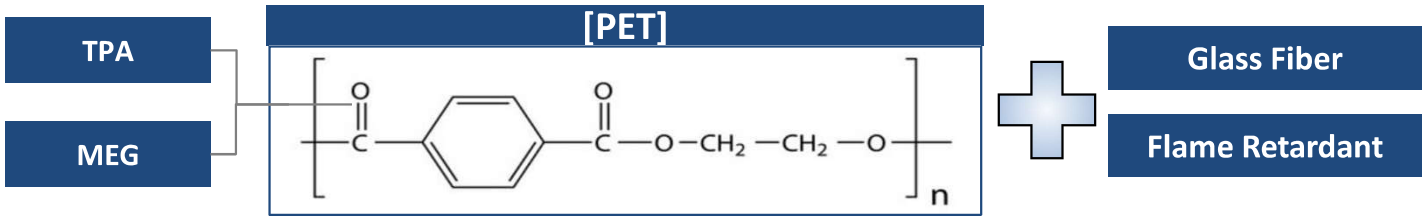
Introduction to SKYTRA

SK Chemicals Engineering Polymer Team

SKYTRA Overview

SKYTRA® PET thermoplastic polyester resins are among the strongest and stiffest engineering resins available. They are a prime candidate for the replacement of die-cast metals and thermosets in many demanding applications where stiffness, critical tolerances, and dielectric properties are key requirements. With extensive UL listings and excellent flow characteristics, SKYTRA® can be used in many encapsulation and thin wall electrical and electronic applications.

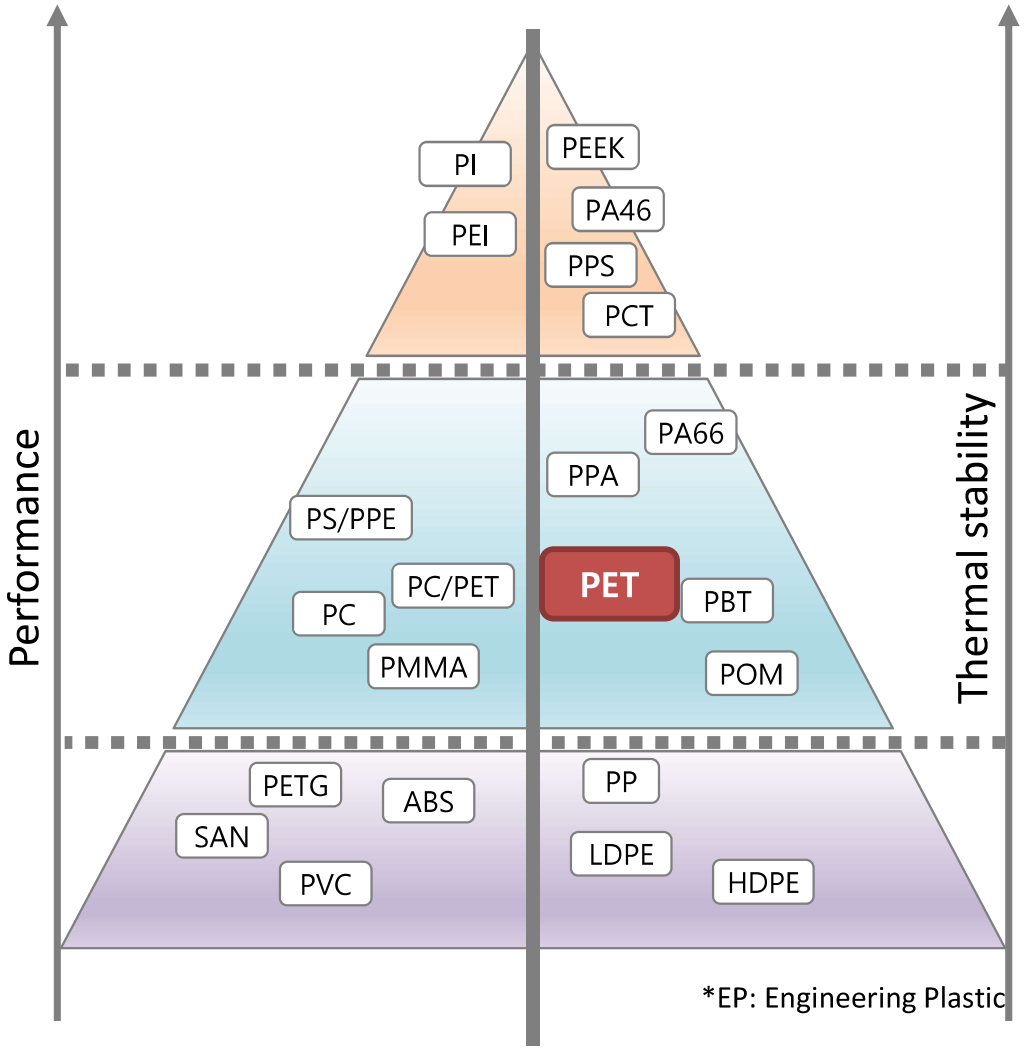


Main Key Features

- ✓ Good heat resistance
- ✓ High strength, Stiffness and excellent dimensional stability
- ✓ Good electrical properties
- ✓ Low moisture absorption
- ✓ Good chemical resistance
- ✓ Good UV resistance and weatherability

