

Ultra-High Heat Resistant Engineering Plastics

SUMIKASUPERTM E101

Wholly
Aromatic
Polyester

Proper Use of SUMIKASUPER E101

The information contained in this document has been prepared based on materials, information and data currently available and is subjected to revision based on new findings.

1. Handling

The followings are listed key points that must be observed when handling SUMIKASUPER E101. Before handling SUMIKASUPER E101, please be sure to read the Safety Data Sheet (SDS), which has been prepared separately. Please note that it is the responsibility of the user to investigate the safety of any additives used in conjunction with SUMIKASUPER E101.

(1) Safety and Health

Ensure to avoid contact with the eyes and skin, as well as the inhalation of gases that are generated when drying and melting SUMIKASUPER E101. In addition, be careful not to directly touch the resin while it is still hot. Local ventilation equipment must be installed and proper protective gear (such as protective goggles and protective gloves) must be worn while drying or melting this product.

(2) Flammability

SUMIKASUPER E101 is a flame-resistant material (classified as UL94 V-0). However, it should be handled and stored in places well away from heat and ignition sources. If the material catches fire, toxic gases may be released. Use water, foam, or fine chemical extinguishers to extinguish any flames.

(3) Disposal

SUMIKASUPER E101 may be disposed by burial or incineration. Burial of the material should be conducted by certified industrial waste processors or by the local municipal authorities in accordance with the Waste Management and Public Cleansing Act. Incineration should be conducted using a furnace which complies with the laws and regulations of the Air Pollution Control Act. Toxic gases may be released when this product is incinerated.

(4) Storage

Store SUMIKASUPER E101 at room temperature away from direct sunlight, water, and humidity.

2. Other

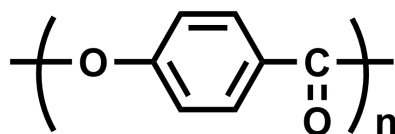
All data in this document is for reference only and is not intended as guarantees on product performance.

Be aware of intellectual property rights when using this product.

Introduction of SUMIKASUPER E101

1. INTRODUCTION

SUMIKASUPER E101 is a kind of whole aromatic polyester with superior ABRASION-RESISTANCE, SELF-LUBRICATION property, CHEMICAL RESISTANCE and HEAT-RESISTANCE.



SUMIKASUPER E101 shows excellent TRIBOLOGICAL PROPERTY while being used together with solid lubricant like polytetrafluoroethylene resin (PTFE / Poly Tetra Fluoro Ethylene) or graphite, providing a high LIMIT PV VALUE and a low FRICTION COEFFICIENT to decrease surface damage for mating material like aluminum.

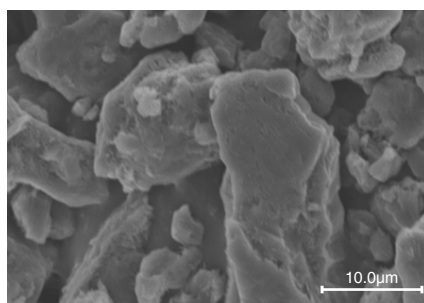
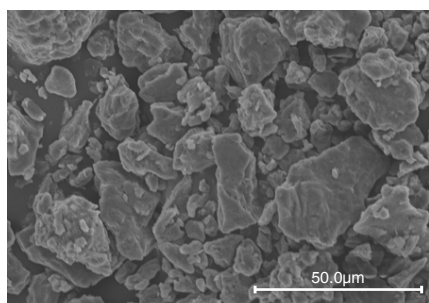
2. PARTICLE SHAPE OF SUMIKASUPER E101-S

Particle size & Bulk Density of E101-S (Please see Table 1)

Table 1. Particle size & Bulk Density of E101-S

		Test Method	Unit	E101-S
Particle Size	Average	JIS Z8815	μm	15
	90μm or higher		%	<1
	45μm or lower		%	83-93
Bulk Density		-	g/cm ³	0.40

