SOLARFAM

SolarFam®

Shingle-Tech Series

LLUMOR
PASIÓN POR LA EFICIENCIA ENERGÉTICA

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◆ Upgraded Efficiency

◆◆

In our Shingle-Tech panels, each sub-string consists of 36~40 connected cut cells in a way that ensures that there is no distance between cells.This innovative technique maximizes the space for cell array and significantly improves the panel' seffiiciency compared to the conventional method.

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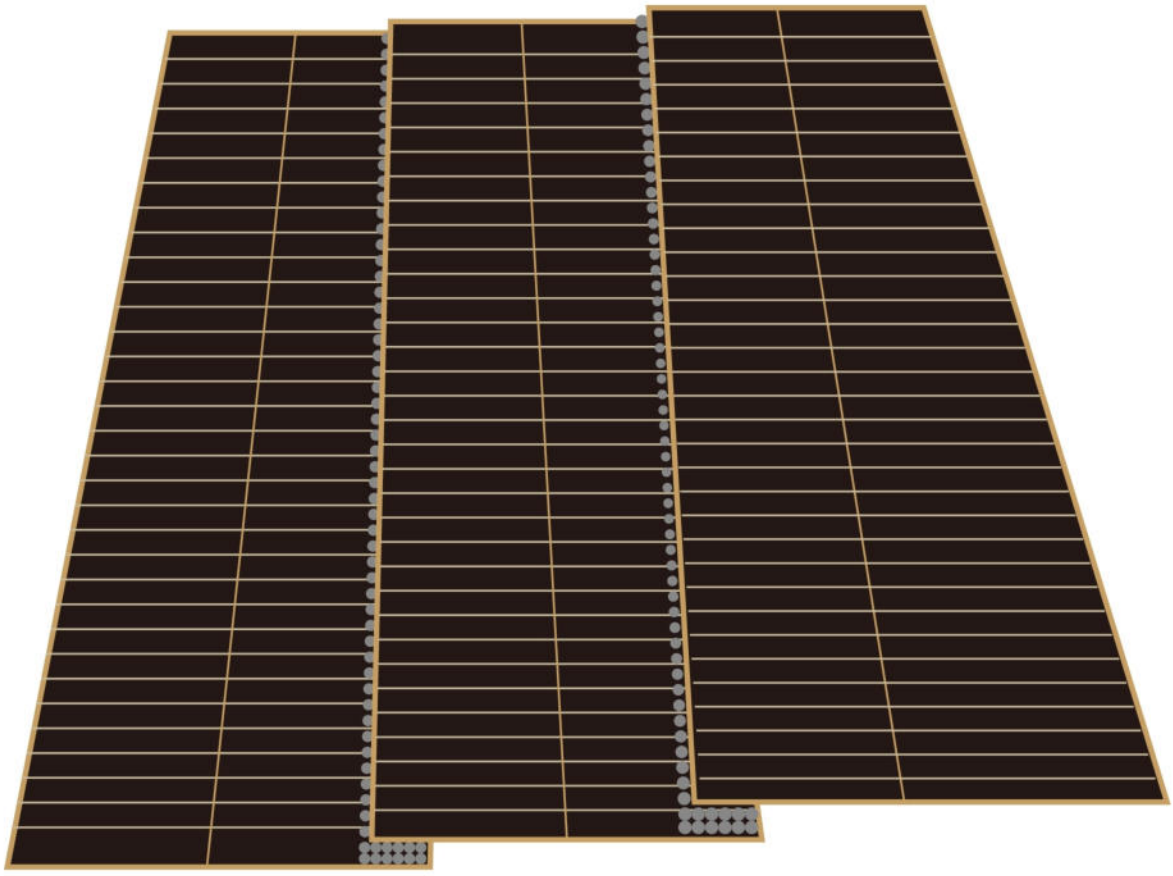
Another significant advantage this connection technique offers is that it provides greater contact and lower resistance between cells. This results in a greatly reduced internal power loss and a higher output.



