

Examples of electrical and electronic parts application

GRADES AND PHYSICAL PROPERTIES

Test method			ARLEN							Remarks			
			C/Eseries (For electrical and electronic parts)										
			flame-retardant	flame-retardant	flame-retardant	flame-retardant	flame-retardant	flame-retardant	flame-retardant	flame-retardant	flame-retardant	flame-retardant	flame-retardant
Physical properties	Unit	ASTM	C230	C240	C430N	E430N	CH230N	E630N	E440NK	PA46	PA9T	PPS	LCP
Glass fiber content	%	—	30	40	30	30	30	30	40	30	33	40	30
Specific gravity	—	D 792	1.42	1.53	1.66	1.66	1.63	1.58	1.75	1.63	1.68	1.67	1.62
Mechanical properties*1													
Tensile strength	MPa	D 638	170	210	170	170	160	210	190	180	180	170	140
Tensile elongation	%	D 638*2	3	3	3	3	4	6	3	3	3	2	3
Flexural strength	MPa	D 790	260	300	250	250	240	275	280	260	240	250	220
Flexural modulus	MPa	D 790	10,000	13,000	11,400	11,400	11,000	12,500	17,000	11,000	11,000	13,000	13,000
Izod impact strength (notched)	J/m	D 256	80	85	85	80	80	100	100	90	100	80	110
Rockwell hardness	Mscale	D 785	110	110	95	100	95	100	100	—	—	100	—
Thermal properties													
Melting point	℃	—	310	310	310	320	310	320	320	290	306	280	—
Glass transition point	℃	—	85	85	85	95	85	95	95	89	125	90	—
Deflection temp. under load (1.82MPa)	℃	D 648	300	300	295	305	290	310	300	285	285	265	280
Coefficient of linear thermal expansion	Flow direction	×10 ⁻⁵ /℃ E831-93	1.8	1.8	1.2	2.2	1.5	1.6	1.8	—	2.5	2.0	—
	Vertical direction		10	8.0	9.2	7.3	8.9	6.8	6.9	—	4.0	4.0	—
Flammability	—	UL 94	HB	HB	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0
Electrical properties*1													
Volume resistivity	Ω · cm	D 257	10 ¹⁶	10 ¹⁶	10 ¹⁵	10 ¹⁵	10 ¹⁵	10 ¹⁵	10 ¹⁵	10 ¹⁵	10 ¹⁶	10 ¹⁶	10 ¹⁶
Dielectric constant (10 ⁶ Hz)	—	D 150	4.5	4.5	4.0	3.6	4.0	3.9	4.1	4.0	3.7	3.8	4.0
Dielectric dissipation factor (10 ⁶ Hz)	—	D 150	0.018	0.018	0.013	0.012	0.013	0.013	0.011	—	0.014	0.0014	—
Dielectric breakdown voltage	KV/mm	D 149	28	30	26	24	25	24	18	—	38	17	—
Mold shrinkage(2mmt)													
Flow direction	%	D 955	0.5	0.4	0.3	0.3	0.4	0.2	0.2	0.2	0.4	0.2	0.02
Vertical direction	%		0.8	0.8	0.7	0.9	0.8	0.8	0.6	1.7	0.9	0.4	0.06
Reflow soldering test*3													
Water absorption*4	%	D 570	3.6	—	2.0	1.9	2.2	2.1	1.4	3.8	0.8	—	—
Peak Temperature under reflow soldering test	℃	Mitsui Method	250*5	—	240*5	250*5	240*5	255*5	250*5	< 210*5	245*5	265*5	> 265*5

Notes:

★ The above figures are just representative values but not specification values.

*1 Specimen was in the dry condition

*2 Elongation was measured between the chucks

*3 The Size of Specimen: 64L × 6W × 0.8Tmm

*4 Moist: In a saturated state in the atmosphere at 23°C and a relative humidity of 65%

*5 Heat resistance under a reflow soldering process depends on the dimension of the products and the reflow conditions.

Unit conversion:

Tensile strength, flexural strength, flexural modulus.

1 MPa = 10.2 kg/cm²

Izod impact strength.

