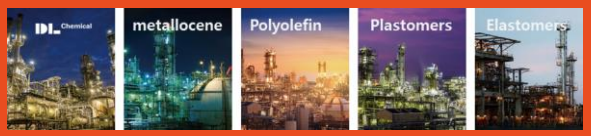
D.XPOLY

DL Chemical

Photovoltaic Encapsulant Solution

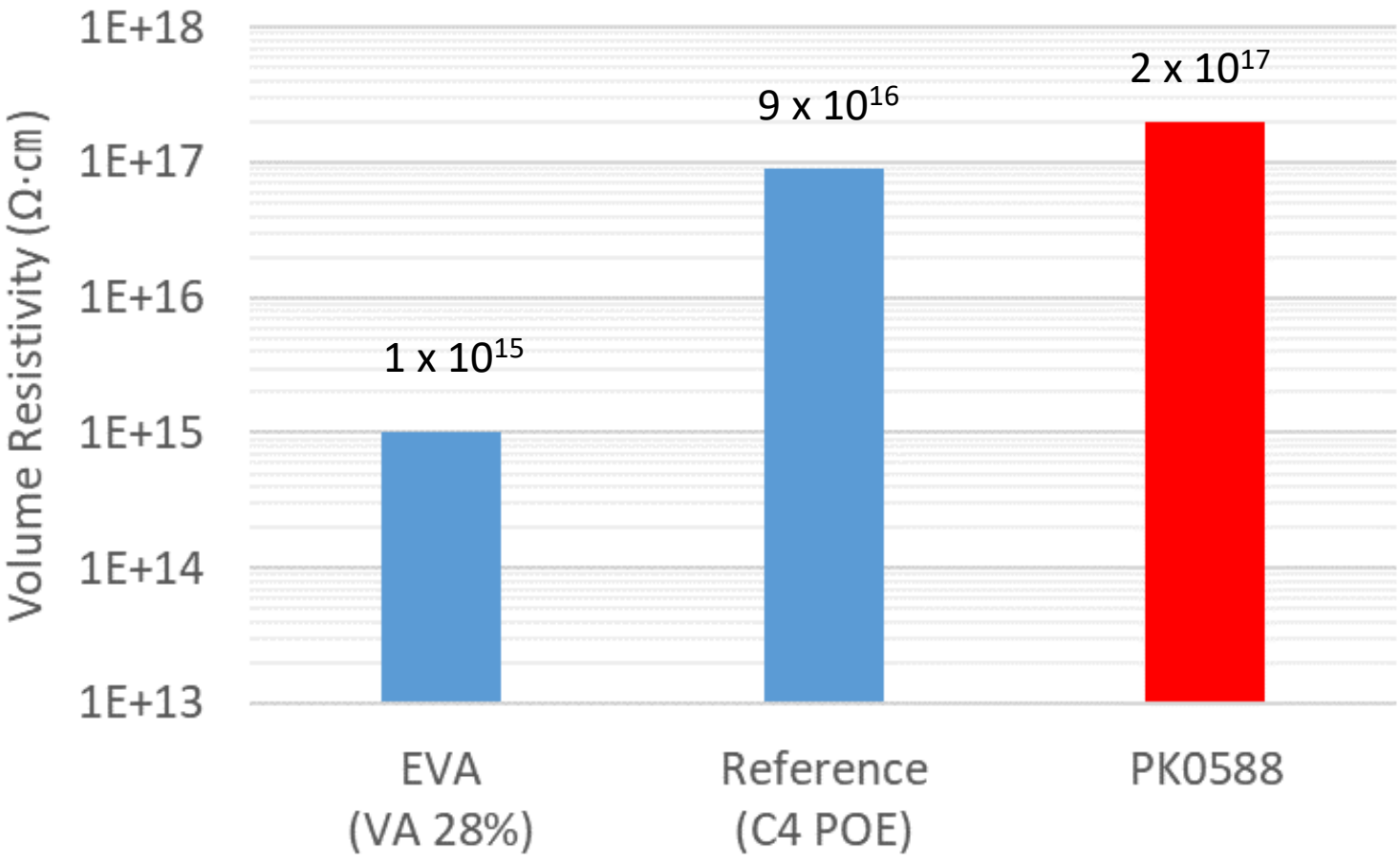
DL Chemical

www.dlchemical.co.kr



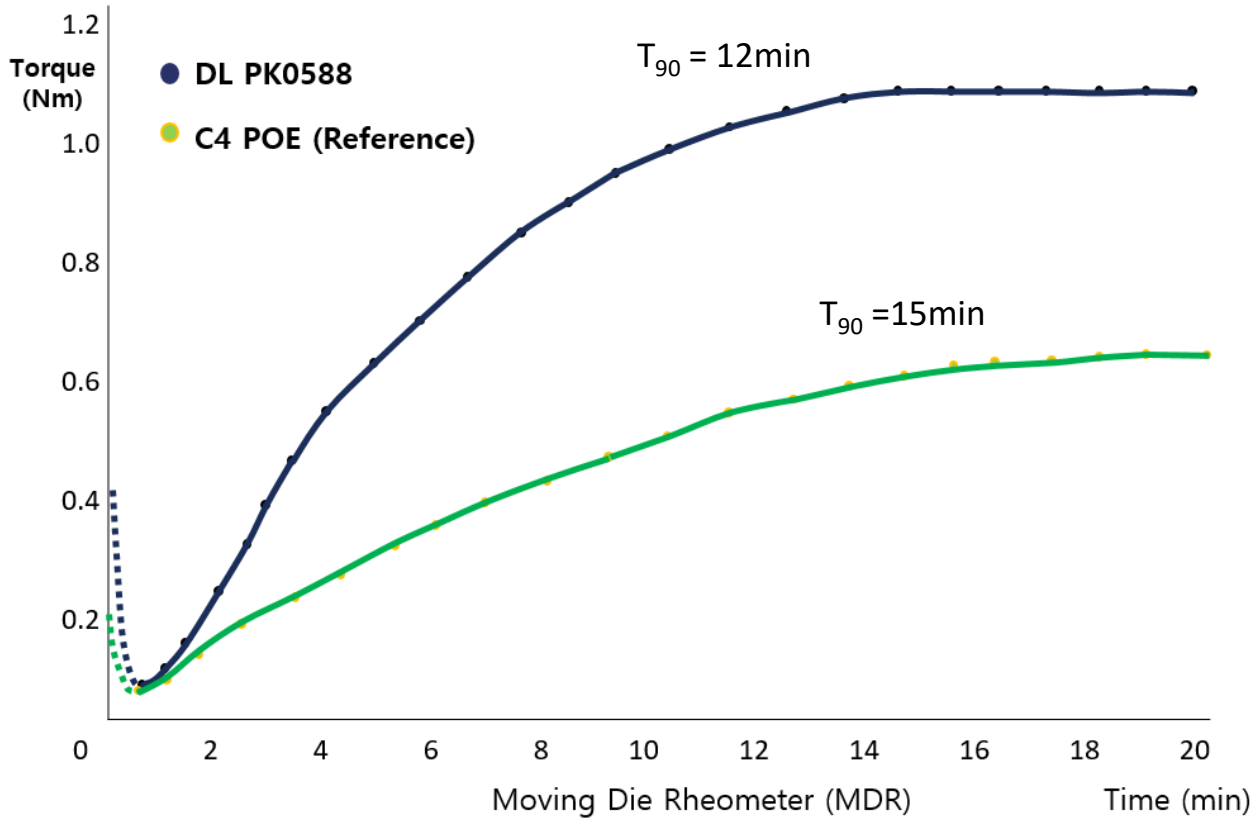
Excellent Volume Resistivity

- **Test Agency :** Korea Polymer Testing & Research Institute, Ltd. (Koptri)
- **Test Specimen :** 2 mm press sheet
- **Test Result : Better volume resistivity compared to EVA and POE → Low power loss compared to EVA and POE**



