

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

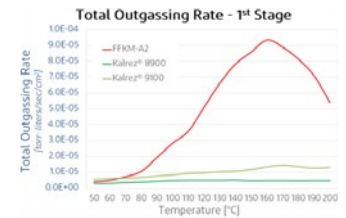
Typical Applications for Thermal Processes:

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

Current Kalrez® Product Offerings for Thermal Application

Kalrez® 8900

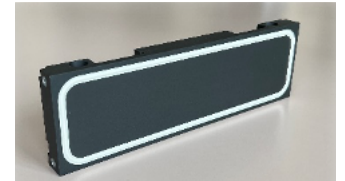
Kalrez® 8900 parts are for **oxidation, diffusion, ALD, and LPCVD** applications. It offers outstanding thermal stability, **very low outgassing** and excellent (low) compression set properties. Kalrez® 8900 parts exhibit excellent retention of physical properties at elevated temperatures, have excellent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

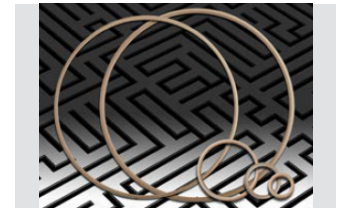


Kalrez® 7075UP O-Rings

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

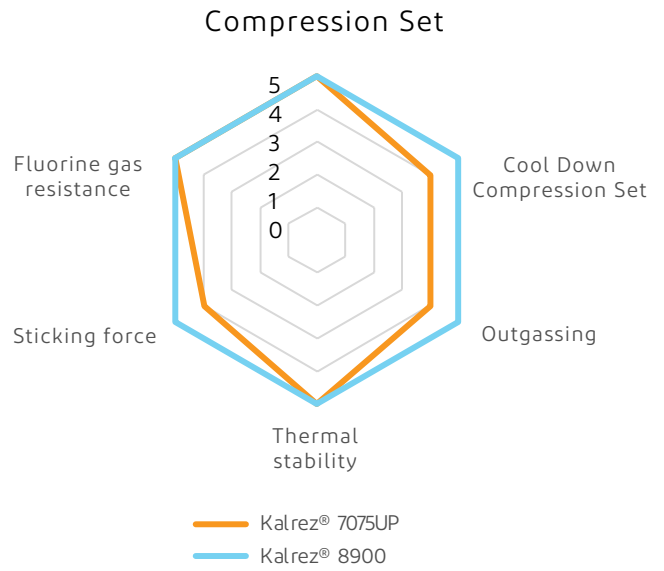
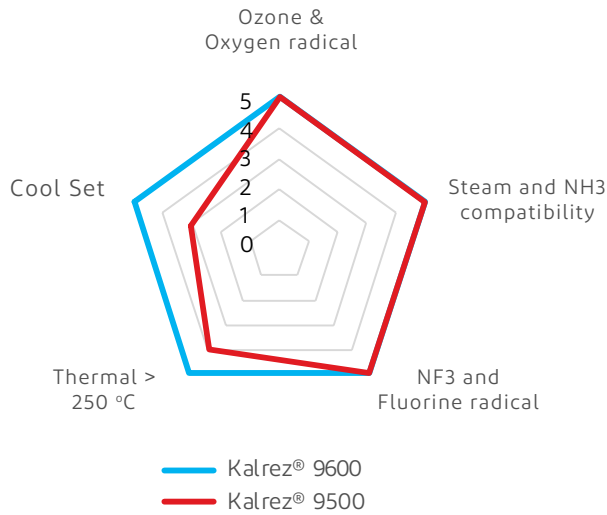
Kalrez® 9600

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

Visit us at kalrez.com

The information set forth herein is furnished free of charge and is based on technical data that DuPont believes to be reliable and falls within the normal range of properties. It is intended for use by persons having technical skill, at their own discretion and risk. This data should not be used to establish specification limits nor used alone as the basis of design. Handling precaution information is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards. Since conditions of product use and disposal are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. As with any product, evaluation under end-use conditions prior to specification is essential. Nothing herein is to be taken as a license to operate or a recommendation to infringe on patents.

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.

DuPont™, the DuPont Oval Logo, and all products, unless otherwise noted, denoted with ™, sm or ® are trademarks, service marks or registered trademarks of affiliates of DuPont de Nemours, Inc. © 2022 DuPont. All rights reserved.

Form No. KZE-A40112-00-A0422 CDP
Rev. 0, June 2022