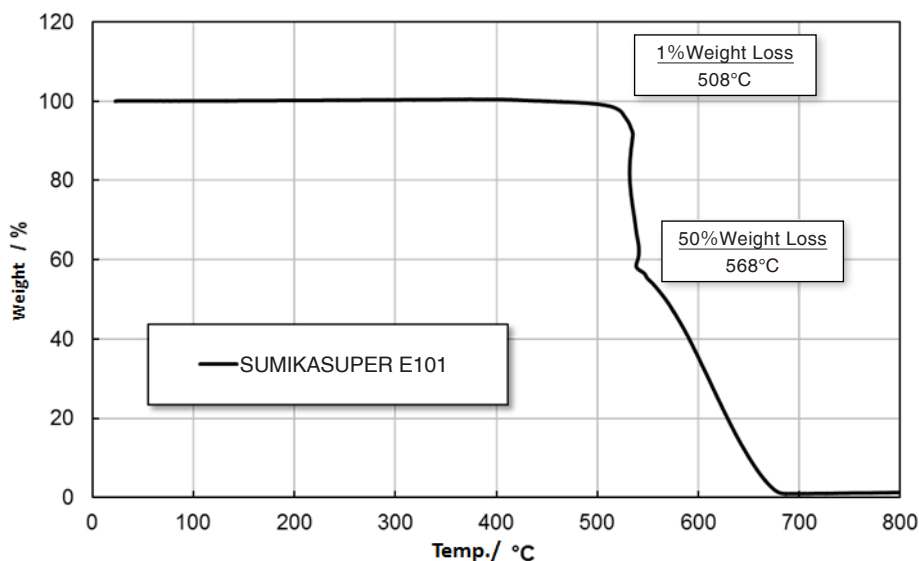
Microscope image of SUMIKASUPER E101-S (Left Pic:×1000, Right Pic:×3000)



3. HEAT-RESISTANT PORPerty for SUMIKASUPER E101

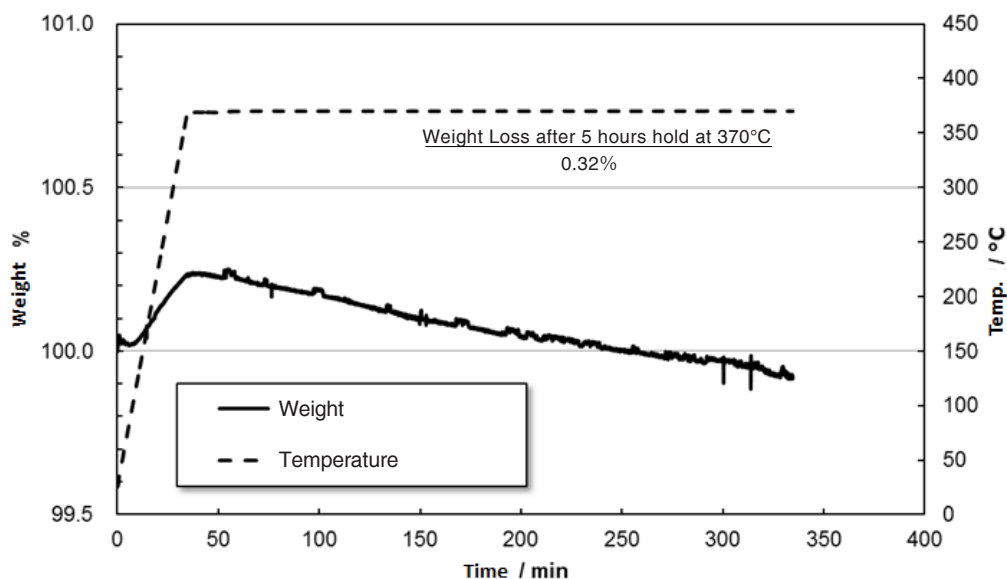
Test result of TGA (Thermal Gravimetric Analysis) for SUMIKASUPER E101

※Test condition: Heat from ambient temperature to 800 °C at 10 °C/min in Air atmosphere



Test result of TGA (Thermal Gravimetric Analysis) @370°C of SUMIKASUPER E101

※Test condition: Heat from ambient temperature to 370 °C at 10 °C/min in Air atmosphere and hold at 370 °C for 5 hours



4. FEATURES OF SLIDING MATERIALS USING SUMIKASUPER E101

(1) TRIBOLOGICAL PROPERTY

- Low and stable friction coefficient
- Very low Wear coefficient, highest LIMIT PV VALUE among all NON-LUBRICATION sliding materials
- Low damage against a surface of soft metal like aluminum and stainless steel (SUS)
- Excellent ABRASION-RESISTANT property even for a long period of time
- Superior WATER-LUBRICANT PROPERTY

(2) HEAT-RESISTANCE

It can be used Continuously at 260°C.

(3) CHEMICAL RESISTANCE

Hardly cause damage by organic solvent or oil even at extremely high temperature.

