



TOSOH

Polyphenylene Sulfide

SUSTEEL®

Certifications of ISO9001, ISO14001



UL (Underwriters Laboratories Inc.)

Please refer to UL's database (File No. E102861) about each grade level to be certified.

Important Notice to Recipient

- 1 All properties shown in this brochure are the typical values of the material. It is not guaranteed value.
- 2 All properties shown in this brochure can not guarantee qualities of your product. So please judge for yourself how to use.
- 3 When you have to handle this material, please refer to Safety Data Sheet (SDS). All applications shown in this brochure can not guarantee that your products
- 4 don't infringe on intellectual property rights.

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

●More data can be found on our Website.
<http://www.tosoh.co.jp/division/polymer/index.html>



TOSOH

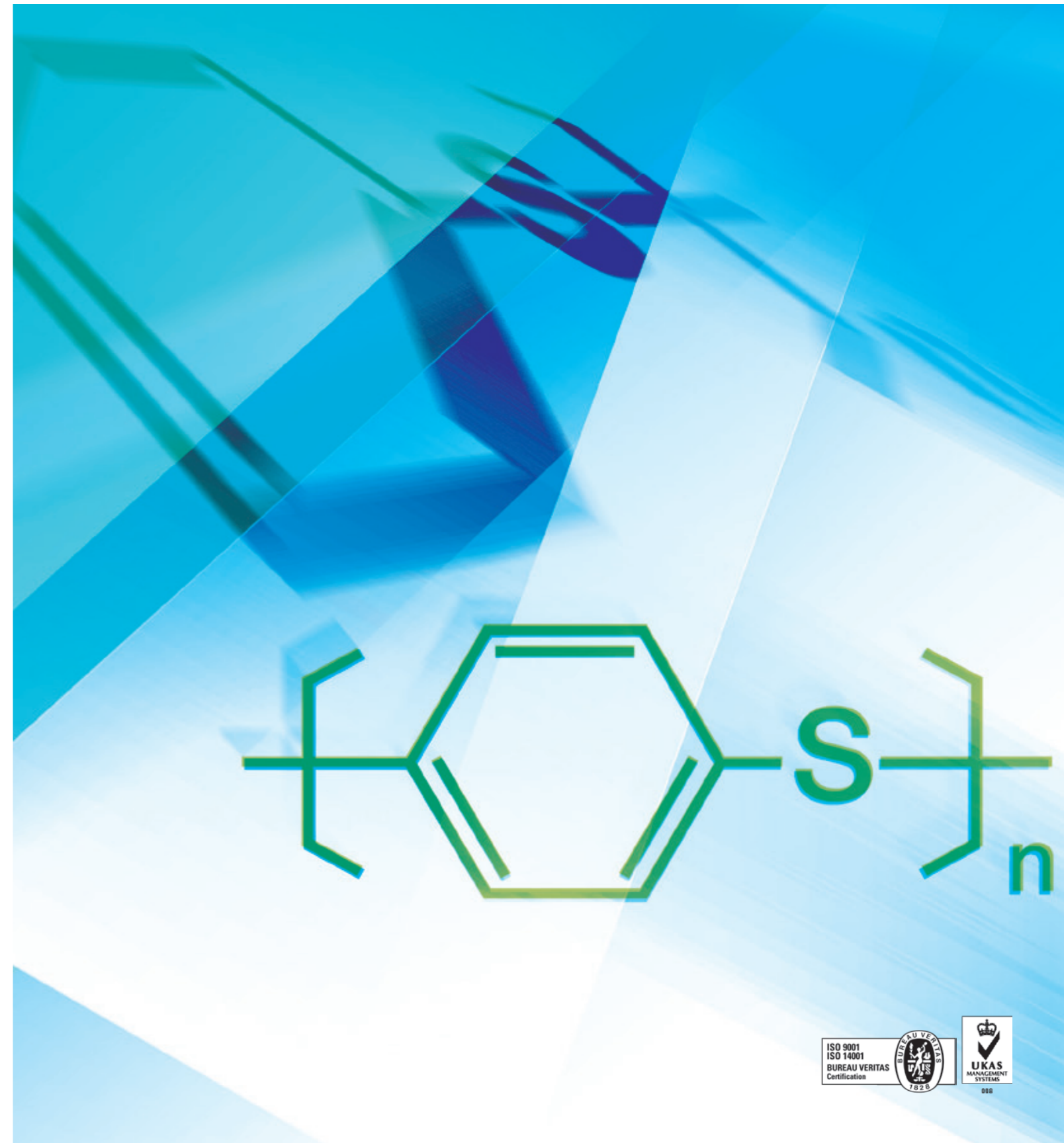
Tosoh Europe BV
Rembrandt Tower
Amstelplein 1
1096 HA AMSTERDAM
The Netherlands
Phone: 0032 (0) 20 565 00 10
Mail; info.tse@tosoh.com