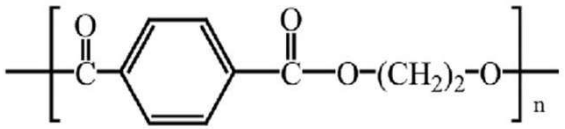
SKYTRA Overview

SKYTRA is high performance polyester compounds with high strength and stiffness.



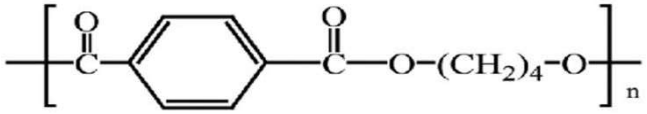
Comparison of PET molecular structure with other EP

PET — Tm 250 °C, Tg ~80 °C

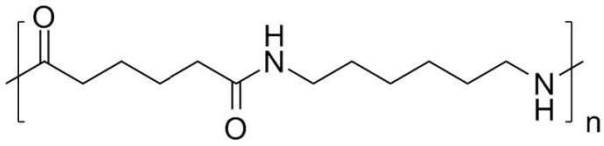


vs

PBT — Tm 220 °C, Tg ~40 °C

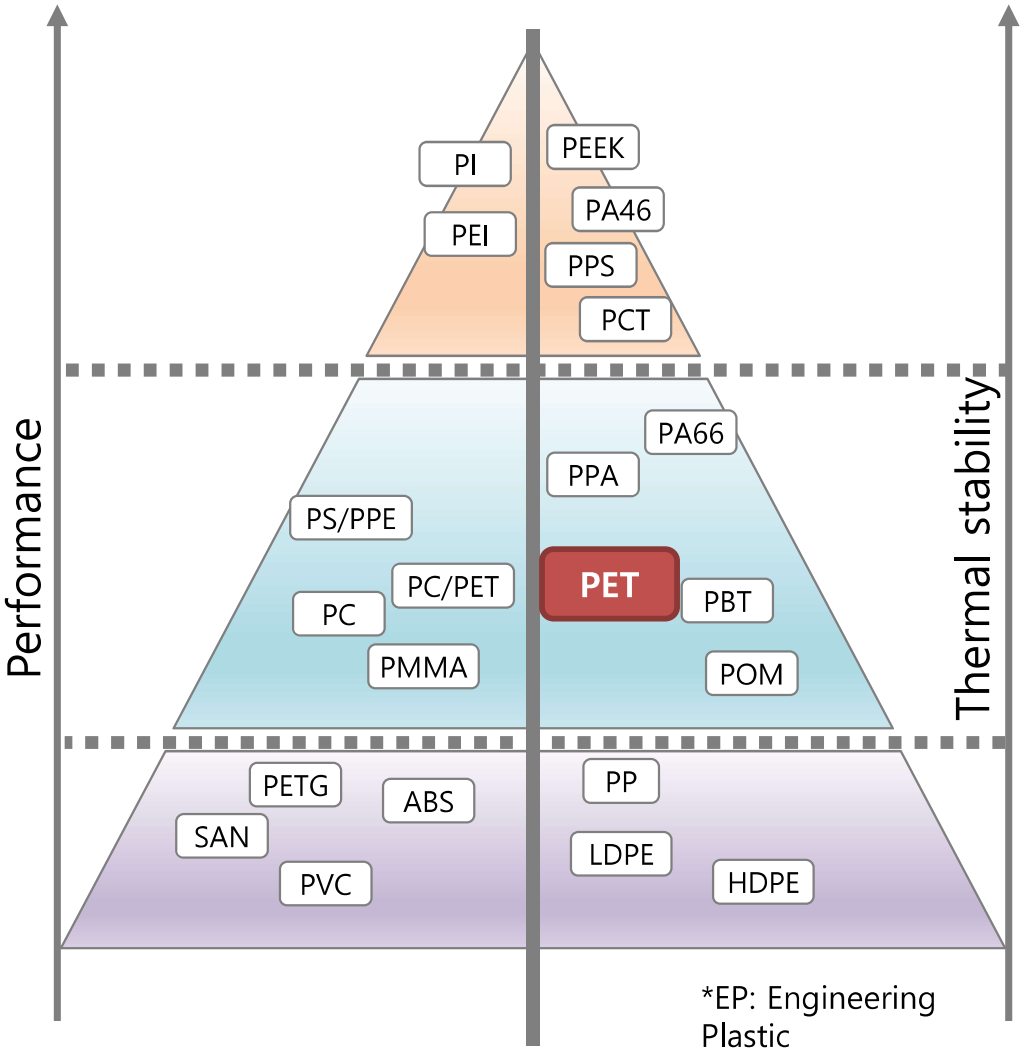


PA66 — Tm 260 °C, Tg ~60°C



SKYTRA Overview

Typical Application Areas of PET Compounds



SKYTRA offers excellent mechanical and electrical properties. It is a prime solution for many applications, where long term thermal properties, flame retardant, strong chemical resistances and dielectric properties are key requirements.

- Electrical encapsulation
- Electrical insulation
- PCB Supporter
- Motor insulator, Rotor, Stator
- Printer fuser unit, Guide In/Output
- Coil bobbins, Relay Socket, Regulator
- Photovoltaic junction box housings
- Curling iron, Hair dryers
- Pot coil base (Rice Cooker)
- Oven handles, Holder handles

Application

SKY TRA

Printer Fuser unit

- Dimensional stability
- High strength / Stiffness

Motor Insulator

- Dimensional stability
- Good Heat Resistance
- Good Electrical Properties
- Good Physical Properties

Junction Box Housing

- Good Electrical Properties
- Good UV resistance / weatherability

Coil Bobbin

- Good Electrical Properties
- High strength / Stiffness
- Good Heat resistance

Hair Beauty Appliance

- Dimensional stability
- Good Heat resistance
- Good Electrical Properties

