



DuPont™ Kalrez® Perfluoroelastomer Parts

FPD Product Selector Guide

Technical Information – February, 2018

	Process type	Typical Seal Temperature	Typical Process Environment	Suggested products	Comment	Typical Applications
 Plasma Processes	a-Si/ Poly-Si/ Dielectric Etching	70-200 deg.C	Cl ₂ , O ₂ , SF ₆ , SO ₂ , NF ₃ , BCl ₃ , C ₂ H ₅ F, H ₂ , CHF ₃ , Ar	Kalrez® 7075 9300	Kalrez® 7075 - Good mechanical properties and excellent resistance to plasma radicals Kalrez® 9300 – Excellent resistance to plasma ions and radicals	<u>Dynamic:</u> - Slit Valve - Gate Valve - APC ¹ Valve - Cut Off Valve <u>Static:</u> - Chamber Lid - Upper Electro Node - Shield Ring - Gas Tube/ Nozzle - RPSC ² In & Out - Central Support Diffuser - View Port - NW ring <u>Other:</u> - End Effector Pad
	Metal Etching	50 - 160 deg.C	Cl ₂ , SF ₆ , O ₂ , C ₂ H ₅ F, BCl ₃ , CF ₄			
	PE-CVD	150 – 200 deg.C	SiH ₄ , NH ₃ , PH ₃ , N ₂ , NF ₃ , Ar, Ph ₃ , H ₂ , N ₂ O	Kalrez® 9100 8085 8900	Kalrez® 8085 - Good resistance to plasma ions and radicals Kalrez® 8900 – Excellent mechanical properties and good resistance to plasma radicals	
	PVD	80 - 120 deg.C	Ar	Kalrez® 6190 8900		
 Wet Processes	Etching	R.T. – 40 deg.C	H ₃ PO ₃ , HNO ₃ , CH ₃ COOH, NaOH	Kalrez® 6375UP W240UP	Kalrez® 6375UP – General purpose product for all wet process applications Kalrez® W240UP - General purpose product for for high volume wet applications	Transfer Roller Nozzle Wiper Piping connection Valve Filter
	Photo Resist Stripper		Monoethanol amine (MEA)			
	Coater Developer		TMAH, Photo Resists			
	Cleaning		SC-1, SC-2, Alkaline, HF			

1) Automatic Pressure Control system
2) Remote Plasma Source Gas Inlet & Outlet

Suggested Compound for Typical Applications

Process type	Suggested compound	Dynamic		Static				End effector pad
		Slit valve, Gate valve	APC, Cut off valve	Chamber seal (S&J O-ring)	Upper electro node	Gas tube, RPSC In&Out	Central Support Diffuser	
Etching	Kalrez® 7075	✓	✓	✓				
	Kalrez® 9300				✓			
PE-CVD	Kalrez® 9100	✓*	✓	✓		✓	✓**	✓
	Kalrez® 8085	✓*			✓			
	Kalrez® 8900						✓**	
PVD	Kalrez® 6190							✓**
	Kalrez® 8900							✓**

*) 1st choice is Kalrez® 8085. 2nd choice is Kalrez® 9100LS

***) Kalrez® 8900 for high temp.

DuPont™ Kalrez® Parts for the FPD manufacturing processes

DuPont™ Kalrez® perfluoroelastomer parts have been used successfully in highly aggressive sealing environments for over 30 years. Kalrez® parts have excellent chemical and thermal stability and have been specially formulated and processed to meet the unique requirements of array and color filter processing environments. DuPont offers molded O-rings and custom seals using a series of specialty products and ultrapure processing for the Flat Panel Display industry. Ultrapure processing is standard for all FPD product grades except for Kalrez® 6375UP and W240UP.

Typical Physical Properties¹

Products	Color	Hardness Shore A (pellet) ²	Hardness Shore M (O-ring) ³	Maximum Application Temp ⁴ , °C	100% Modulus ⁵ , MPa	Compression Set ⁶ , % 70 hr at 204 °C
Kalrez® 7075	Black	75	85	327	10.5	15
Kalrez® 9300	Brown	77 ⁷	82	300	6.1	25
Kalrez® 9100	Amber translucent	70 ⁷	78	300	5.2	18
Kalrez® 8085	Beige	80	86	275	7.5	42
Kalrez® 8900	Black	76	85	325	13.3	8
Kalrez® 6190	Black	73	N/A	300	6.2	29
Kalrez® 6375UP	Black	77	86	275	9.0	24 ⁸
Kalrez® W240UP	Black	76	N/A	230	6.9	26

¹ Not to be used for specification purposes

² ASTM D2240 (pellet test specimens unless otherwise noted)