TOSOH CORPORATION POLYMERS DIVISION

Shiba-Koen First Bldg. 3-8-2, Shiba, Minato-Ku, Tokyo 105-8623, JAPAN
Phone: +81-3-5427-5147 FAX: +81-3-5427-5210 E-mail: info@tosoh.co.jp

This article has been prior notice may be revised.

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Polyphenylene Sulfide **SUSTEEL**[®]

Introduction

Polyphenylene sulfide (PPS) is a crystalline, high-performance engineering thermoplastic characterized by high heat resistance, chemical resistance, stiffness, and outstanding dimensional stability .
Tosoh corporation is the first Japanese company to start production of PPS neat resin.
SUSTEEL[®] PPS can be widely used for automotive components, electrical and electronic components, OA equipments, precision instruments, and machine parts.

General property

High temperature resistance	Deflection temperature under load is over 260°C. Continuous use temperature is 200°C.
Flame retardancy	Without flame retardant, UL94 V-0 can be obtained. (UL File No. E102861)
Chemical resistance	Its chemical resistance ranks with that of Fluoro-resin. Only some strong acids can dissolve this plastic.
Superior dimensional stability	Due to its low coefficient of linear expansion and low water absorption, dimensional accuracy and stability is outstanding.
Mechanical property	A wide temperature range, it maintains its high strength and high stiffness. High temperature creep characteristics are good.
Moldability	Due to its high flow and low shrinkage, it is suitable for precision molding.
Electrical property	Superior electrical properties are maintained in the areas of high temperature, high humidity, and high frequency.
Wide variety	We have many kinds of PPS grades available, such as Superior Metal Bonding and Thermal Conductivity etc.

Grade

General grade

- Glass Fiber Reinforced
- Glass Fiber and Mineral Reinforced

Special grade

- Superior Metal Bonding
- Thermal Conductivity
- Super Toughness
- Superior Epoxy Bonding
- Low Wear
- Electric Conductivity
- Unfilled

Applications

Automotive

- **Electrical components**
 - Alternator component
 - Fuse case
 - Connector
 - Lamp socket
 - Ignition coil
 - Injector
 - Reflector
 - Capacitor case
 - Module parts case
 - ECU parts case
 - Motor brush holders

- **Engine components**
 - Water pump impeller
 - Water pump housing
 - Control valve
 - Exhaust gas valve

Electric / Electronic appliances

- **Electronic parts**
 - Connector
 - Module parts case
 - Switch
 - Relay
 - Coil bobbin
 - LCD frame
 - Cell cap
 - Capacitor cap
 - Capacitor base

- **AV equipments / Household appliances**
 - Smartphone
 - Tablet
 - LED heat sink
 - Optical fiber connectors
 - Electric cooking devise parts
 - Electronic equipment enclosure
 - Chassis
 - Lamp holder
 - Steam spray equipment components

Office appliances / Precision instruments / Machinery

- **OA / Precision equipments**
 - Printer parts
 - Copier parts
 - Watch parts

- **Machinery**
 - Gears and cams
 - Chemicals pump
 - Water heater parts
 - Faucet parts