Pot Coil base

- Good Heat resistance
- Good Electrical Properties

Relay

- Good Heat resistance
- Good Electrical Properties

Product Line up

* 5220FR : 100% PET recycled content

ASTM			5220	5235M	5220F	5220FR	5250F
Flame Retardant			N	N	Y	Y	Y
Glass Fiber %			30%	35%	30%	30%	43%
Mica			0%		0%	0%	0%
Color			BK, NC	BK	BK, NC	BK	BK
Classification	**Test Method**	**Unit**	**Technical Data Sheet**				
Mechanical Properties							
Tensile Strength @ Yield (5mm/min)	ASTM D638	kgf/cm²	1,460	1,000	1,400	1,310	1,780
Elongation @ Break (5min/min)	ASTM D638	%	2.4	1.9	2.5	2.5	1.8
Flexural Strength (1.27mm/min)	ASTM D790	kgf/cm²	1,870	1,400	1,900	1,900	2,510
Flexural Modulus (1.27mm/min)	ASTM D790	kgf/cm²	81,000	90,000	95,000	95,000	151,000
Izod Impact Strength Notched 3.2mm (@ 23℃(73°F))	ASTM D256	J/m	95	50	85	85	100
Izod Impact Strength Notched 6.4mm (@ 23℃(73°F))	ASTM D256	J/m	-	-	70	70	80
Thermal Properties							
Melting Temperature (10℃/min)	ISO 11357-1/-3	℃	255	255	255	255	255
Ball Pressure	IEC 60695-10-2	℃	-	-	245	245	-
HDT @ 0.45 Mpa	ASTM D648	℃	245	-	-	-	-
HDT @ 1.82 Mpa	ASTM D648	℃	224	200	225	225	247
Flammability @ 0.35 mm	UL94	-	HB	HB	V-0	V-0	V-0
Flammability @ 0.7 mm	UL94	-	HB	HB	5VA	5VA	5VA
Flammability @ 1.5 mm	UL94	-	HB	HB	5VA	5VA	5VA
Flammability @ 3.0 mm	UL94	-	HB	HB	5VA	5VA	5VA

1) Information inserted in this document such as data, statements, representative values, etc. are provided solely for customer convenience.
2) It does not expressly or impliedly guarantee anything