Excellent Crosslinking Performance

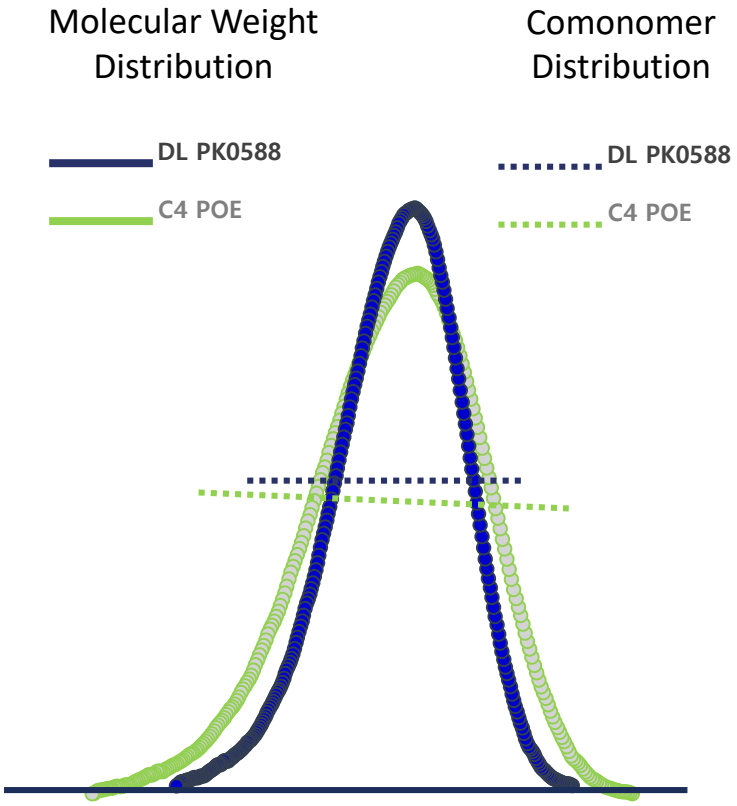
- **Test Condition :** Kneading (90℃, 10min), Press (150℃, 15min), MDR (150℃, 20min)
- **Reference Recipe :** C4 POE + Crosslinking agent 1phr + coagent 0.5phr
- **Test Recipe :** DL PK0588 + Crosslinking agent 1phr + coagent 0.5phr
- **Test Result : Excellent crosslinking rate → Improvement of PV module productivity compared to other POE**



Narrow MWD Material

PK0588 has narrow molecular weight distribution (MWD) and homogeneous comonomer distribution. This results in better crosslinking rate and volume resistivity.

	DL PK0588	C4 POE
Process	Gas Phase	Solution
Catalyst	Metallocene	Metallocene
Molecular Weight Distribution	Narrow	Broad
Low Molecular Weight Portion	Low	Reference
Comonomer	C4	C4



Well-Balanced Material

1) Excellent Crosslinking Rate

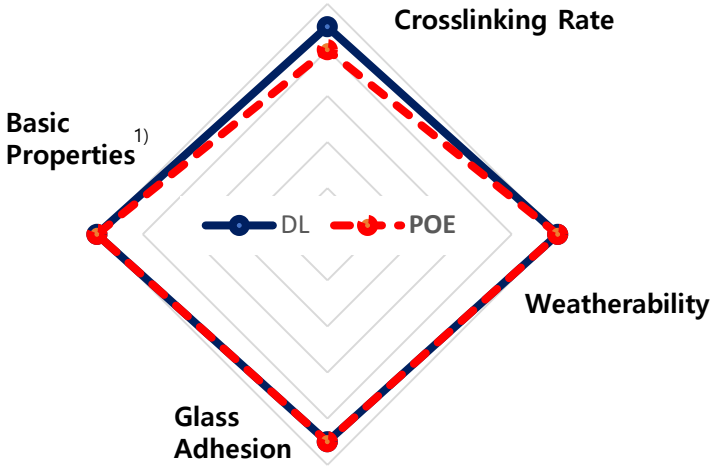
PK0588 shows a better crosslinking rate than counterparts of competitors.
→ Improvement of PV module productivity compared to other POE