SUSTEEL® PPS Characteristics General grade

Type	Grade	Code ¹⁾	ISO Identification Mark	Grade Descriptions	Mechanical property										Thermal property				Electrical property			Flammability	Moldability		
					Density g/cm ³	Water absorption 24h %	Mold shrinkage		Tensile strength MPa	Tensile strain at break %	Tensile weld strength MPa	Flexural strength MPa	Flexural modulus GPa	Charpy impact strength (notched) kJ/m ²	Rockwell hardness —	Temperature of deflection under load		Coefficient of linear thermal expansion		Electric strength MV/m	Arc resistance s	Relative Permittivity (1MHz) —	Flammability class /mm thickness	Melt Flow Rate g/10min	Bar Flow Length (t=1mm) mm
							MD %	TD %								0.45MPa °C	1.82MPa °C	MD ×1E-5/K	TD ×1E-5/K						
ISO 1183	ISO 62	TOSOHO	TOSOHO	ISO 527-1, 2	ISO 527-1, 2	ASTM D638	ISO 178	ISO 178	ISO 179-1	ISO 2039-2	ISO 75-1, 2	ISO 75-1, 2	ISO 11359-2	ISO 11359-2	IEC 60243-1	ASTM D495	IEC 60250	UL 94	ISO 1133	TOSOHO					
Glass Fiber Reinforced	P-13	11	>PPS-GF15<	toughness	1.46	0.02	0.5	1.0	105	1.5	73	155	7	3	R122	>260	225	3.5	5.1	16	95	3.1	Equivalent V-0/0.38	23	190
	GS-20	32	>PPS-GF20<	toughness	1.49	0.02	0.4	0.9	125	1.7	70	195	8.5	6.5	R123	>260	240	3.0	4.8	16	120	3.7	Equivalent V-0/0.38	15	160
	GS-30	3102 3202	>PPS-GF30<	toughness, standard	1.58	0.02	0.3	0.8	170	1.7	73	255	12	8.5	R123	>260	>260	2.6	3.5	16	35	3.9	V-0/0.75	14	140
	GS-30	31A5 32A5	>PPS-GF30<	toughness, low flash	1.58	0.02	0.3	0.8	170	1.6	65	255	12	7.5	R123	>260	>260	2.6	3.5	16	35	3.9	V-0/0.75	30	200
	GS-30	3144	>PPS-GF30<	toughness, low flash, high flow, mold releasability	1.58	0.02	0.3	0.8	170	1.8	68	255	12	7.5	R123	>260	>260	2.6	3.5	16	35	3.9	V-0/0.75	30	180
	GS-40	11 12	>PPS-GF40<	standard	1.66	0.02	0.3	0.7	165	1.5	45	250	14.5	10	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	45	180
	GS-40	11A3 12A3	>PPS-GF40<	standard, low flash	1.66	0.02	0.3	0.7	170	1.5	53	270	14.5	9.5	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	22	170
	GS-40	21A5 22A5	>PPS-GF40<	high flow, low flash	1.66	0.02	0.3	0.7	155	1.2	38	235	14	10	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	45	220
	GS-40	2208	>PPS-GF40<	ultra high flow	1.66	0.02	0.3	0.7	115	0.9	30	200	14	9.5	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	300	380
	GS-40	3102 3202	>PPS-GF40<	toughness, standard	1.66	0.02	0.3	0.7	180	1.7	70	265	14.5	9.5	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	22	140
	GS-40	3103	>PPS-GF40<	toughness, mold releasability	1.66	0.02	0.3	0.7	180	1.6	70	270	14.5	8.5	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	30	160
	GS-40	31A4 32A4	>PPS-GF40<	toughness, low flash	1.66	0.02	0.3	0.7	185	1.6	53	270	14.5	8.5	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	25	170
	GS-40	3165	>PPS-GF40<	toughness, high flow, mold releasability	1.66	0.02	0.3	0.7	175	1.4	50	260	14.5	8.5	R123	>260	>260	2.2	3.1	16	35	3.9	V-0/0.38	75	200
	P-28	11 12	>PPS-GF50<	toughness, stiffness	1.76	0.02	0.3	0.7	170	1.3	55	285	18	9.5	R123	>260	>260	2.1	2.9	15	45	4.2	V-0/0.75	20	140
Glass Fiber and Mineral Reinforced	G-10	11 12	>PPS-(GF+MD)65<	standard	1.96	0.02	0.3	0.6	125	0.9	35	215	19	7	R121	>260	>260	2.0	3.4	14	120	4.9	V-0/0.75	95	130
	G-10	11F 12F	>PPS-(GF+MD)65<	standard, moldable at low temperature	1.96	0.02	0.3	0.6	100	0.8	40	190	19	6.5	R121	>260	>260	2.0	3.5	14	120	4.9	V-0/0.75	100	120
	P-01	11 12	>PPS-(GF+MD)55<	toughness	1.83	0.02	0.3	0.7	135	1.4	50	240	16	7.5	R122	>260	>260	2.1	3.1	14	95	4.7	V-0/0.75	60	130
	P-30	11 12	>PPS-(GF+MD)50<	toughness	1.76	0.02	0.3	0.6	170	1.5	55	260	16	7.5	R122	>260	>260	2.2	3.3	14	45	3.8	V-0/0.86	25	120
	P-42	11 12	>PPS-(GF+MD)60<	dimensional stability, for capacitor cap	1.86	0.02	0.3	0.6	85	1.5	53	170	12	3.5	R122	>260	255	2.6	2.9	14	60	4.3	V-0/0.75	25	80
	GM-70	12	>PPS-(GF+MD)70<	low stress relaxation	2.02	0.02	0.3	0.6	100	0.8	40	210	19.5	6	R122	>260	>260	2.0	2.6	12	180	5.4	V-0/0.75	60	100
	GE-60	12	>PPS-(GF+MD)65<	arc-resistance, comparative tracking index	1.99	0.02	0.3	0.6	95	0.5	23	180	22	6.5	R118	>260	>260	2.2	3.2	14	180	4.5	V-0/0.75	30	110