Product Line up

ASTM			5220	5235M	5220F	5220FR	5250F
Flame Retardant			N	N	Y	Y	Y
Glass Fiber %			30%	35%	30%	30%	43%
Mica			0%		0%	0%	0%
Color			BK, NC	BK	BK, NC	BK	BK
Classification	**Test Method**	**Unit**	**Technical Data Sheet**				
Thermal Properties							
GWFI @ 3.0mm	IEC 60695-2-12	℃	-	-	960	960	-
GWIT @ 3.0mm	IEC 60695-2-13	℃	-	-	960	960	-
RTI Elec @3.0mm	UL 746B	℃	75	-	155	155	-
RTI Imp @3.0mm	UL 746B	℃	75	-	155	155	-
RTI Str @3.0mm	UL 746B	℃	75	-	155	155	-
Physical Properties							
Specific Gravity (Density)	ASTM D792	g/cm3	1.54	1.58	1.63	1.63	1.76
Mold Shrinkage MD (Flow)	ASTM D955	%	0.2 (2mm)	0.3 (2mm)	0.15 (2mm)	0.15 (2mm)	0.2 (2mm)
Mold Shrinkage TD (Cross-Flow)	ASTM D955	%	0.9 (2mm)	0.8 (2mm)	0.8 (2mm)	0.8 (2mm)	0.65 (2mm)
Melt Flow Index (280℃/ 2.16kg)	ASTM D1238	g/10min	>15	-	>15	>15	>7
Outdoor Suitability	UL 746C	-	-	-	f1	f1	-
Electrical Properties							
C.T.I (Comparative Tracking Index)	UL 746A	PLC	-	-	PLC 2	PLC 2	-
HWI @ 0.7mm	UL 746A	PLC	-	-	PLC 0	PLC 0	-
HWI @ 1.5mm	UL 746A	PLC	-	-	PLC 0	PLC 0	-
HWI @ 3.0mm	UL 746A	PLC	-	-	PLC 0	PLC 0	-
HAI @ 0.7mm	UL 746A	PLC	-	-	PLC 0	PLC 0	-
HAI @ 1.5mm	UL 746A	PLC	-	-	PLC 0	PLC 0	-
HAI @ 3.0mm	UL 746A	PLC	-	-	PLC 0	PLC 0	-
IPT (Inclined Plane Tracking)	ASTM D2303	KV	-	-	1.5KV	1.5KV	-
Arc Resistance	ASTM D495	PLC	-	-	PLC 7	PLC 7	-
Dielectric Strength	ASTM D149	kV/mm	-	-	35kV/mm	35kV/mm	-

II. Application of SKYTRA

SKYTRA

Material requirements : Motor Insulator & Stator

SKY TRA

DD Motor

☐ **Potential (FR PET & FR PBT : 50,000 ton/yr)**

- Samsung : 5,000 ton/yr (FR PET give weight to 70%)
- LG : 5,000 ton/yr (FR PBT give weight to 90%)
- Haier & Media etc.: 40,000 ton/yr (FR PBT give weight to 90%)

☐ **Requirements**

- UL 94 (Flammability Ratings)
  * V-0 @ 0.7mm
- UL 746B RTI (Relative Temperature Index)
  * Elec > 140℃ / Imp > 140℃ / Str > 140℃
- 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
- Chemical resistance

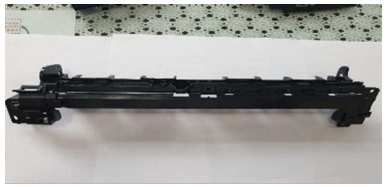
Linear Motor

Stator

SK chemicals

Material requirements : Printer Fuser Unit

SKY TRA



☐ **Potential (only FR PET : 10,000 ton/yr)**

- Fuji : 2,700 ton/yr , Brother : 2,200 ton/yr
- HP : 1,000 ton/yr, Cannon etc. 13개 : 4,100 ton/yr

☐ **Requirements**

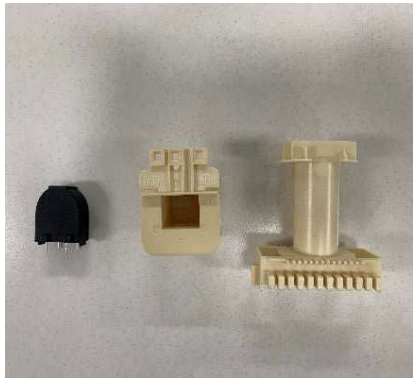
- UL 94 (Flammability Ratings)
  - * 5VA @ 1.5mm
- UL 746B RTI (Relative Temperature Index)
  - * Elec > 150℃ / Imp > 140℃ / Str > 140℃
- Dimensional stability (Mold Shrinkage)
  - * MD(Flow) < 0.2mm
  - * TD(Cross-Flow) < 1.0mm
- HDT (Heat distortion temperature)
  - * 220 ℃ @ 1.82 Mpa
- Surface roughness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

SK chemicals

Material requirements : Bobbin & Relay

SKY TRA

Coil bobbin & Regulator



Relay Socket & PCB Supporter

☐ **Potential (FR PET & FR PBT : 65,000 ton/yr)**

- FR PET : 17,000 ton/yr (TV, MWO, Oven, Bobbin)
- FR PBT : 48,000 ton/yr (Large weight on Automobile)

