Technical Information

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Kalrez® perfluoroelastomer parts

From DuPont Performance Elastomers

Introducing Kalrez® Perfluoroelastomer Parts For Photovoltaic Manufacturing Processes

Increase Uptime ...
Increase Throughput ...
Lower Cost of Ownership ...

As the demand for photovoltaic systems continues to rise, manufacturers must find ways to increase uptime and improve output. Frequently, more aggressive and efficient chemicals, and/or higher temperatures are employed to increase throughput; thereby, putting more strain on the manufacturing infrastructure. Unplanned maintenance due to incompatible sealing materials can interfere with production schedules causing downtime. As a result, sealing materials in either wafer-based or thin film processes should have broad chemical compatibility and excellent thermal stability.

Kalrez® perfluoroelastomer parts have been field proven in highly aggressive sealing environments for more than 30 years. Kalrez® parts can help improve sealing reliability in photovoltaic processes that use high heat, aggressive chemicals and plasma. Kalrez® seals resist over 1,800 chemicals including reactive gases and plasmas, alkalis, acids and solvents. Even in contact with these corrosive chemicals, Kalrez ® seals retain their elastomeric properties at temperatures as high as 325°C. On page 2 are the suggested Kalrez® products for use in the different photovoltaic manufacturing processes and also for poly-silicon feedstock production and abatement systems.

Photovoltaic Product Selector Guide

Surface Texturing	Doping	Edge Isolation	P Silicate Removal	ARC Coating	Metallization	Testing Sorting
Kalrez® PV8030	Kalrez® PV8070	Kalrez® PV8050	Kalrez® PV8030	Kalrez® PV8050	Kalrez® PV8070	

Process Type	Typical Process Environment	Suggested Kalrez® Product
Surface Texturing	HF, HNO_3, Hot Concentrated KOH, IPA	PV8030
Doping	850-900°C, $POCl_3$, In-Situ Cl2Cleaning	PV8070
Edge Isolation	CF_4/O_2 Plasma	PV8050
P Silicate Removal	HF, HNO3, etc.	PV8030
ARC Coating (Batch Process)	SiH_4, NH_3 Plasma, In-Situ NF_3 Plasma Cleaning	PV8050
Metallization	Annealing/Firing Process	PV8070

Back Contact	Patterning Laser Scribing	Cell Layer Deposition See Below For Product	Patterning Laser Scribing	TCO Deposition Kalrez® PV8050	Patterning Laser Scribing	Testing

* Note - The order of the process steps can be different depending upon the module construction sequence.

Process Type	Typical Process Environment	Suggested Kalrez® Product
Cell Layer Deposition/Absorber		
• Amorphous/Micro-Crystalline Silicon	SiH_4, H_2 Plasma, Remote NF_3 Plasma Cleaning	9100
• CIS/CIGS	Cu (In, Ga), Sputtering	PV8050
	500-550°C, H_2Se, H_2S	PV8070
• Cadmium Telluride	Congruent Sublimation	PV8050
TCO Deposition/Front Contact	ZnO, Sputtering	PV8050

Other Process Types	Typical Process Environment	Suggested Kalrez® Product
Poly-Silicon Feedstock Production	TCS Deposition (1100°C, $SiCl_4$, HCl, H_2)	PV8050
Abatement Systems ("Wet" Scrubbers)	Strong Acids/Bases	PV8030

Suggested Products For Photovoltaic Use

Kalrez® PV8030
Kalrez® PV8030 is a black product for surface texturing, P silicate removal and "wet" scrubber processes. This product exhibits excellent resistance to aggressive chemicals including strong acids, bases and amines. It offers low extractables along with excellent compression set properties and is well suited for both static and dynamic sealing applications. A maximum continuous service temperature of 275°C is suggested.

Kalrez® PV8050
Kalrez® PV8050 is a white product for edge isolation, metallization and TCS deposition processes. This product exhibits excellent resistance to oxygen and fluorine-based plasmas. It offers excellent vacuum and long-term sealing performance, good mechanical strength properties and is well suited for both static and select dynamic sealing applications. A maximum continuous service temperature of 300°C is suggested.

Kalrez® PV8070
Kalrez® PV8070 is a black product for doping, arc coating and CIS and CIGS cell layer deposition processes. This product exhibits excellent thermal stability, compression set and low outgassing properties and is well suited for both static and dynamic sealing applications. A maximum continuous service temperature of 325°C is suggested. Short excursion to higher temperatures may also be possible.

Kalrez® 9100
Kalrez® 9100 is an amber translucent product for amorphous/microcrystalline silicon cell layer deposition processes. This product exhibits low erosion and ultra-low particle generation in aggressive plasma environments. It offers excellent thermal stability along with low outgassing properties and is well suited for both static and dynamic sealing applications. A maximum continuous service temperature of 300°C is suggested.

Photovoltaic Product Information

Typical Physical Properties[1]

Product	Color	Hardness[2] Shore M (O-ring)	Maximum Continuous Service Temperature[3], °C	Compression Set, 70 Hrs. @ 204°C, %
Kalrez® PV8030	Black	83	275	25[4]
Kalrez® PV8050	White	72	300	29[4]
Kalrez® PV8070	Black	83	325	14[5]
Kalrez® 9100	Amber Translucent	74	300	17[5]

[1] Not to be used for specification purposes

[2] ASTM D2240 & D1414 (AS568 K214 O-ring test specimens)

[3] DuPont Performance Elastomers proprietary test method

[4] ASTM D395B (pellet test specimens)

[5] ASTM D395B & D1414 (AS568 K214 O-ring test specimens)

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