

Flammability and Durability Solution with Polyester Compounds

<FR PET/GF SKYTRA 5220F >

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Engineering Plastics Business Team

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Introduction

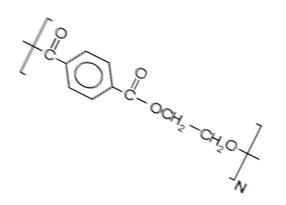
Introduction



SKYTRA 5220F (FR PET/GF) is a 30% glass reinforced, flame retardant modified polyethylene terephthalate resin approved by UL as UL94(V-0), UL746C(f1) and UL746B(RTI). It is a prime solution in many demanding applications where critical tolerances, long term thermal properties, strong chemical resistances and dielectric properties are key requirements

Characteristics

- High heat resistance & Long-term heat stability
- Excellent UL flammability and relative temperature index rating
- Excellent electrical properties
- Good UV resistance and weatherability
- Good processability
- Good chemical resistance
- Good surface appearance





Applications

Applications



SKYTRA 5220F (FR PET/GF) offers excellent properties that are high strength, stiffness, excellent dimensional stability, outstanding chemical and heat resistance, and good electrical properties. It is a prime solution for many encapsulation and electrical and electronic applications. Especially where the high temperature index and UV resistance are required.

Applications

- Motor insulators
- Printer fuser unit
- Coil bobbins, Relay Socket
- Photovoltaic junction box housings
- Curling iron, Hair dryers
- Pot coil base
- Oven handles, small appliance handles
- Luggage racks



Material requirements : Motor Insulator











□ Requirements

- UL 94 (Flammability Ratings)
 - * V-0 @ 0.7mm
- UL 746B RTI (Relative Temperature Index)
 - * Elec > 140°C / Imp > 140°C / Str > 140°C
- UL 746C (f1) Class
 - * UV exposure & Water immersion
- UL 1446 EIS (Electrical Insulation System)
 - * OBJS2's requirements or available of OBJY2 (STTA : UL's Short-Term Thermal Aging)
- Hole strength
- Dimensional stability
- Insulation resistance
- Insulation pressure resistance
- Chemical resistance

Material requirements : Printer Fuser Unit





□ Requirements

- UL 94 (Flammability Ratings)
 - * 5VA @ 1.5mm
- UL 746B RTI (Relative Temperature Index)
 - * Elec > 150°C / Imp > 140°C / Str > 140°C
- Dimensional stability (Mold Shrinkage)
- * MD(Flow) < 0.2mm
- * TD(Cross-Flow) < 1.0mm
- HDT (Heat distortion temperature)
 - * 220 °C @ 1.82 Mpa
- Surface roughness
- Lowest warpage

Material requirements : Bobbin & Relay



Coil bobbin



Requirements

- UL 94 (Flammability Ratings)
 - * V-0 @ 0.35mm
- UL 746A
 - Under the condition a V-0
 - * HWI (Hot Wire Ignition) : Assigned PLC 4
 - * HAI (High-Current Arc Ignition) : Assigned PLC 3
 - GWIT(Glow Wire Ignitability Temperature) on some parts Under the condition a 0.75mm @ 775 ℃
- GWFI(Glow-Wire Flammability) on some parts Under the condition a 0.75mm @ 960 ℃
- UL 746B RTI (Relative Temperature Index)
 - * Elec > 150°C / Imp > 140°C / Str > 140°C

• Some Customer ask for VDE(Germany) approved products certification is better

Material requirements ; Juntion box housing

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Junction box housing





• UL3730 (Standard for Photovoltaic Junction)

• UL6703 (Standard for Connectors for Use in Photovoltaic Systems)

- IEC 62790 (Junction boxes for photovoltaic modules Safety requirements and tests)
 - IEC 62852(Connectors for DC application in photovoltaic systems Safety requirements and tests)