☐ **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℃ / Imp > 140℃ / Str > 140℃

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

SK chemicals

Material requirements : Juntion box housing

SKY TRA

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)

☐ **Potential (FR PET & FR m PPO : 20,000 ton/yr)**

- FR PET : 5,000 ton/yr (Household appliances high-end model)
- FR m PPO : 15,000 ton/yr (Industrial large-scale model)

☐ **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℃ / Imp > 130℃ / Str > 130℃
- UL 746C (f1) Class
  * UV exposure & Water immersion

SK chemicals

Material requirements : Curing Iron, Hair dryer & Coil Base

Curing Iron & Hair dryer

Plate Type

Straightener Type

Conical Type

Hair dryer

Coil Base (Induced Heating Pot)

IH(유도가열)

코일

High-end

DH(직접가열)

열판

Low-end

☐ **Potential (FR PET & FR PBT : 10,000 ton/yr)**

- FR PET : 3,000 ton/yr (High-end Model)
- FR PBT : 7,000 ton/yr (Low-end Model)

☐ **Requirements**

- UL 94 (Flammability Ratings)
  - * V0 @ 0.35mm / 5VA @ 1.5mm
- UL 746B RTI (Relative Temperature Index)
  - * Elec > 155℃ / Imp > 155℃ / Str > 155℃
- UL 746A CTI (Comparative Tracking Index) : PLC 2 (250V)
- HDT (Heat Distortion Temp.) : 225 ℃
- GWIT (Glow-wire Ignition Temp.) : 965 ℃
- Excellent UL flammability
- High heat resistance & Long-term heat stability
- Dimensional stability & Chemical resistance
- Excellent electrical properties
- Good processability
- Good surface appearance

UL_Yellow Card (f1)

SKYTRA

Component - Plastics E215991

Guide Information

SK CHEMICALS CO LTD

310 Pangyo-ro Bundang-gu, Seongnam-si Gyeonggi-do 13494 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): 1
Dimensional Stability (%): 0
Inclined Plane Tracking (IPT) kV: 1.5
Volume Resistivity (10^x ohm-cm): 14
Surface Resistivity (10^x ohms/square): -
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.

Report Date: 2013-12-06
Last Revised: 2020-09-14

c UL us

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
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	240
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m^2	-	-
ISO Izod Impact	ISO 180	kJ/m^2	-	-
ISO Charpy Impact	ISO 179-1	kJ/m^2	-	-

SK chemicals

UL_Yellow Card (f2)

SKYTRA

Component - Plastics — E215991

Guide Information

SK CHEMICALS CO LTD

310 Pangyo-ro Bundang-gu, Seongnam-si Gyeonggi-do 13494 KR

SKYTRA 5220F(#)(f2)

Polyethylene Terephthalate (PET), furnished as pellets

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
ALL	0.35	V-0	-	-	75	75	75
	0.7	V-0	0	0	155	155	155
	1.5	V-0, 5VA	0	0	155	155	155
	3.0	V-0, 5VA	0	0	155	155	155

Comparative Tracking Index (CTI): 2
Dielectric Strength (kV/mm): 35.04
High-Voltage Arc Tracking Rate (HVTR): 1
Dimensional Stability (%): 0

Inclined Plane Tracking (IPT) kV: 1.5
Volume Resistivity (10^x ohm-cm): 14
Surface Resistivity (10^x ohms/square): -
High Volt, Low Current Arc Resis (D495): 7

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

(f2) - Subjected to one or more of the following tests: Ultraviolet Light, Water Exposure or Immersion in accordance with UL 746C, where the acceptability for outdoor use is to be determined by UL.

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.

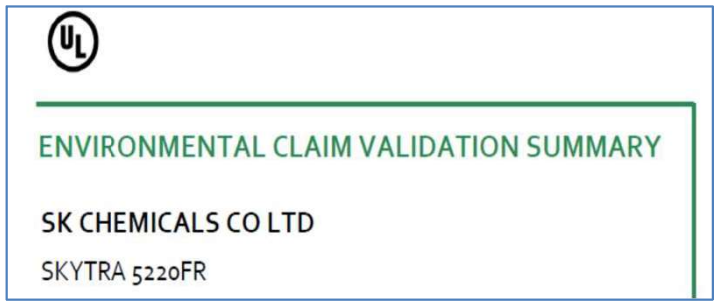
Report Date: 2013-12-06
Last Revised: 2020-09-14

c UL us

IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10, IEC 60695-11-20	Class (color)	0.35	V-0 (ALL)
			0.7	V-0 (ALL)
			1.5	V-0, 5VA (ALL)
			3.0	V-0, 5VA (ALL)
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
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	240
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m^2	-	-
ISO Izod Impact	ISO 180	kJ/m^2	-	-
ISO Charpy Impact	ISO 179-1	kJ/m^2	-	-

UL_Site Certification for SKYTRA 5220FR


ENVIRONMENTAL CLAIM VALIDATION SUMMARY

SK CHEMICALS CO LTD

SKYTRA 5220FR

Claim:

SKYTRA 5220FR contains a minimum of 50% post consumer recycled content.