³ ASTM D2240 and ASTM D1414 (AS568 K214 O-ring test specimens)

⁴ DuPont proprietary test method

⁵ ASTM D412 (dumbbell test specimens unless otherwise noted)

⁶ ASTM D395B and ASTM D1414 (AS568 K214 O-ring test specimens unless otherwise noted)

⁷ ASTM D2240 (plied slab test specimens)

⁸ ASTM D395B (pellet test specimens)

Case report – Etching Process: Expected longer PM Cycle > 6X at major Chinese Fab Line

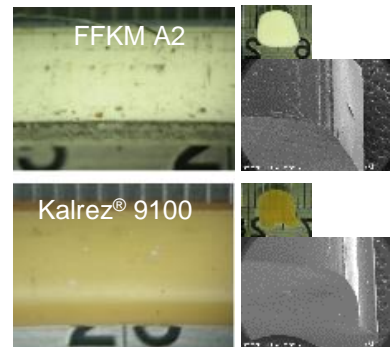
- Fab line has expected to extend PM cycle from 1-2 month to over 1 year
- Equipment Platform – Tokyo Electron MP-1800
- Process – Metal Etching
- Sealing Location – Chamber upper electrode
- Process Chemistry – SF2, O2
- Process Temperature – 100 deg.C
- Incumbent Material – FKM
- Incumbent Performance – Black contaminants appeared after 1~2 months uses.
- Kalrez® 9300 Performance – Kalrez® 9300 sample is still on the tool without any issues for 7 months. It is anticipated life of about a year.

O-ring sizes list for the upper electrode (Unit: mm)

ID	300	380	448	492	520	372	445	504	518	553	577	591	2541
CSD	2.62	2.62	2.62	2.62	2.62	3	3	3	3	3	3	3	3

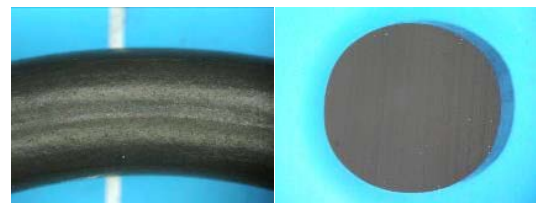
Case report – CVD Process : Provided better PM control at major Taiwanese Fab Line

- Fab line has had better control on PM cycle setting by the stable lifetime.
- Equipment Platform – Applied Materials AKT-4300PX
- Process – PECVD
- Sealing Location – Slit Valve Door
- Process Chemistry – SiH4, NH3, H2 and N2
- Cleaning Chemistry – NF3
- Process Temperature – 420 deg.C
- Incumbent Material – FFKM A2
- Incumbent Performance – The life time is unstable and unmet customers requirement (one year) due to the particle issue.
- Kalrez® 9100LS Performance – Customer evaluated for one year without any issue. The stable lifetime with less particle generation helps customer having better control on PM cycle setting to reduce the down time and keeping better yield rate for mass production.



Case report– CVD Process: Exceeded PM Target at major Taiwanese Fab Line

- Fab line has exceeded lifetime from 6 month to over 6 months.
- Equipment Platform – Applied Materials AKT-40K
- Process – PECVD
- Sealing Location – Central Support Diffuser
- Process Chemistry – SiH4, NH3, N2
- Cleaning Chemistry – NF3
- Process Temperature – 360 deg.C
- Sealing Location Temperature – 250 deg.C
- Incumbent Material – FFKM
- Incumbent Performance – Caused leakage issue after several heating/cooling cycles after 6 months.
- Kalrez® 8900 Performance – There is almost no damage can be observed on Kalrez® 8900 NW-40 O-ring which has been used for 3 weeks. The compression set is around 15%, which means that Kalrez® 8900 is still in a very good seal performance. The O-ring has been used over six months.



Kalrez® 8900

Case report – Wet Process: Expected longer PM Target at major Japanese Fab Line

- Fab line has expected to extend the lifetime from 4-6 months to over 6 months
- Equipment Platform – Dainihon Screen (DNS) Wet Tool/ Febacs
- Process – Photoresist Stripping
- Application – Transportation roller, JIS-P41 O-ring
- Process Chemistry – Aqua Regia and Some Acids
- Process Temperature – 40 deg.C
- Application Temperature – > 40 deg.C
- Incumbent Material – Local FFKM
- Incumbent Performance – Incumbent seal life is only 4~6 months and it is a big cost impact that processed glass gets cracked on transportation due to degradation of the seal and frequent maintenance.
- Kalrez® 6375 Performance – Kalrez® 6375 showed less swelling than incumbent one for process chemistry at our test and they decided to switch every O-rings and it has been working well. It is anticipated life longer than 6 months.

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