

DuPont™ Kalrez® Perfluoroelastomer Parts

In Semiconductor Industry – Thermal Processes

DuPont™ Kalrez® perfluoroelastomer parts have been used successfully in highly aggressive sealing environments for more than 40 years. Kalrez® parts have excellent chemical and thermal stability and have been specially formulated and processed to meet the unique requirements of wafer processing environments. DuPont Kalrez® seals are available in standard and custom sized O-rings, as well as customized shapes, that meet the demanding requirements of wafer processing in thermal environments. A proprietary ultraclean process and cleanroom handling is standard for all Kalrez® products utilized in the Semiconductor Industry.

Product Selector for Thermal Processes

The following table provides a quick and easy tool for the selection of Kalrez® parts depending on the production process type:

Process Type	Maximum Service Temperature	Typical Chemistries	Suggested Products ¹
ALD / LPCVD / Metal CVD	250 °C to 300 °C	WF ₆ , TiCl ₄ , SiH ₄ , HF, F ₂ , Cl ₂ , O ₂ , H ₂ O Vapor, ClF ₃	Kalrez® 8900/7075UP
Oxidation / Nitridation / Diffusion	280 °C to 300 °C	N ₂ , O ₂ , H ₂ O Vapor, HCl, Cl ₂ , O ₃	Kalrez® 7075UP/8900
Lamp Anneal /RTP	250 °C to 275 °C	Infrared light, O ₂ , H ₂ O vapor	Kalrez® 8575
Wafer surface preparation	200 °C to 275 °C	NF ₃ , NH ₃ , HF, F ₂ , H ₂	Kalrez® 9500/9600

¹ Please consult the Kalrez® Application Guide and/or your Kalrez® Representative to assess performance fit for your specific application

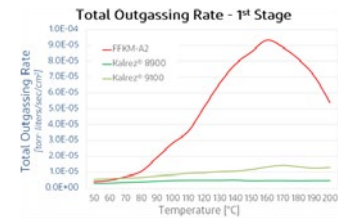
Typical Applications for Thermal Processes:

- Quartz chamber seal
- Fittings
- Center ring
- Low dielectric curing processes

Current Kalrez® Product Offerings for Thermal Application

Kalrez® 8900

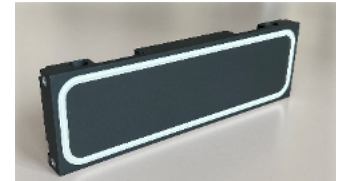
Kalrez® 8900 parts are for **oxidation, diffusion, ALD, and LPCVD** applications. It offers outstanding thermal stability, **very low outgassing** and excellent (low) compression set properties. Kalrez® 8900 parts exhibit excellent retention of physical properties at elevated temperatures, have excellent mechanical strength and are well-suited for both static and dynamic sealing applications.



Kalrez® 8900 parts: very low outgassing vs competitive FFKM products

Kalrez® 8575

Kalrez® 8575 parts are developed for **oxidation, diffusion, lamp anneal** and RTP sealing applications. Kalrez® 8575 exhibits excellent thermal stability and long-term sealing performance, **less Infrared (IR) absorption and significantly reduced outgassing properties at elevated temperatures**. It also has good mechanical properties and is well-suited for both static and low stress/low sealing force applications.



Kalrez® 8575 part

Kalrez® 7075UP

Kalrez® 7075UP parts are targeted specifically **metal CVD applications**. They offer outstanding thermal stability, **very low outgassing** and excellent compression set properties. Kalrez® 7075UP exhibits **excellent seal force retention**, has good mechanical properties and is well suited for both static and dynamic sealing applications.

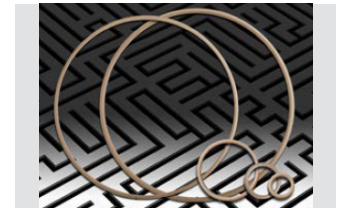


Kalrez® 7075UP O-Rings

Ultrapure post-cleaning and packaging is standard for all parts made from Kalrez® 7075UP.