Method:

Environmental Claim Validation Procedure (ECVP) for Recycled Content, UL 2809 - Fifth Edition

Facility:

SK chemicals

UL_Environmental Claim Validation for SKYTRA 5220FR

SK chemicals
310 Pangyo-ro
Bundang-gu, Seongnam-si, Gyeonggi-do 13494
Republic of Korea
ULE Project No.: 4789432915
ULE Order No.: 13296744
Subject: Environmental Claims Validation for SKYTRA 5220FR

Processing Guidelines

Classification	Units	Condition	Remarks
Mold Temperature	℃	120	▷ For oil heater - Temperature range : 100 ~ 140 ℃
Melt Temperature		265 ~ 275	
Nozzle	℃	270 ~ 280	
Front	℃	265 ~ 275	▷ Hot Runner : 260 ~ 330 ℃
Middle	℃	255 ~ 265	
Rear	℃		
Screw Speed	rpm	50 ~ 150	
Back Pressure	bar	3 ~ 20	
Injection Pressure	Bar	50 ~ 500	
Drying Temperature & Time	℃, hr	120℃, 5 ~ 6hr 120℃, Overnight	▷ Proper drying process is required before injection

*** Effects of Moisture (insufficient drying)**

- Degradation of Base Resin & any additives
- 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.)**

Comparison of Properties

SKY TRA

구분	Unit	ASTM	FR PET	FR PBT	FR Nylon 6	FR Nylon 66	FR PC	FR M-PPO	FR POM
			GF30%	GF30%	GF30%	GF30%	GF30%	GF30%	GF25%
비 중	-	-	1.63	1.62	1.36	1.37	1.43	1.27	1.61
흡수율(24hrs)	%	D570	0.06	0.07	1.2	1	0.2	0.06	-0.29
충격 강도	kg.cm/cm	D256	9	7	11	8	15	12	8.6
인장 강도	kg/cm2	D638	1,400	1,350	1,600	1,700	1,250	1,200	1,280
파단 신율	%	D638	15	4	5	5	4	5	3
굴곡 강도	kg/cm2	D790	1950	1900	2400	2400	1900	1400	2000
굴곡 탄성율	kg/cm2	D790	95000	85000	75000	80000	78000	77000	77000
난연성	-	UL 94	V0-5VA	V1-V0	HB-V0	HB-V0	HB-V0	HB-V0	HB
장기 내열 온도	deg.C	UL746B	155	140	115	125	130	110	100
열변형 온도	deg.C	D648	225	210	190	240	145	140	163
선팽창 계수	$X10^{-5}/C$	D696	2.5	2	2.5	3	2.7	2.5	6
체적 고유 저항	Ohm-cm	D257	10^{16} .	10^{16} .	10^{15} .	10^{15} .	10^{17} .	10^{17} .	10^{14} .
절연 내력	KV/mm	-	35	23	60	60	60-150	22	23
내 Arc성	sec	-	100	150	131	114	120	100	130
용융 온도 (Tm)	deg.C	-	260	224	220	260	-	-	180
유리전이온도 (Tg)	deg.C	-	70	22	50	50	150	-	56
사용량	Ton/yr	-	40,000	120,000	3,000	5,000	4,000	5,000	2,000
Pirce	USD/kg		3.5~4.0	2.8~3	5.2~5.7	5.5~6.2	4.7~5.2	5.2~5.6	2.4~2.8
주요 용도	-	-	Motor, Printer	Motor, Rotor	Connector	Connector	Switch, Relay	Junction Box	Bobbin
대표 Maker	-	-	Dupont, SK	Dupont, LG	Dupont, DSM	Dupont, DSM	SABIC, Mitsubishi	SABIC, LG	BASF, KEP