(4) PROCESSABILITY

Very easy to be shaped by usual metal-cutting machine.

5. PHYSICAL PROPERTY

Physical property of SUMIKASUPER E101/PTFE (Please see table 2)

Table 2. Physical Property

		Unit	E101/PTFE 20/80wt%	E101/PTFE 30/70wt%	GlassFiber/PTFE 25/75wt%	Carbon Fiber/PTFE 25/75wt%
Specific Gravity			1.95	1.84	2.24	1.93
Tensile strength		MPa	17	11	21	18
Tensile elongation		%	290	230	310	70
Compressive strength	0.20% offset	MPa	11	12	9	10
	1% Deformation	MPa	9	9	9	10
	10% Deformation	MPa	18	23	18	8
	25% Deformation	MPa	32	33	30	48
Compressive modulus		MPa	900	1,000	960	1,200
Compression creep strain	23°C, 14MPa, 24hr	%	4.2	2.1	7.7	1.7
	100°C, 7MPa, 24hr	%	1.7	0.5	3.1	1.3

(1) Specific Gravity : Hydrostatic weighing in butanol ϕ 30×50L.

(2) Tensile strength/elongation : Measured with JIS No. 3 dumbbell punched out from ϕ 100 × 1.5 t sheets.

※Tensile speed: 200mm/min

(3) Compressive strength/modulus : Measured with ϕ 10×20L cut out from ϕ 30×50L

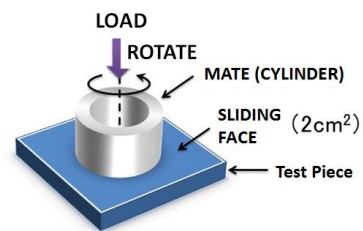
※Compressive speed : 2mm/min

(4) Compression creep strain : Measured with ϕ 7×20L cut out from ϕ 30×50L

※Deformation occurred during 10 seconds - 24 hours.

6. TRIBOLOGICAL PROPERTY

E101/PTFE exhibits much better TRIBOLOGICAL PROPERTY compared to other materials against SUS304, able to keep a very low abrasion coefficient stably. The significant damage caused by E101/PTFE against SUS304 is not observed after long time friction.



Thrust cylinder type
(JIS K7218)

Table 3. TRIBOLOGICAL PROPERTY against SUS304

	Wear coefficient: $K, \text{mm}^3/(\text{N} \cdot \text{km})$	Friction Coefficient: μ	Stability of μ	Wear Degree of SUS304
E101/PTFE 30/70wt%	1.2×10^{-4}	0.20	○	○
PTFE	$6,000 \times 10^{-4}$	0.18	×	○
GF/PTFE 25/75wt%	16.7×10^{-4}	0.29	×	×
Graphite/PTFE 15/85wt%	308×10^{-4}	0.19	○	○
Bronze/PTFE 30/70wt%	17.4×10^{-4}	0.23	×	△
CF/PTFE 25/75wt%	24.3×10^{-4}	0.24	×	△

Pressure P: 0.6 MPa Speed V: 40 m/min Testing time: 7 hours

Table 4. TRIBOLOGICAL PROPERTY against Aluminum

	Wear coefficient: $K, \text{mm}^3/(\text{N} \cdot \text{km})$	Friction Coefficient: μ	Stability of μ	Wear Degree of Aluminum
E101/PTFE 30/70wt%	1.5×10^{-4}	0.21	○	$\leq 0.1\text{mg}$
GF/PTFE 25/75wt%	$2,200 \times 10^{-4}$	0.34	×	67.4mg
CF/PTFE 25/75wt%	$1,200 \times 10^{-4}$	0.23	×	50.7mg

