



**Dr. HANS WERNER®
CHEMIKALIEN**

'Solar Encapsulates EVA, POE, EPE Films'

Dr. HANS WERNER CHEMIKALIEN®

TPO (Thermoplastic Polyolefin) Film For Encapsulating of Perovskite on Silicon Tandem Solar Cells PV Panels

TP46X GRADE

PRODUCT SPECIFICATION



Shorter Lamination Time



Excellent Transparency



Strong Anti PID Ability



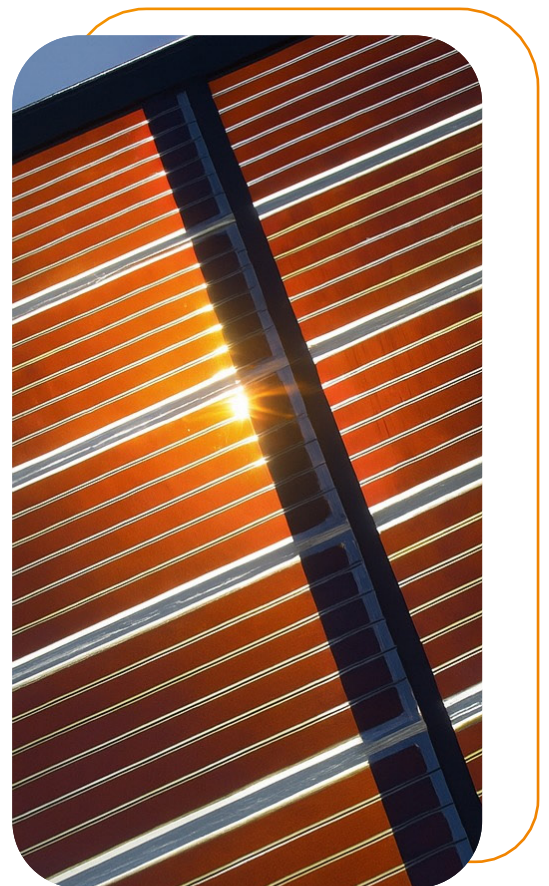
Non-crosslinkable Encapsulate



Low Water Vapor Rate



**Excellent Weatherability and
Long Term Reliability**



**info@dr-hwc.com
www.dr-hwc.com**

Technical Specification (Dr. HWC-TP46X Grade)

Properties	Unit	Test Method	Value TP46X
Total Thickness (Tolerance: $\pm 0.05\%$)	mm	DR. HWC method	0.40 ~ 0.90
Total Width	mm	Scale	Up to 1300
Thermal Shrinkage (MD)	%	On solar glass (3 min, 125°C)	≤ 2
Thermal Shrinkage (TD)	%	On solar glass (3 min, 125°C)	≤ 3
Melting Range	°C	DR. HWC method	80°C ~ 120°C
Adhesion to Glass	N/cm	ASTM D 903	≥ 60
Optical Transmittance (380nm-1100nm)	%	ASTM E424	≥ 88
UV Cut-off Wave Length	nm	DR. HWC method	340-360
Volume Resistivity (Cured)	$\Omega \cdot \text{cm}$	ASTM D 257	$\geq 1 \cdot 10^{15}$
Water Vapor Transmission Rate	g/m ² /24h	ASTM F1249	≤ 5

Lamination Recipe

Lamination Parameters	Unit	First Chamber	Second Chamber
Temperature	°C	120	120
Vaccum Time	min	4 - 5	4 - 5
Lamination Time	min	9 - 14	9 - 14
Pressure	kPa	-70 l -50 l -25	-70 l -50 l -25

Note 1: Customers can adjust to appropriate lamination parameters according to different equipment or process.

Note 2: It is recommended to use it up within 48 hours after opening of the original packing.

Note 3: These are typical laboratory values that may change depending on the cure conditions as well as the test conditions and methods.



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