Kalrez® 9500

Kalrez® 9500 parts are targeted specifically for **deposition processes where ozone, ammonia and water vapor are used for processing, e.g. SACVD, FCVD, PECVD curing** processes, etc. It has been specifically designed for use in applications where the plasma environment is more “chemical”, i.e., where oxygen and fluorine radicals are more dominant. Kalrez® 9500 also offers outstanding thermal stability, **very low outgassing** and excellent mechanical strength and is well suited for both static and dynamic sealing applications.



Kalrez® 9500 parts are based on a proprietary crosslinking system which is only available from DuPont

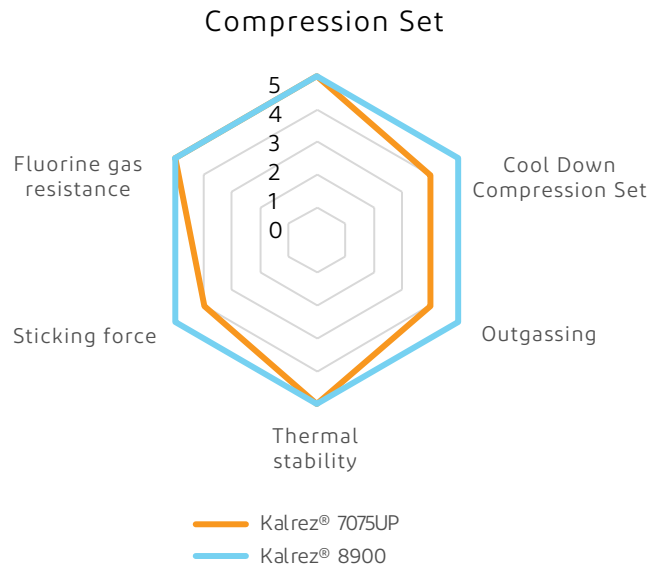
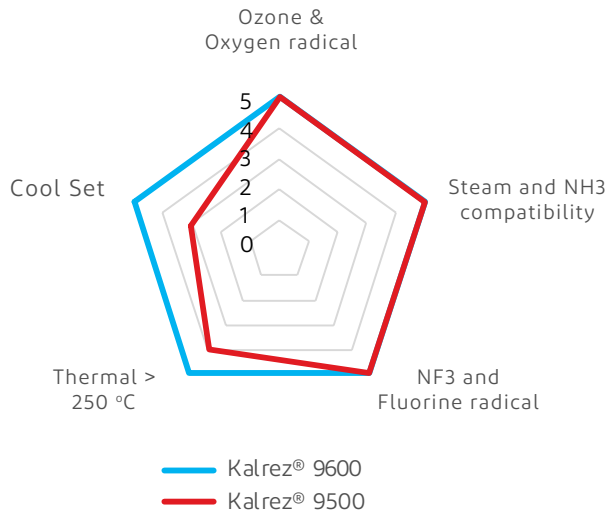
Kalrez® 9600

Kalrez® 9600 parts are designed for high purity, high temperature vacuum applications where seals are exposed to damaging Fluorine and Oxygen plasma radicals. It has an **extremely low erosion rate and weight loss from plasma attack** and provides **excellent chemical resistance to Ammonia, Ozone, and Water Vapor**. Its outstanding resilience in compression and **ultra-low outgassing at high temperature conditions** makes it especially suitable for applications where purity is paramount, such as Plasma-Enhanced Atomic Layer Deposition and Chemical Vapor Deposition processes.



Kalrez® 9600 O-Rings

Typical Product Positioning



Typical Physical Properties*

Kalrez® grade	Color	Hardness ¹ , Shore A	Maximum Service Temperature ² , °C (°F)	Compression Set ³ at 70 hours, 204 °C, %
8900	Black	76 ⁴	325 (617)	20
8575	White	63	300 (572)	25
7075UP	Black	75	327 (621)	13
9500	Tan	76 ⁴	310 (590)	18
9600	Olive-Green	70 ⁴	315 (599)	12

1 ASTM D2240 (pellet test specimens unless otherwise noted)

2 DuPont proprietary test method; useful temperature range may vary with seal design and application specifics

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

4 ASTM D2240 (plied slab test specimens)

* Not to be used for specification purposes

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, discuss with your DuPont customer service representative and read Medical Caution Statement H-50103-3.

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