1) 'Code' is such as color

The figures are listed in the table, based on a variety of standard test to measure the value or even typical, is not guaranteed value.

● Packing



● Pellets

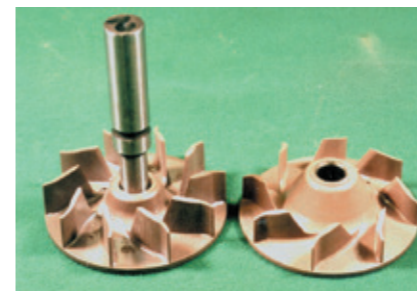


● Applications

ECU parts case



Water pump impeller



Capacitor cap



Others

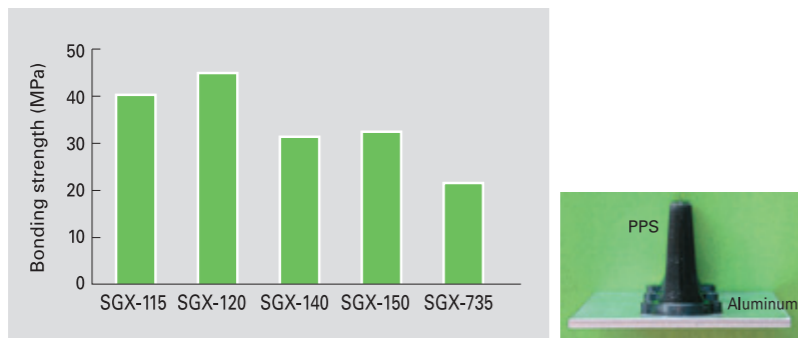


Type	Grade	Code ¹⁾	ISO Identification Mark	Grade Descriptions	Mechanical property										Thermal property				Electrical property			Flammability	Moldability		
					Density g/cm ³	Water absorption 24h %	Mold shrinkage		Tensile strength MPa	Tensile strain at break %	Tensile weld strength MPa	Flexural strength MPa	Flexural modulus GPa	Charpy impact strength (notched) kJ/m ²	Rockwell hardness	Temperature of deflection under load		Coefficient of linear thermal expansion		Electric strength MV/m	Arc resistance s	Relative permittivity (1MHz) —	Flammability class /mm thickness	Melt Flow Rate g/10min	Bar Flow Length (t=1mm) mm
							MD %	TD %								0.45MPa °C	1.82MPa °C	MD ×1E ⁻⁵ /K	TD ×1E ⁻⁵ /K						
ISO 1183	ISO 62	TOSOHO	TOSOHO	ISO 527-1, 2	ISO 527-1, 2	ASTM D638	ISO 178	ISO 178	ISO 179-1	ISO 2039-2	ISO 75-1, 2	ISO 75-1, 2	ISO 11359-2	ISO 11359-2	IEC 60243-1	ASTM D495	IEC 60250	UL 94	ISO 1133	TOSOHO					
Superior Metal Bonding (NMT)	SGX-115	52A	>PPS-I-GF15<	superior metal bonding, impact strength	1.36	0.05	0.6	0.9	95	2.7	50	150	5	16	R118	>260	235	6.1	7.1	16	60	3.5	HB/0.4	25	240
	SGX-120	12	>PPS-I-GF20<	superior metal bonding, high flow, heat cycle resistance	1.40	0.06	0.3	0.9	120	2.1	55	170	6.5	8.5	R112	>260	220	3.1	5.0	16	120	3.6	V-2/1.0	90	310
	SGX-140	12	>PPS-I-GF40<	superior metal bonding, high strength	1.59	0.06	0.2	0.5	165	1.8	55	250	13	12.5	R118	>260	260	2.3	3.5	15	120	3.7	Equivalent V-1/1.0	50	200
	SGX-150	12B	>PPS-I-GF50<	superior metal bonding, dimensional stability, stiffness	1.71	0.04	0.2	0.3	180	1.3	35	270	16	15	R118	>260	>260	1.8	2.1	13	120	4.3	—	60	255
	SGX-735	53A	>PPS-I-(GF+MD)35<	superior metal bonding, impact strength, white color	1.53	0.04	0.7	0.9	55	4.0	43	100	4.5	13	R112	255	150	5.1	6.3	19	70	3.9	—	15	180