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Cells are laser-cut in 5 equal parts and connected in series to reduce the current flow. A smaller current means fewer internal power loss. The internal power loss in a 1/5-cut cell is reduced up to 1/25 of that in a whole cell.

Traditional 100W Panel VS Shingle-Tech 100W Panel

efficiency raised by 11.1%

Traditional 150W Panel VS Shingle-Tech 150W Panel

efficiency raised by 20.3%

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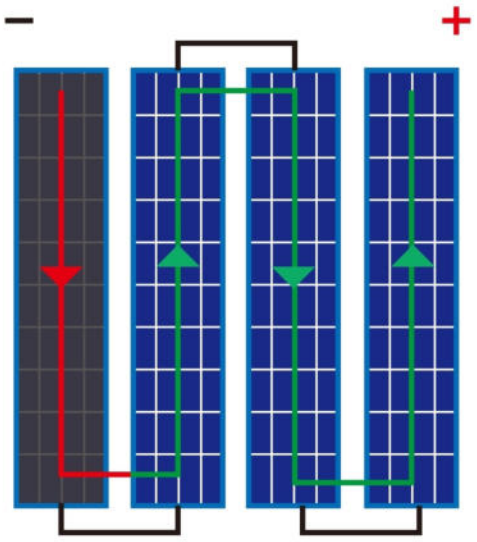
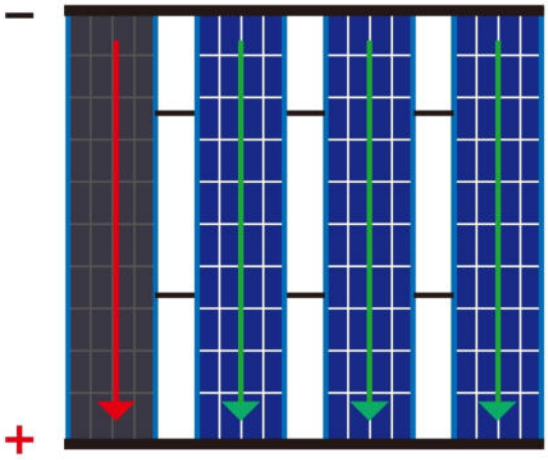
◆Optimized shading performance

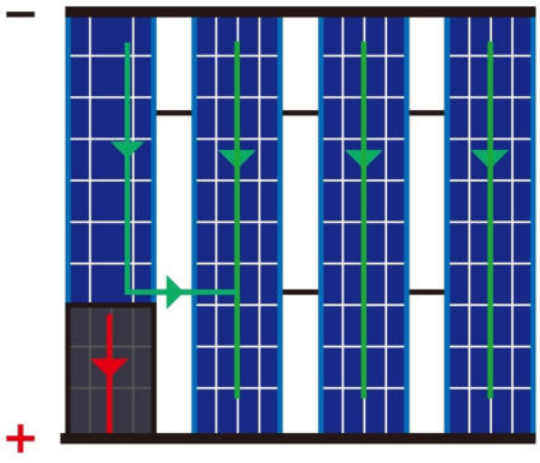


In conventional panels, if part of the panel is shaded or soiled, the panel will lose the output voltage of the affected part.



But in the panels with our Shingle-Tech,each sub-strings are connected in parallel, which means partial shade or soiling won't affect the output voltage of the whole panel.

And if part of the sub-string is shaded or soiled, the energy generated by the rest part of the string will flow through the internal bypass connection to minimize the energy loss.



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◆ Reduced risk and effect of hot-spots.

If there is one shaded or broken cell in a string, it will reduce the current through the good cells, lead to the rise of voltage of the good cells which will reverses the bias of the bad cell. In this case, the bad cell will consume the energy generated accompanied by the rise of self-temperature which is also called hot-spot.

