

DuPont™ Kalrez® Bonded Door Seals

Optimal Seal Design + Material Performance =
Higher Wafer Yield + Lower Cost of Ownership

Technical Information—Rev. 10, July 2010



Bonded door seals for gate valves and slit valve door seal applications provide improved sealing performance versus conventional O-rings by reducing particle generation, extending seal life and minimizing replacement time during preventive maintenance.

DuPont™ Kalrez® bonded door seals are designed for easy installation and low particle generation. They combine a custom seal design and proprietary adhesion technology along with the excellent plasma resistance of Kalrez® 9100, 8002, and Kalrez® Sahara™ 8085. The seal is held in a “fixed” position versus conventional O-rings, thereby eliminating “rolling/twisting” during door actuation. In addition, the seal design has been optimized using finite element analysis (FEA) to minimize high concentrations of localized stresses. As a result, both particle generation and sealing performance significantly improved versus conventional O-rings. Kalrez® bonded door seals are available in Kalrez® 9100, 8002 and Kalrez® Sahara™ 8085* for etching, ashing/stripping, HDPCVD, PECVD, SACVD, metal CVD and ALD wafer processing applications.

Typical Applications

Gate valves, slit valve doors, and other similar parts currently employing an O-ring seal or dovetail seal.

Lower Particle Generation and Extended Seal Life versus Conventional O-rings

- Sealing element held in a “fixed” position, i.e., eliminates “rolling/twisting” in service
- Kalrez® 9100, 8002 and Kalrez® Sahara™ 8085 employed to minimize particle generation in reactive plasmas
- Ultrapure post-cleaning and packaging reduces unwanted contamination
- Improved sealing performance—optimal design minimizes high concentrations of localized stresses

Less Replacement Time versus O-ring Seals During Preventive Maintenance

- Quick and easy assembly/disassembly to mounting bracket
- Reduces installation problems commonly experienced with O-ring seals
- Eliminates need to clean the seal gland during preventive maintenance
- Barcode on packaging plus bonded door seal part number and Kalrez® product number engraved on back of commercially available bonded door seals maintains traceability and identification plus provides assurance that it is a Kalrez® perfluoroelastomer part (FFKM).

* Select bonded door seals may also be available in DuPont™ Zalak® 5100.



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Availability

DuPont™ Kalrez® bonded door seals are available to fit most semiconductor OEM equipment platforms. In addition, a custom Kalrez® bonded door seal can be developed for most gate valve and slit valve door seal applications. Ultrapure post-cleaning and packaging is standard for all Kalrez® bonded door seals. Contact a DuPont Performance Elastomers applications engineer or an authorized Kalrez® distributor for specific size availability.

Proven Performance at Fab Lines

Case Report #6376 — European Fab Line, PECVD VAT MONOVAT® bonded door application

- Process chemistry: Trimethyl silane (TMS), O₂
- Cleaning chemistry: NF₃ plasma via remote plasma source
- Customer reported results: No reported performance problems with a Kalrez® 9100 VAT MONOVAT® bonded door after processing more than 55,000 pairs of wafers. Incumbent VAT MONOVAT® bonded door (competitive FFKM F4) lasted only 30,000 pairs of wafers before exhibiting particle generation.

Case Report #7174 — U.S. Fab Line, Integrated ALD/Tungsten CVD Slit Valve Door Seal Application

- Process chemistry: WF₆, SiH₄, H₂, N₂, Ar
- Cleaning chemistry: NF₃ plasma generated “in situ”
- Customer reported results: Customer was able to extend PM cycle from 6,000 to 10,000 wafers using a Kalrez® 9100 bonded slit valve door seal. The PM cycle for the incumbent bonded slit valve door seal (competitive FFKM A11) had been set at 6,000 wafers due to inconsistent seal life and premature replacement due to particle generation.