□ Requirements

- UL 94 (Flammability Ratings)
 - * 5VA @ 1.5mm
- UL 746A
- IPT (Inclined Plane Tracking) : 1500V
- Under the condition a V-0
- * HWI (Hot Wire Ignition) : Assigned PLC 3
- * HAI (High-Current Arc Ignition) : Assigned PLC 4
- GWIT(Glow Wire Ignitability Temperature)
- * Inner : 650V, Outer : 750V
- Ball Pressure
 - * Inner : 90V, Outer : 125V
- UL 746B RTI (Relative Temperature Index)
 - * Elec > 130°C / Imp > 130°C / Str > 130°C
- UL 746C (f1) Class
 - * UV exposure & Water immersion

Comparison of Properties

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				SK	Dupont	KANEKA	Samyang
Mechanical Proper	ties			SKYTRA 5220F	RYNITE FR530	HYPERITE 8300SE	TRIPET LV2550GN30
Tensile Strength @ (5mm/min)	2 Yield	ASTM D638	kgf/cm ²	1,400	1,350	1,500	1,370
Elongation @ Brea (5mm/min)	k	ASTM D638	%	2.50	2.47	2.50	3.00
Tensile Modulus (5mm/min)		ASTM D638	kgf/cm ²	109,000	91,800	x	x
Flexural Strength (1.27mm/min)		ASTM D790	kgf/cm ²	1,900	1,650	2,050	1,750
Flexural Modulus (1.27mm/min)		ASTM D790	kgf/cm ²	95,000	84,650	95,000	88,250
Izod Impact Streng Notched 3.2 mm Notched 6.4 mm	@ 23℃(73℉)	ASTM D256	J/m	90 70	82 60	78 -	59 -
Thermal Properties	5						
HDT @ 1.82 MPa		ASTM D648	°C	225	225	220	220
Flammability	@ 0.35 mm @ 1.5 mm	UL94	-	V-0 V-0, 5VA	V-0 V-0, 5VA	X V-0, 5VA	X V-0, 5VA
Ball Pressure		IEC 60695-10-2	°C	245	245	X	X
Physical Properties	s						
Specific Gravity		ASTM D792	g/cm ³	1.63	1.68	1.70	1.63
Mold Shrinkage	MD (Flow) TD (Cross-Flow)	ASTM D955	%	0.15 0.80	0.20 0.80	0.20 0.90	0.2~0.4
Electrical Propertie	25						
Comparative Track	king Index(CTI)	UL 746A	V(volt)	250	250	X	X
Relative Tem. Index(RTI) @ 3.0mm		UL 746A	°C	155	155	150	150
Glow-wire Ignition (GWIT) @ 3.0mm		UL 746A	°C	975	975	X	X

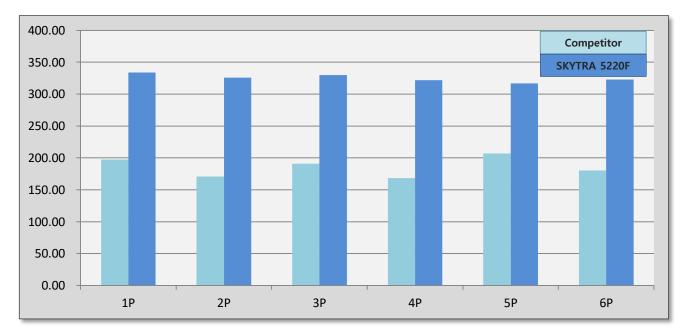
• KANEKA & Samyang's materials can be used in Printer Fuser Unit only

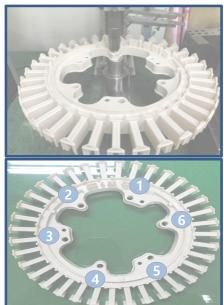


Certification with SKYTRA FR PET GF

Introduction - comparison with competitive material

Hole strength " Motor Insulator "