The hot-spots accelerate the material degradation in the area affected by the high temperature which can result in permanent efficiency decrease. In extreme cases, hot-spots can lead to burning.

In our shingle-tech solar panels, when part of the string gets shaded or soiled, energy generated by the unaffected part will flow through the internal by-pass connection into the other strings to avoid the negative effect caused by the shaded or soiled part of the string.

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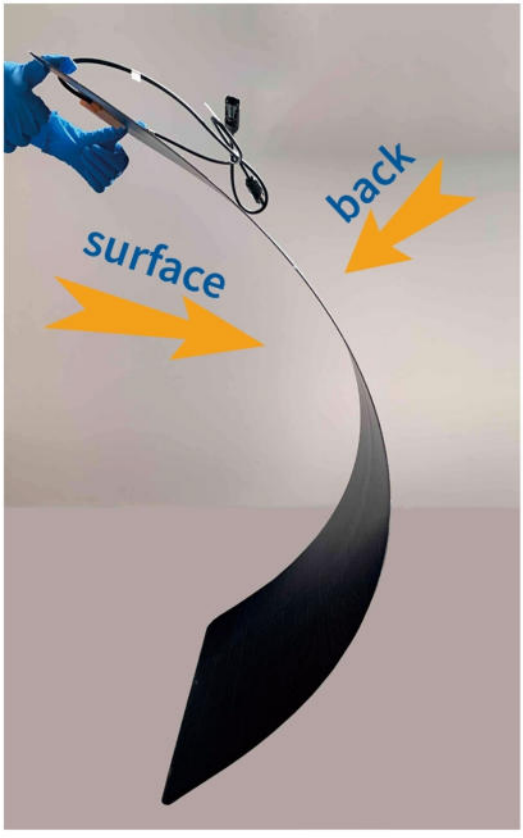
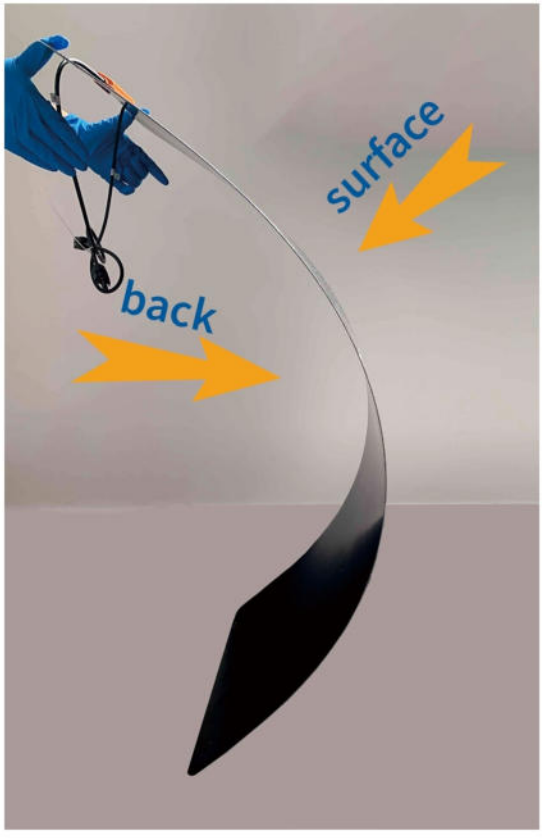
◆Unprecedented flexibility