1 J/m = 0.102 kg·cm/cm

Examples of mechanical and structural application

GRADES AND PHYSICAL PROPERTIES

Test method				ARLEN						Remarks			
				A series (For mechanical and structural parts)			AE series (For tribologic applications)						
							non-reinforced	non-reinforced, flameretardant					
Physical properties		Unit	ASTM	A315	A335	A350	AE4200	AE4200N	AE2230	PA66	PA MXD6	PPS	
Glass fiber content		%	—	15	35	50	0	0	30	30	40	40	
Specific gravity		—	D792	1.30	1.48	1.63	1.10	1.40	1.37	1.37	1.53	1.67	
Mechanical properties													
Tensile strength	dry	MPa	D638	120	240	300	80*3	70*3	200	180	220	170	
	(moist)*1			(110)	(220)	(270)	(70)*3	(60)*3	(180)	(130)	(150)	(—)	
Tensile elongation	dry	%	D638*2	3	3	3	50*3	4*3	4	4	2	2	
	(moist)*1			(3)	(3)	(3)	(50)*3	(4)*3	(4)	(4)	(2)	(—)	
Flexural strength	dry	MPa	D790	190	360	430	110	120	270	260	310	250	
	(moist)*1			(170)	(320)	(390)	(100)	(110)	(240)	(180)	(210)	(—)	
Flexural modulus	dry	MPa	D790	6,000	12,000	17,000	2,400	3,000	9,000	8,800	13,000	13,000	
	(moist)*1			(5500)	(11,000)	(15,000)	(2,200)	(2,700)	(8,000)	(6,000)	(11,000)	(—)	
(notched)	dry	J/m	D256	50	130	150	200	70	100	130	80	80	
	(moist)*1			(70)	(150)	(160)	(220)	(80)	(110)	(150)	(80)	(—)	
Rockwell hardness		M scale	D785	105	110	110	65 (R110)	80	95	95	95	100	
Thermal properties													
Melting point		℃	—	330	330	330	330	330	330	260	240	280	
Glass transition point		℃	—	125	125	125	125	125	125	50	80	90	
Deflection temp. under load (1.82MPa)		℃	D648	290	310	310	135	145	300	255	230	265	
Coefficient of linear thermal expansion	Flow direction	× 10 ⁻⁵ /℃	D696	3.4	2.0	1.8	8.0	6.5	2.6	2.2	2.0	2.0	
	Vertical direction			5.5	4.5	4.2	8.2	6.7	6.0	9.0	4.5	4.0	
Electrical properties													
Volume resistivity (dry)		Ω · cm	D257	10 ¹⁶	10 ¹⁶	10 ¹⁶	10 ¹⁶	10 ¹⁵	10 ¹⁶	10 ¹⁵	10 ¹⁶	10 ¹⁶	
Dielectric constant (10 ⁶ Hz)		(dry)	—	4.2	4.5	4.5	3.3	3.3	3.7	3.3	4.0	3.8	
Dielectric dissipation factor (10 ⁶ Hz)		(dry)	—	0.020	0.018	0.018	0.018	0.014	0.018	0.015	0.009	0.0014	
Dielectric breakdown voltage		(dry)	kV/mm	D149	25	27	29	23	31	27	23	31	17
Other properties													
Mold shrinkage (2mmt)	Flow direction	%	D955	0.5	0.3	0.2	0.9	0.8	0.4	0.4	0.2	0.2	
	Vertical direction			0.6	0.6	0.6	0.9	1.0	0.7	0.8	0.6	0.4	
Water absorption (24 hr in water) (2 mm)	23℃	%	D570	0.4	0.3	0.2	0.4	0.3	0.2	0.8	0.2	0.02	
	100℃			2.5	1.8	1.2	2.6	2.0	1.7	4.5	3.2	0.3	
Flammability		—	UL94	H B	H B	HBequiv.	H B	V-0	HBequiv.	H B	H B	V-0	

Notes:

- ★ The above figures are just representative values but not specification values.
 *1 Moist: In a saturated state in the atmosphere at 23°C and a relative humidity of 65%
 *2 Elongation was measured between the chucks.
 *3 Test specimens of the non-reinforced grades were 2 mm.

Unit conversion:
 Tensile strength, flexural strength,
 flexural modulus.
 1 MPa = 10.2 kg/cm²

Izod impact strength.
 1 J/m = 0.102 kg-cm/cm