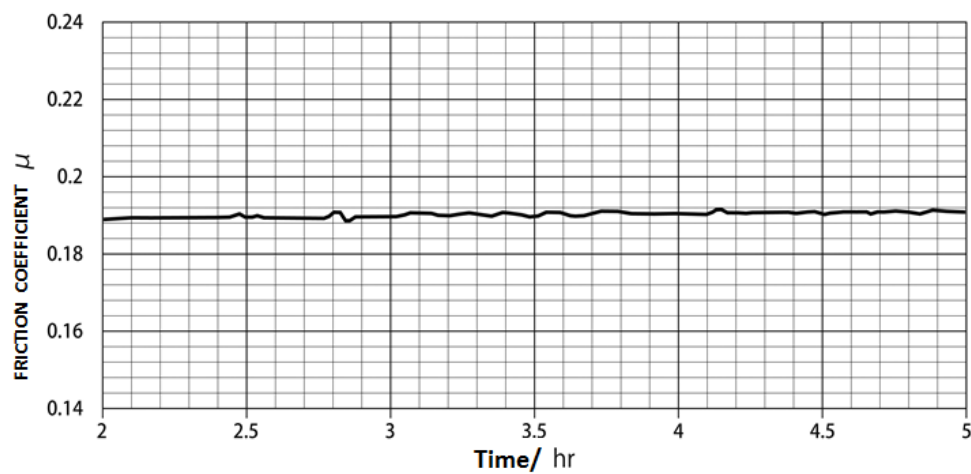
※Pressure P: 1 MPa、Speed V: 40 m/min

※Testing Time: 20 hours for E101/PTFE, 2 hours for other materials

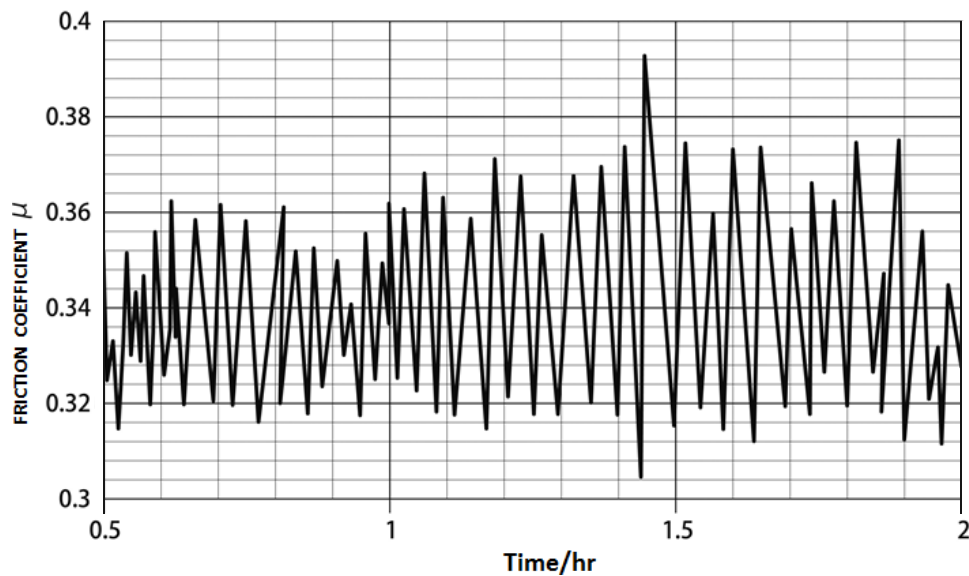
STABLE FRICTION COEFFICIENT

Counter material: Aluminum

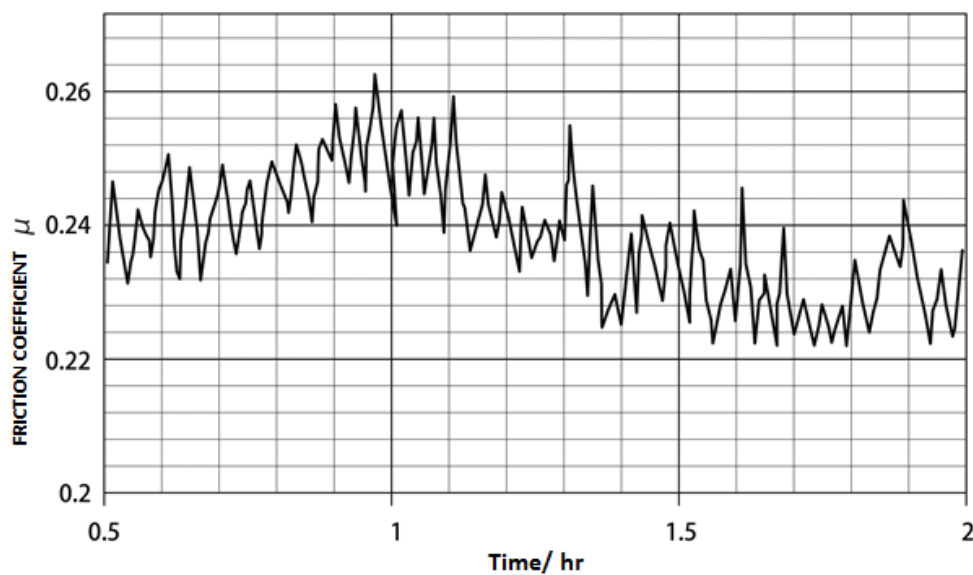
- E101/PTFE=30/70wt%