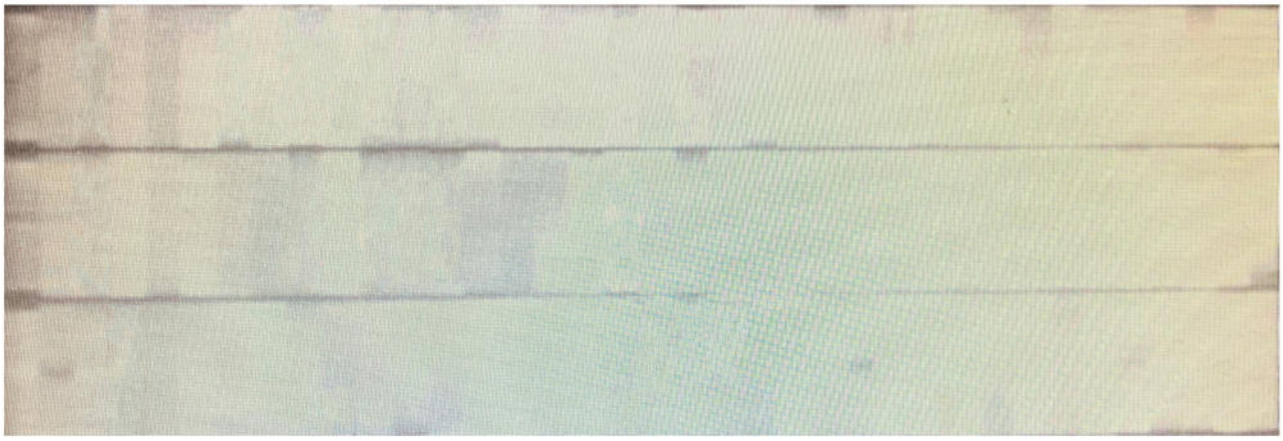
Due to the special connection method, our panels have unprecedented flexibility. It can be bended inward or outward by an angle of 30 degree with very little degradation.

To verify the flexibility of the Shingle-tech panel,we took a random sample with shingle-tech and bended it to a degree like the picture showed.





After 600 times of bending inward and outward, the output power loss is about 2.86% (from 140W to 136W) and according to the EL Testing graph, no cell got broken after bending.



Power Output 140W (before bending)

Power Output 136W (after 600 times of bending inward and outward)

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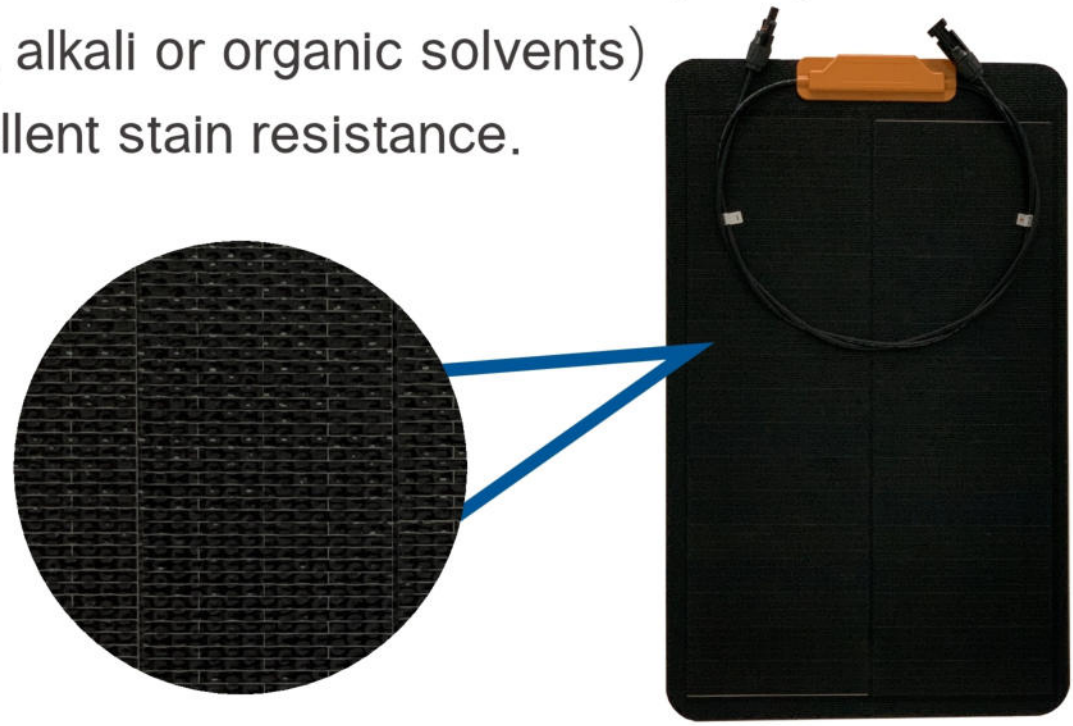
◆Extraordinary Surface Material -ECTFE (flexible panels)