SK chemicals

Comparison of Properties : SK vs LG

SKYTRA

Mechanical Properties			SK Chemicals SKYTRA 5220F	LG Chemicals LUPOX 2306FI
Tensile Strength @ Yield (5mm/min)	ASTM D638	kgf/cm^2	1,400	1,350
Elongation @ Break (5mm/min)	ASTM D638	%	2.5	2
Tensile Modulus (5mm/min)	ASTM D638	kgf/cm^2	109,000	91,800
Flexural Strength (1.27mm/min)	ASTM D790	kgf/cm^2	1,950	1,900
Flexural Modulus (1.27mm/min)	ASTM D790	kgf/cm^2	95,000	85,000
Izod Impact Strength Notched 3.2 mm @ 23℃(73℉) Notched 6.4 mm @ 23℃(73℉)	ASTM D256	J/m	90 70	- 70
Thermal Properties				
HDT @ 1.82 MPa	ASTM D648	℃	225	210
Flammability @ 0.35 mm @ 0.7 mm @ 1.5 mm	UL94	-	V-0 V-0 5VA	- V-0 V-0
Ball Pressure	IEC 60695-10-2	℃	245	-
Physical Properties				
Specific Gravity	ASTM D792	g/cm^3	1.62	1.62
Mold Shrinkage MD (Flow) TD (Cross-Flow)	ASTM D955	%	0.15 0.8	0.3 1
Electrical Properties				
Comparative Tracking Index(CTI)	UL 746A	V(volt)	250(PLC2)	-
Relative Tem. Index(RTI) @ 3.0mm	UL 746A	℃	155	140
Glow-wire Ignition (GWIT) @ 3.0mm	UL 746A	℃	960	825
체적저항	ASTM D257	Ohm.cm	1.00E+15	1.00E+17
내아크성	ASTM D495	PLC	6	6
절연파괴전압, 1mm	ASTM D149	Kv/mm	22	28

SK chemicals

Comparison of Properties : SK vs Dupont (ISO Ver.)

ISO			SKYTRA 5220	Rynite 530	SKYTRA 5235M	Rynite 935	SKYTRA 5220F	Rynite FR530	SKYTRA 5250F	Rynite FR543
Flame Retardant			N	N	N	N	Y	Y	Y	Y
Glass Fiber %			30%	30%	15%	15%	30%	30%	43%	43%
Mica			0%	0%	20%	20%	0%	0%	0%	0%
Color			BK, NC	BK	BK	BK	BK, NC	BK	BK	BK
Manufacturer			SK Chemicals	Dupont	SK Chemicals	Dupont	SK Chemicals	Dupont	SK Chemicals	Dupont
Classification	Test Method	Unit	Technical Data Sheet							
Mechanical Properties										
Tensile Strength @ Yield (5mm/min)	ISO 527	MPa	150	150	850	82	130	130	175	160
Elongation @ Break (5min/min)	ISO 527	%	2.3	2.1	1.8	2.0	2.5	1.9	1.8	1.5
Tensile Modulus	ISO 527	MPa	-	10,200	-	10,200	11,000	11,300	14,200	15,600
Flexural Strength (1.27mm/min)	ISO 178	MPa	210	210	140	132	200	200	250	275
Flexural Modulus (1.27mm/min)	ISO 178	MPa	8,200	8,940	8,800	9,300	9,400	10,500	14,800	16,500
Charpy Impact Strength Notched (@ 23℃(73℉))	ISO 179/1eA	KJ/m²	10	9.5	-	5.5	10	9	-	10.5
Charpy Impact Strength UnNotched (@ 23℃(73℉))	ISO 179/1eU	KJ/m²	55	52	-	25	45	40	-	-
Thermal Properties										
Melting Temperature (10℃/min)	ISO 11357-1/-3	℃	255	250	255	252	255	252	255	254
Ball Pressure	IEC 60695-10-2	℃	-		-	-	245	230	-	-
HDT @ 0.45 Mpa	ISO 75-1/-2	℃	245	244	-	240	245	243	-	-
HDT @ 1.82 Mpa	ISO 75-1/-2	℃	224	221	200	200	225	220	247	-
Flammability @ 0.35 mm	UL94	-	-	-	-	HB	V-0	V-0	-	-
Flammability @ 0.7 mm	UL94	-	HB	HB	-	HB	V-0	V-0	V-0	V-0
Flammability @ 1.5 mm	UL94	-	HB	HB	-	HB	5VA	5VA	5VA	5VA
Flammability @ 3.0 mm	UL94	-	HB	HB	-	HB	5VA	5VA	5VA	5VA

Comparison of Properties : SK vs Dupont (ISO Ver.)