SKY TRA

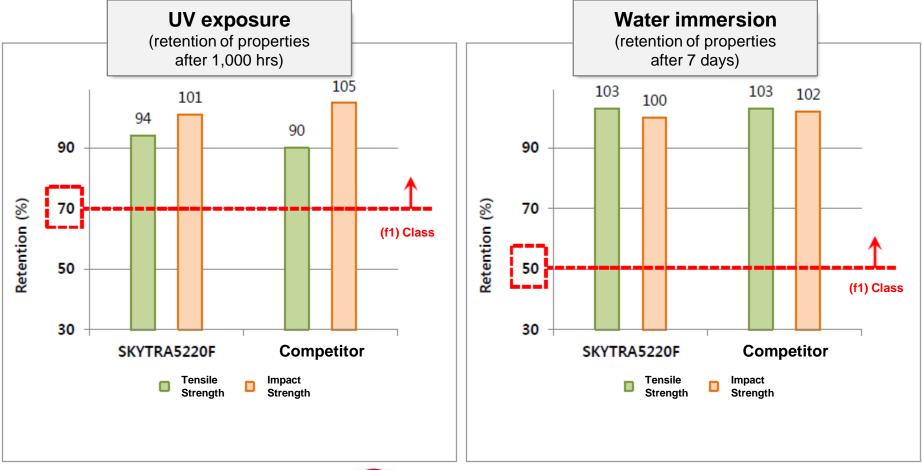
- SKYTRA 5220F (FR PET GF30%) has
 - a higher hole strength than the competitor's
- SK Chemicals Reference

- E85300.OBJY2/8 - New EIS, DD Motor, 155(F) class STTA Evaluation (1000 hr, 50 day)



Introduction - comparison with competitive material

Comparison with competitive materialUL746C is an evaluation of polymer materials properties for outdoor uses, such as ultraviolet (UV) light exposure and/or water immersion. "Motor Insulator & Photovoltaic junction box housings "



• SK Chemicals Reference: File E215991



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Thermal Properties (f1)

Component - Plastics

Guide Information

SK CHEMICALS CO LTD

98-36 Dongtansandan 7-gil Dongtan-myeon, Hwaseong-si Gyeonggi-do 18487 KR

SKYTRA 5220F(#)(f1)

Polyethylene Terephthalate (PET), furnished as pellets

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
NC, BK	0.7	V-0	0	0	155	155	155
	1.5	V-0	0	0	155	155	155
	3.0	V-0	0	0	155	155	155

Comparative Tracking Index (CTI): 2 Dielectric Strength (kV/mm): 35.04 High-Voltage Arc Tracking Rate (HVTR): 4 Dimensional Stability (%): 0 Inclined Plane Tracking (IPT) kV: -Volume Resistivity (10^x ohm-cm): 14 Surface Resistivity (10^x ohm-cm): High Volt, Low Current Arc Resis (D495): 7

(#) - May be replaced by one or two numbers and/or letters.

(f1) - Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C.

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

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Report Date: 2013-12-06 Last Revised: 2020-01-30

IEC and ISO Test Methods				
Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10	Class (color)	0.7	V-0 (NC, BK)
			1.5	V-0 (NC, BK)
			3.0	V-0 (NC, BK)
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	°C	0.7	960
			1.5	960
			3.0	960
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	0.7	930
			1.5	875
			3.0	960
EC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
EC Ball Pressure	IEC 60695-10-2	°C	-	240
SO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
SO Tensile Strength	ISO 527-2	MPa	-	-
SO Flexural Strength	ISO 178	MPa	-	-
SO Tensile Impact	ISO 8256	kJ/m ²	-	-
SO Izod Impact	ISO 180	kJ/m ²	-	-
SO Charpy Impact	ISO 179-2	kJ/m ²	-	-



E215991

Thermal Properties (f2)