- Supplied by Denka Company Limited from Japan.
- Excellent heat resistance: melting point 242℃
- Excellent transparency:total light transmittance 95%/μm better than common glass
- Excellent flame retardancy and prevention of fire spreading(flame retardancy level: corresponding to UL94 VTM-0/50μm, limiting oxgen index: 60%, FM4910 approved material)
- Excellent tensile strength;
- Low specific gravity(1.68g/cm3)
- Low water absorption rate(2.4g/ m3*day)
- Excellent chemical resistance(rarely attacked by acid, alkali or organic solvents)
- Excellent stain resistance.



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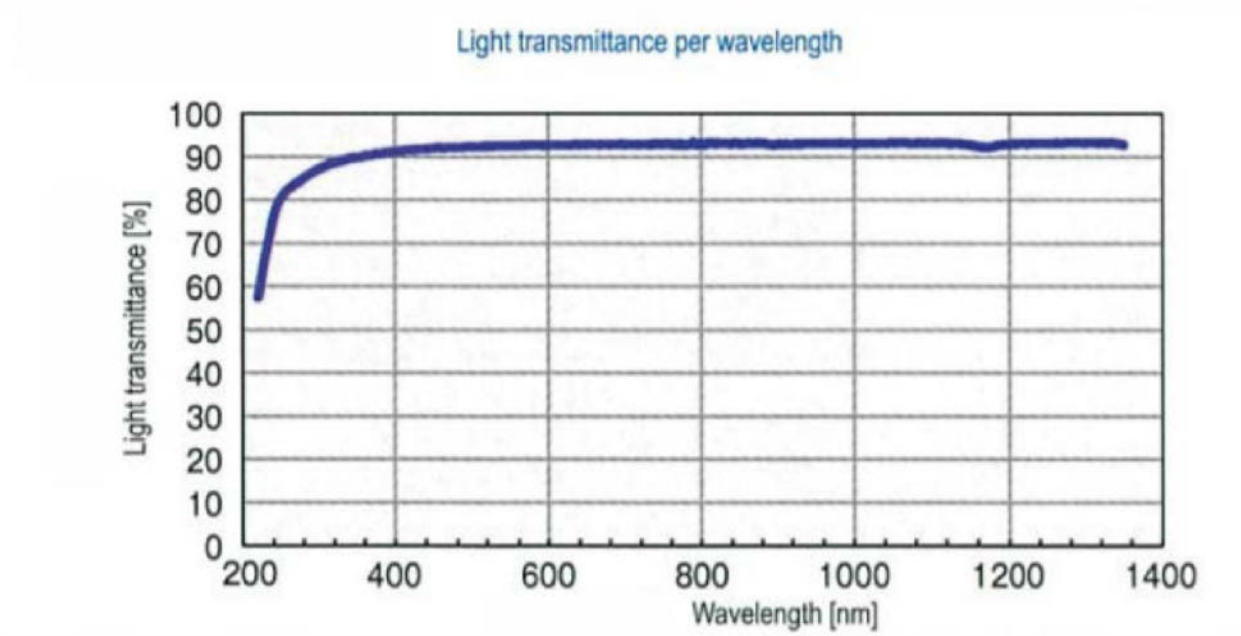
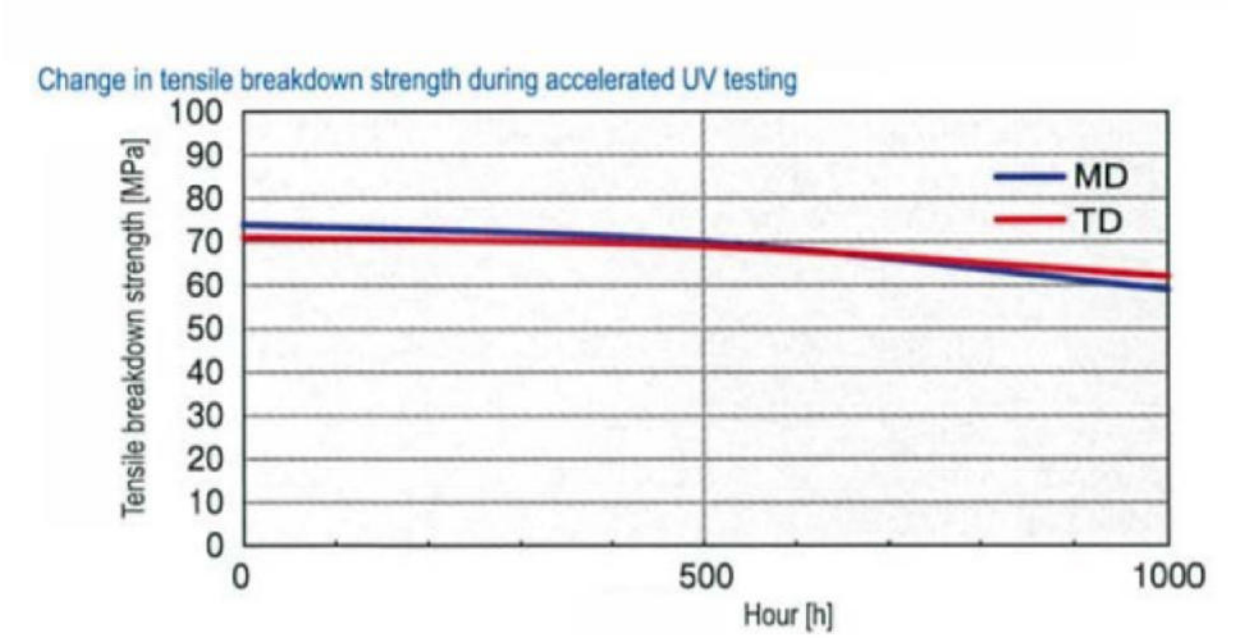
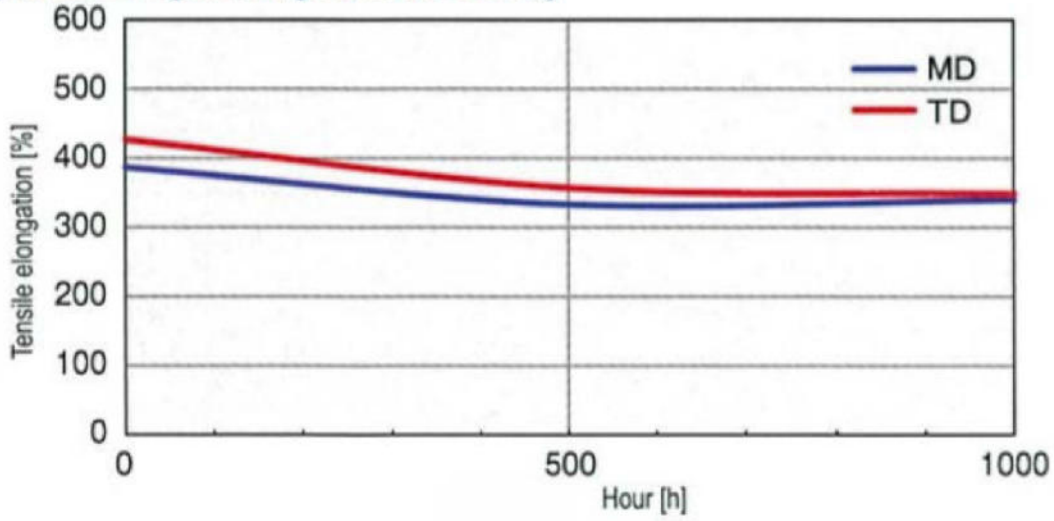
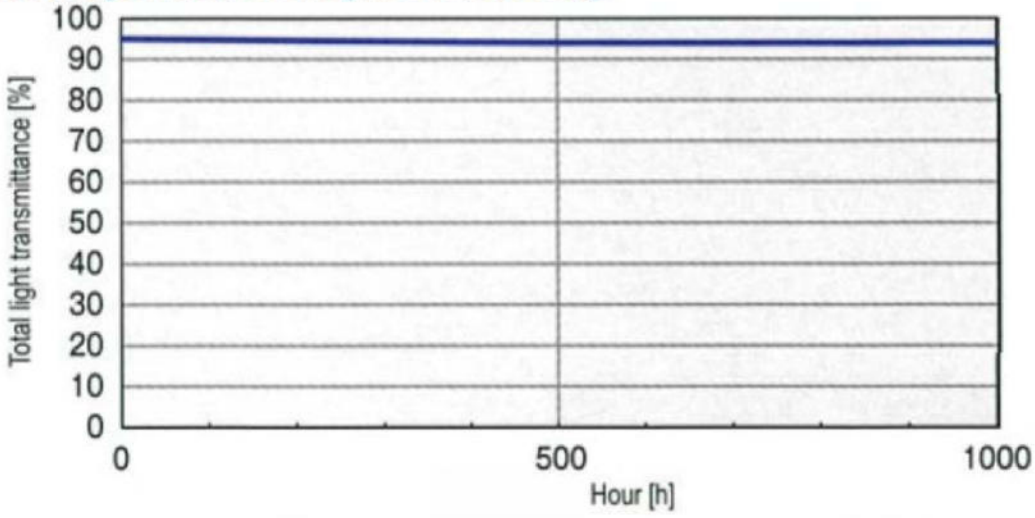