ISO			SKYTRA 5220	Rynite 530	SKYTRA 5235M	Rynite 935	SKYTRA 5220F	Rynite FR530	SKYTRA 5250F	Rynite FR543
Flame Retardant			N	N	N	N	Y	Y	Y	Y
Glass Fiber %			30%	30%	15%	15%	30%	30%	43%	43%
Mica			0%	0%	20%	20%	0%	0%	0%	0%
Color			BK, NC	BK	BK	BK	BK, NC	BK	BK	BK
Manufacturer			SK Chemicals	Dupont	SK Chemicals	Dupont	SK Chemicals	Dupont	SK Chemicals	Dupont
Classification	Test Method	Unit	Technical Data Sheet							
Thermal Properties										
GWFI @ 0.7mm	IEC 60695-2-12	℃	-	800	-	-	960	960	-	-
GWFI @ 1.5mm	IEC 60695-2-12	℃	-	900	-	-	960	960	-	-
GWFI @ 3.0mm	IEC 60695-2-12	℃	-	-	-	-	960	960	-	-
GWIT @ 0.7mm	IEC 60695-2-13	℃	-	-	-	800	930	800	-	-
GWIT @ 1.5mm	IEC 60695-2-13	℃	-	-	-	800	875	850	-	-
GWIT @ 3.0mm	IEC 60695-2-13	℃	-	-	-	850	960	925	-	-
RTI Elec @0.35mm	UL 746B	℃	75	140	-	140	75	155	75	155
RTI Elec @0.7mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Elec @1.5mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Elec @3.0mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Imp @0.35mm	UL 746B	℃	75	140	-	140	75	155	75	155
RTI Imp @0.7mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Imp @1.5mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Imp @3.0mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Str @0.35mm	UL 746B	℃	75	140	-	140	75	155	75	155
RTI Str @0.7mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Str @1.5mm	UL 746B	℃	75	140	-	140	155	155	75	155
RTI Str @3.0mm	UL 746B	℃	75	140	-	140	155	155	75	155

Comparison of Properties : SK vs Dupont (ISO Ver.)

ISO			SKYTRA 5220	Rynite 530	SKYTRA 5235M	Rynite 935	SKYTRA 5220F	Rynite FR530	SKYTRA 5250F	Rynite FR543
Flame Retardant			N	N	N	N	Y	Y	Y	Y
Glass Fiber %			30%	30%	15%	15%	30%	30%	43%	43%
Mica			0%	0%	20%	20%	0%	0%	0%	0%
Color			BK, NC	BK	BK	BK	BK, NC	BK	BK	BK
Manufacturer			SK Chemicals	Dupont	SK Chemicals	Dupont	SK Chemicals	Dupont	SK Chemicals	Dupont
Classification	Test Method	Unit	Technical Data Sheet							
Physical Properties										
Specific Gravity (Density)	ISO 1183	g/cm3	1.56	1.56	1.58	1.58	1.63	1.68	1.76	1.79
Mold Shrinkage MD (Flow)	ISO 294-4	%	0.2%	0.3%	0.3%	0.2%	0.15%	0.2%	0.2%	0.2%
Mold Shrinkage TD (Cross-Flow)	ISO 294-4	%	0.9%	0.9%	0.8%	0.7%	0.80%	0.8%	0.65%	0.80%
Melt Flow Index (280℃/ 2.16kg)	ISO 1183	g/10 min	>15	-	-	-	0.15~0.80	-	-	-
Outdoor Suitability	UL 746C	-	-	-	-	-	f1	-	-	-
Electrical Properties										
C.T.I. (Comparative Tracking Index)	UL 746A	PLC	-	250	-	-	PLC 2	PLC 2	-	PLC 2
HWI @ 0.7mm	UL 746A	PLC	-	-	-	-	PLC 0	-	-	-
HWI @ 1.5mm	UL 746A	PLC	-	-	-	-	PLC 0	-	-	-
HWI @ 3.0mm	UL 746A	PLC	-	-	-	-	PLC 0	-	-	-
HAI @ 0.7mm	UL 746A	PLC	-	-	-	-	PLC 0	-	-	-
HAI @ 1.5mm	UL 746A	PLC	-	-	-	-	PLC 0	-	-	-
HAI @ 3.0mm	UL 746A	PLC	-	-	-	-	PLC 0	-	-	-
HVTR	UL 746A	PLC	-	-	-	-	PLC 1	-	-	-
Arc Resistance	ASTM D495	PLC	-	-	-	-	PLC 7	-	-	-
Dielectric Strength	ASTM D149	kV/mm	-	32kV/mm	-	-	35kV/mm	39kV/mm	-	-
IPT	ASTM D2303	kv	-	-	-	-	1.5kV	-	-	-
Volume Resistivity	ASTM D257 / IEC 60093	-	-	1.0E+15ohms	-	-	1.0E+14ohms·m	1.0E+13ohms·m	-	-

We care for the future

Healthcare, Earthcare

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