDS"** of the proper material.

This brochure is edited based on reference literatures, information and data currently available to us. So the contents of this brochure are subject to change without notice due to new data.

Please contact our office for any questions about products we supply, descriptive literatures or any description in this brochure.

*"VECTRA®" is a registered trademark of Polyplastics Co., Ltd. in Japan.

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