C OL CERTINGATION. LE 13551 - C	omponent - Plastics - Inte	ernet Explorer					
https://iq.ul.com/ul/cert.aspx?	ULID=101729226						
q.ul.com							
PROSPECTOR® /iew additional material information ir	CLICK TO CO	Prospector makes substan	d on the UL Prospector on trial efforts to assure the gly encourages that upor	accuracy of this da	ata. However, UL Prospe	ctor assumes no a	responsibility for
omponent - Plastics							E2159
uide Information							
K CHEMICALS CO 8-36 Dongtan sandan 7-gil Don		si Gyeonogi-do 18487 KR					
KYTRA 5220F(#)(f2)							
	Min. Thk	Flame			RT	RTI	RTI
Color	(mm)	Class	HWU	HAI	Elec	Imp	Str
NC, BK	0.35	V-0	-	-	75	75	75
allow rear and a	0.7	V-0	0	0	155	155	155
ſ	1.5	V-0, 5VA	0	0	155	155	155
L	3.0	V-0, 5VA	0	0	155	155	155
Comparative	Tracking Index (CTI):		Inclined Plane	Tracking (IPT) KV: -		
Dielect	ric Strength (kV/mm):	35.04	Volume Resist	tivity (10 ^x oh	m-cm): 14		
High-Voltage Arc T	racking Rate (HVTR): ensional Stability (%):	4 High V	olt, Low Curren		(D495): 7		
High-Voltage Arc T Dim (#) - May be replaced ANSINL 94 small-scale test data do plastic materials us	ensional Stability (%): by one or two numbers ar es not pertain to building met	4 High V 0	to. ANSPUL 94 small	t Arc Resis	is intended solely for	mined by UL.	
High-Voltage Arc T Dim (#) - May be replaced ANSIUL 94 small scale test data do plastic materials us Report Date: 2013-12-06	ensional Stability (%): by one or two numbers ar es not pertain to building met	4 High V 0 nd/or letters. erists, furnishings and related content erists of end-product devices and appl	to. ANSPUL 94 small	t Arc Resis	is intended solely for	mined by UL.	
High-Voltage Arc T Dim (#) - May be replaced ANSMUL 94 small-scale test data do plastic materials us report Date: 2013-12-06 ast Revised: 2019-07-22	ensional Stability (%): by one or two numbers ar es not pertain to building met	4 High V 0 nd/or letters. erists, furnishings and related content erists of end-product devices and appl	folt, Low Curren	t Arc Resis	is intended solely for	mined by UL.	
High-Voltage Arc T Dim (#) - May be replaced ANSIUL 94 small-scale test data do plastic materials us eport Date: 2013-12-06 ast Revised: 2019-07-22 EC and ISO Test Methods	ensional Stability (%): by one or two numbers ar es not pertain to building met	4 High V 0 nd/or letters. erists, furnishings and related content erists of end-product devices and appl	to ANSI'UL 94 small ances, where the ac	t Arc Resis	is intended solely for	mined by UL.	
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Processing Guidelines

Processing Guidelines



	Units	Condition	Remarks
Mold Temperature	°C	120	 ▷ For oil heater - Temperature range : 100 ~ 140 °C
Melt Temperature Nozzle Front Middle Rear	ະ ເ ະ ະ	265 ~ 275 270 ~ 280 265 ~ 275 255 ~ 265	⊳ Hot Runner : 260 ~ 330 °C
Screw Speed	rpm	50 ~ 150	
Back Pressure	bar	3 ~ 20	
Injection Pressure	Bar	50 ~ 500	
Drying Temperature & Time	°C, h	120°C, 5 ~ 6	\triangleright Dehumidified dryer, dew point of dry air
· · · ·	-	120°C, Overnight	: -30 ℃, -40 ℃ is better for good drying
Moisture Content, Max.	%	< 0.03% (300ppm)	

* Effects of Moisture (insufficient drying)

- Degradation of Base Resin & any additives
- \cdot Adverse effect of the color of the final product
- Difficult control of the processing parameters such as melt pressure, rheology, and power consumption
- Bubble and silver streaks
- * It is better to reduce injection speed just at the gate (It would be helpful to decrease gate blush issue.)



We care for the future Healthcare, Earthcare

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