Case Report #7153 — Japanese Fab Line, HDPCVD Slit Valve Door Seal Application

- Process chemistry: SiH₄, O₂, He
- Cleaning chemistry: NF₃ plasma via a remote plasma source
- Customer reported results: Kalrez® 8002 bonded slit valve door seal lasted approximately 20,000 wafers without any reported performance problems. Incumbent seal (competitive FFKM A11) lasted only 12,000 wafers (1 PM cycle) before exhibiting vacuum leakage.

Case Report #7640 — Japanese Fab Line, HPDCVD Slit Valve Door Seal Application

- Process chemistry: SiH₄, O₂, He, Ar, H₂
- Cleaning chemistry: NF₃ plasma
- Customer reported results: Kalrez® 8002 bonded slit valve door seal lasted 15,000 wafer cycles without any reported performance problems. Incumbent seal lasted only 10,000 wafers before exhibiting particle generation and vacuum leakage.

Case Report #3786 — European Fab Line, SACVD Slit Valve Door Seal Application

- Process chemistry: TEOS, O₃, TEBO, TEP
- Customer reported results: Kalrez® Sahara™ 8085 bonded slit valve door seal lasted over 30,000 wafer cycles without any reported performance problems. Incumbent bonded slit valve door seal (competitive FFKM A11) lasted only 10,000 wafer cycles before exhibiting particle generation.

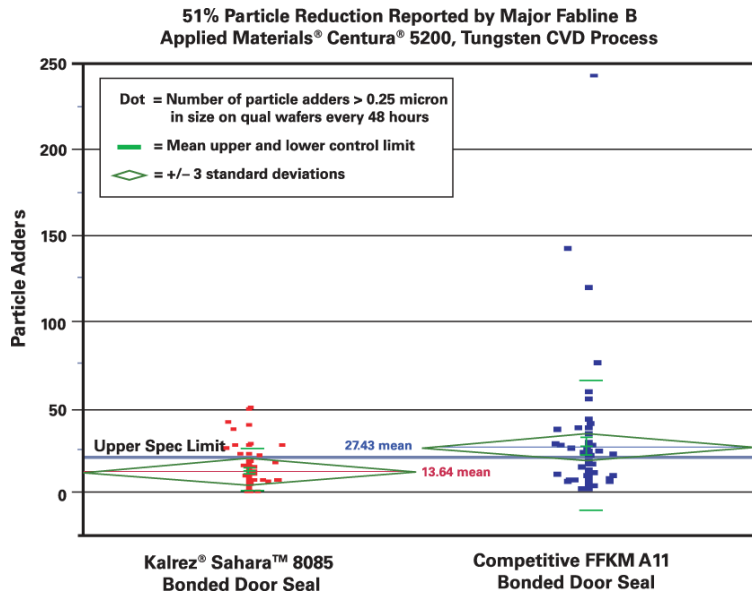
Case Report #7262 — European Fab Line, SACVD MONOVAT® Bonded Door Seal Application

- Process chemistry: TEOS, O₃, TEBO, TEB
- Customer reported results: No reported performance problems with a Kalrez® Sahara™ 8085 VAT MONOVAT® bonded door after processing 96,000 pairs of wafers. Incumbent VAT MONOVAT® bonded doors (competitive FFKM A18 and F4) lasted only 30,000 and 60,000 pairs of wafers respectively before exhibiting particle generation and vacuum leakage.

Case Report #5791 — Malaysian Fab Line, HDPCVD Slit Valve Door Seal Application

- Process chemistry: SiH₄, O₂
- Cleaning chemistry: NF₃ plasma
- Customer reported results: Kalrez[®] Sahara[™] 8085 bonded slit valve door seal lasted 12,000 wafers without any reported performance problems. Incumbent bonded slit valve door seal (competitive FFKM A18) lasted only 6,000 wafers before exhibiting cracking.

Case Report #8729 — U.S. Fab Line, Tungsten CVD Slit Valve Door Seal Application



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