Light transmittance per wavelength
Light transmittance [%]
100
90
80
70
60
50
40
30
20
10
0
200
400
600
800
1000
1200
1400
Wavelength [nm]


Change in tensile breakdown strength during accelerated UV testing
Tensile breakdown strength [MPa]
100
90
80
70
60
50
40
30
20
10
0
MD
TD
0
500
1000
Hour [h]

Change in tensile elongation during accelerated UV testing



Change in total light transmittance during accelerated UV testing



※ Environmental testing equipment: Xenon weather meter Irradiation intensity: 80W/m² Black panel temperature: 85℃ Humidity: 50% RH Drying for 102 minutes & water spraying for 18 minutes

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Material Property	Item	Unit	TEFKA ECTFE	Other Film ETFE
Specific	Gravity	—	1.68	1.73
	Film Thickness	μm	50	50
Tesile Strength ASTM D-256	Tensile Modulus of Elasticity (MD/TD)	Mpa	950/950	570/570
	Breaking Strength (MD/TD)	Mpa	70/70	60/60
	Tensile Elongation (MD/TD)	%	420/420	450/500
Heat Resistant	Melting Point	℃	242	260
	Ball Presure Temprature	℃	180	185
	Flame Retardance (UL94)	—	VTM-0	VTM-0
	Grilled Retardance (FM4910)	—	○	-
	Limiting Oxygen Index	%	60	32
Optic Property	Total Light Transmittance	%	95	94
	HAZE	&	2	2
Electrical Property	Volume Resistivity (23℃/50%RH)	Ω · cm	＞10^15	＞10^15
	Dielectric Breakdown Voltage (3.2mm Thickness)	kV/mm	20	16
Durability	Water Vapor Permeability (40℃/90RH)	$g/m^2 \cdot day$	2.39	9.32
	Water Absorption (24h)	%	0.01	0.03