- Glass Fiber(GF)/PTFE=25/75wt%



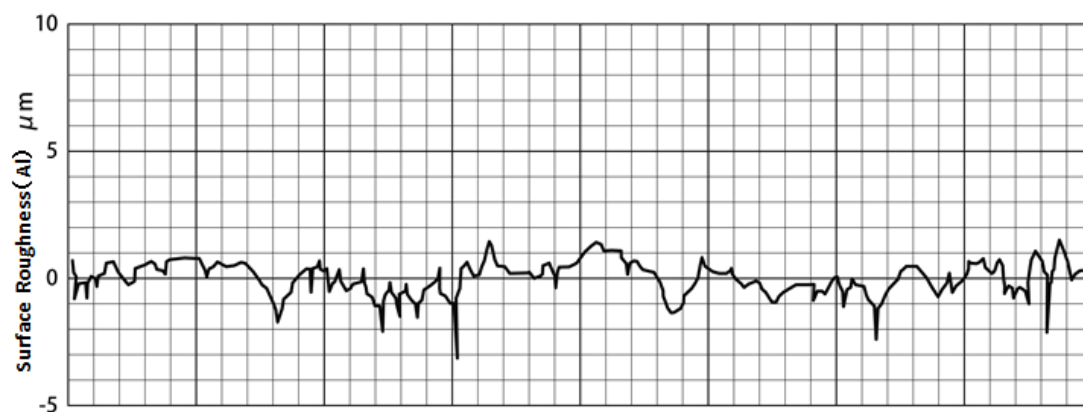
- Carbon Fiber(CF)/PTFE=25/75wt%



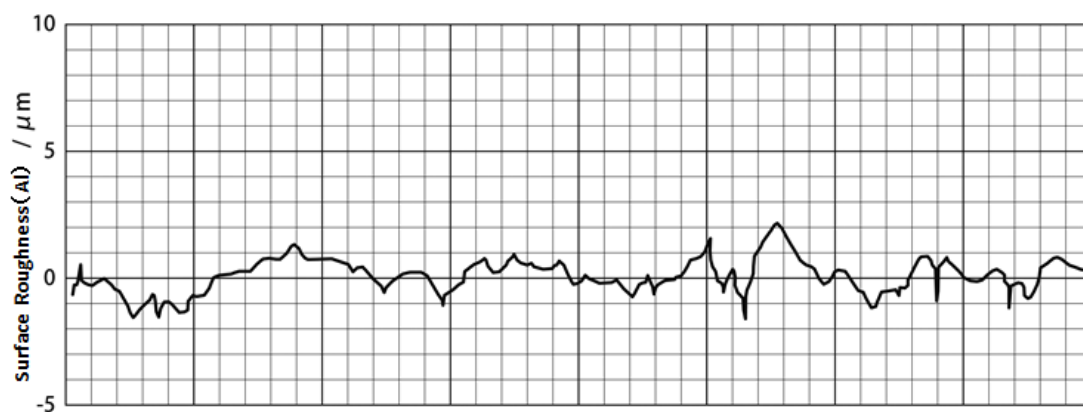
SURFACE DAMAGE OF SOFT METAL (Aluminum)

Surface Roughness of aluminum before test: Ra 0.8 μ m

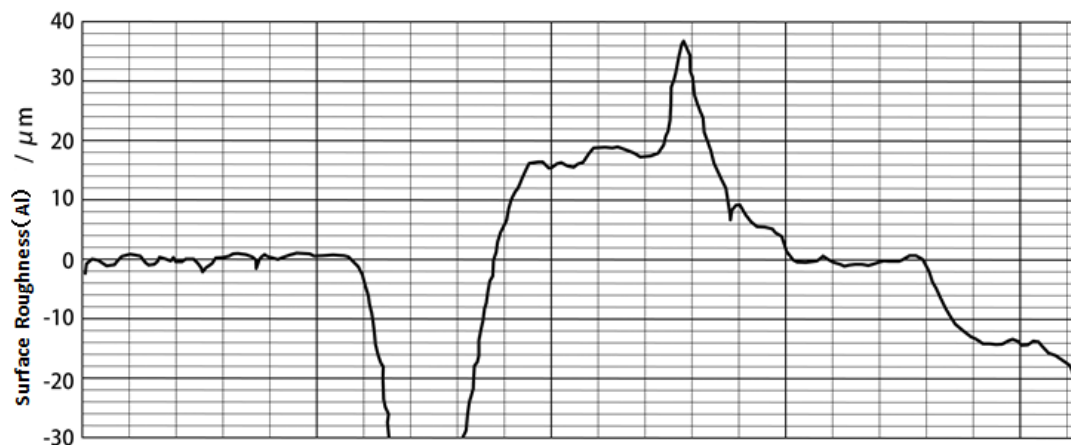
- Surface roughness of aluminum before test