2) Excellent Volume Resistivity

PK0588 has an excellent volume resistivity.
→ Increase in PV efficiency by low PID (Potential-Induced Degradation)

3) Good Weatherability / Glass Adhesion / WVTR

PK0588 has good weatherability, glass adhesion, and WVTR characteristics for PV encapsulant.



Properties			Reference (C4 POE)	PK0588
Crosslinking Rate (Gel Content)		%	70%	80%
Basic Properties	Transmittance (380~1,100 nm)	%	91	91
	WVTR	g/㎡ 24h	<5	<5
	Volume Resistivity	Ω·㎝	$9*10^{16}$	$2*10^{17}$
Glass Adhesion		gf	>200	>200
Weatherability (85℃ / 85%Rh / 40days)		△YI	<3	<3

1) Basic Properties : Transmittance, Volume Resistivity, WVTR

Low CO_2 Emission

PK0588 is produced by Gas Phase Reactor Process without solvent and then has low CO_2 emission by reducing energy intensity. It is the best product for carbon neutrality.

Process (Feed)			PK0588	A Company
			Gas Phase (C2-,1-Butene)	Solution (C2-,1-Octene)
Basic unit	Electricity	KW/MT	674	355
	Steam	MT/MT	0.19	2.2
CO_2 emission[2)]		**ton-CO_2/MT**	**0.343**	**0.544**
Residual Hydrocarbon		ppm	14	34

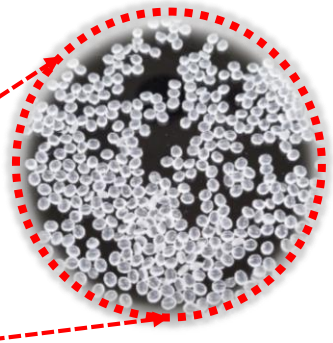
1) Source : SRI and Nexant Technical Report
2) CO2 Conversion Factor: Electricity 0.0004594 tCO2-eq/kw, LP/MP Steam 0.1736 tCO2-eq/MT, HP Steam 0.1874 tCO2-eq/MT

No Caking Problem

PK0588 has higher density and less low molecular weight portion compared to other POE.

There is no caking problem caused by sticking of raw materials during transit or storage.

It is stored in open space by loading it in two layers in a container for **72 days**.
(Outside temperature : 20~35℃)



Disassembly of bottom loaded bag.
PK0588 exists in pellet form without caking

PK0588 Photovoltaic Encapsulant TDS

Description

Characteristics	▪ Excellent Crosslinking Rate ▪ Excellent Volume Resistivity ▪ Good Weatherability and Glass Adhesion ▪ Good Transmittance and WVTR
Application	▪ Photovoltaic Module Encapsulant
Specification	▪ FDA 21 CFR 177.1520

Properties

Basic Properties	Unit	Test Method	PK0588
Density	g/㎤	ASTM D1505	0.885
Melt Index (190℃, 2.16kg)	g/10min	ASTM D1238	5.0
Vicat Softening Temperature	℃	ASTM D1525	52
Molecular Weight (M_W)	g/mol	DL Method	82,000
Melting Temperature	℃	ASTM D3418	63
Glass Transition Temperature	℃	DL Method	- 44
Additives[1)]	-	-	AO
Sheet[2)] Properties	Unit	Test Method	PK0588
Tensile Strength at Break	MPa	ASTM D638	15
Elongation at Break	%	ASTM D638	>1,000
Flexural Modulus	MPa	ASTM D790	31
Hardness (Shore A)	-	ASTM D2240	76

1) Additives : AO (Antioxidant) 2) Compression Molding Sheet data
These are typical properties only and are not to be construed as specifications.