Thermal Conductivity	TCX-150	12		thermal conductivity, high strength	1.70	0.03	0.05	0.6	100	0.2	24	145	36	2.2	R115	>260	>260	0.5	1.8	—	—	—	5VA/2.0, V-0/1.5	30	135
	TCX-250	12		thermal conductivity	1.82	0.01	0.03	0.5	75	0.1	17	130	42	2	R120	>260	>260	0.4	1.3	—	—	—	Equivalent V-0/2.0	0.5	65
Super Toughness	BGX-130	12	>PPS-I-GF30<	super toughness, superior metal bonding	1.50	0.05	0.3	0.9	140	2.2	60	210	9	12	R118	>260	253	2.7	4.6	16	120	3.6	V-0/1.5	40	210
	BGX-545	12	>PPS-I-(GF+MD)45<	heat cycle resistance, high flow, low warpage	1.65	0.03	0.2	0.4	135	1.7	48	210	13	8	R119	>260	255	2.0	2.6	15	100	3.9	V-0/1.5	80	210
Superior Epoxy Bonding	P-60	12	>PPS-(GF+MD)55<	Epoxy adhesion improved	1.82	0.02	0.3	0.7	135	0.9	30	220	17	8	R121	>260	255	2.0	3.4	12	62	4.8	V-0/0.87	60	150
	P-68	12	>PPS-GF45<	Epoxy adhesion improved, high strength	1.72	0.02	0.3	0.8	150	1.0	43	240	16.5	10	R123	>260	>260	2.2	2.8	15	35	3.8	V-0/0.75	60	180
Low Wear	F	11	>PPS+PTFE<	low wear	1.53	0.02	1.2	1.4	30	1.0	35	70	3	1.2	R111	190	110	5.5	5.8	17	35	2.8	V-0/1.5	90	320
	F-2	11	>PPS+PTFE-GF10<	low wear	1.58	0.01	0.5	1.1	65	1.3	30	105	5	4	R120	>260	220	4.0	4.6	18	40	3.1	V-0/0.75	45	270
	FG	11	>PPS+PTFE-GF30<	low wear	1.68	0.02	0.3	0.9	125	1.2	30	190	11	7.5	R120	>260	>260	2.3	3.5	16	100	3.3	V-0/0.75	40	230
	FG	21	>PPS+PTFE-GF30<	low wear, high strength	1.68	0.02	0.3	0.9	150	1.8	40	240	11.5	8.5	R120	>260	>260	2.3	3.2	16	100	3.3	V-0/0.75	30	190
	FC-30	12	>PPS+PTFE-(CF+MD)30<	low wear, high flow	1.52	0.02	0.4	0.9	130	0.7	32	235	17	5.2	R119	>260	>260	1.5	2.6	—	—	—	Equivalent V-0/1.0	225	300
Electric Conductivity	CH-30	32	>PPS-CF30<	electric conductivity, stiffness, toughness	1.44	0.02	0.2	0.5	205	0.9	65	300	22.5	4.5	R123	>260	>260	1.3	2.0	—	—	—	V-0/0.75	30	160
	P-62	12	>PPS-(CF+GF)30<	antistatic	1.45	0.14	0.3	0.7	115	1.4	55	165	9	2.6	R123	>260	245	2.7	4.6	—	—	—	Equivalent V-0/0.75	40	170
Unfilled	B-060P	11	>PPS	toughness	1.36	0.02	1.2	1.3	75	2.3	58	145	4	1.3	R125	135	107	5.0	6.0	16	120	3	Equivalent V-0/1.0	40	230