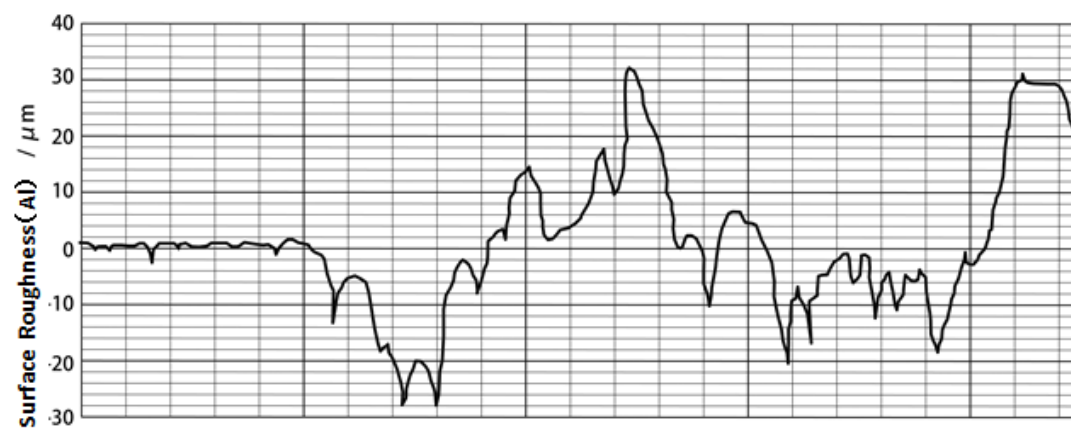
- Surface roughness of aluminum after test with E101/PTFE=30/70wt%



- Surface roughness of aluminum after test with GlassFiber(GF)/PTFE=25/75wt%



- Surface roughness of aluminum after test with Carbon Fiber(CF)/PTFE=25/75wt%



7. THERMAL DEGRADATION RESISTANCE

Table 5 shows the property change of tensile, weight and dimension after the thermal degradation resistance test.

※There is nearly no change in terms of the properties listed below. (Test condition: 260°C×1500 hours)

Table 5. THERMAL DEGRADATION RESISTANCE

		E101/PTFE 20/80wt%	E101/PTFE 30/70wt%
Retention (%)	Tensile strength	97	94
	Tensile elongation	104	95
Weight change (%)		-1.5	-2.3
Dimensional change (%)	MD	-0.05	-0.10
	TD	-0.06	-0.12

8. WATER VAPOR RESISTANCE

Table 6 shows the tensile property change and weight change after the water vapor resistance. (Test condition: 120°C×100 hours)

Table 6. WATER VAPOR RESISTANCE

		E101/PTFE 20/80wt%	E101/PTFE 30/70wt%
Retention (%)	Tensile strength	96	98
	Tensile elongation	94	104
Weight change (%)		+0.16	+0.21

9. GASOLINE RESISTANCE & ENGINE OIL RESISTANCE

Table 7 shows the property change of E101/PTFE after the test in gasoline (Room temperature×1,500 hours) and engine oil (140°C×500 hours)

Table 7. GASOLINE RESISTANCE & ENGINE OIL RESISTANCE

		GASOLINE RESISTANCE		ENGINE OIL RESISTANCE	
		E101/PTFE 20/80wt%	E101/PTFE 30/70wt%	E101/PTFE 20/80wt%	E101/PTFE 30/70wt%
Retention (%)	Tensile strength	98	94	97	91
	Tensile elongation	104	108	105	101
Weight change (%)		+1.06	+0.62	+0.41	+2.02
Dimensional change (%)	MD	+0.55	+0.56	+0.15	+0.40
	TD	+0.47	+0.35	0.00	+0.18

TECHNICAL NOTE

Ultra-High Heat Resistant Engineering Plastics

SUMIKASUPER™ LCP



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