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● Superior Metal Bonding

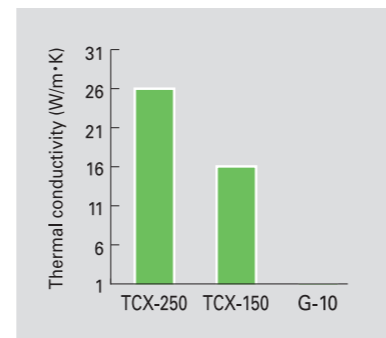
Bonding strength between Aluminum(A5052) and PPS
ISO 19095



These Susteel PPS are suitable for NMT (Nano Molding Technology developed by Taiseiplas Co.,Ltd.)

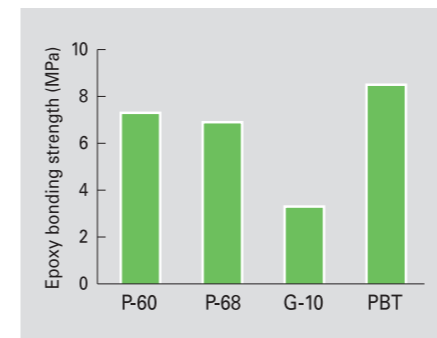
● Thermal Conductivity

Thermal conductivity
TOSOHO Method; Laser flash method



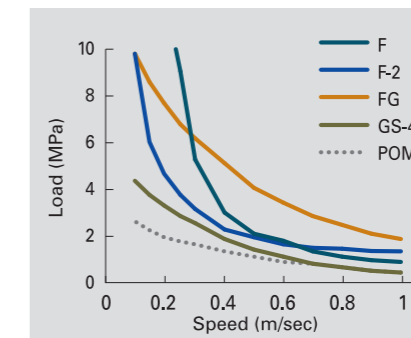
● Superior Epoxy Bonding

Epoxy bonding strength
TOSOHO Method; Two-component epoxy resin



● Low Wear

PV limits TOSOHO Method
(The load when the abnormal wear or melting occurred) × (Speed)



● Electric Conductivity

Volume resistivity
TOSOHO Method

