

UHP Gate Valve Door

For Applied Materials Producer®
and Ultima® DN 35 x 336 mm Valves



Parker Innovation Increases Wafer Yield in Aggressive Process Environments

Continuing to extend seal life dramatically over the OEM door design, the Parker UHP gate valve door unites the strengths of Parker exclusive UHP elastomers, advanced bonding technology, and a uniquely engineered sealing element to decrease particle generation and increase resistance against dynamic mechanical wear and chemical attack.

Unique patented features within the Parker UHP gate valve door seal configuration further enhance the seal's resistance to extreme plasma attack and increases its robustness during mechanical actuation.



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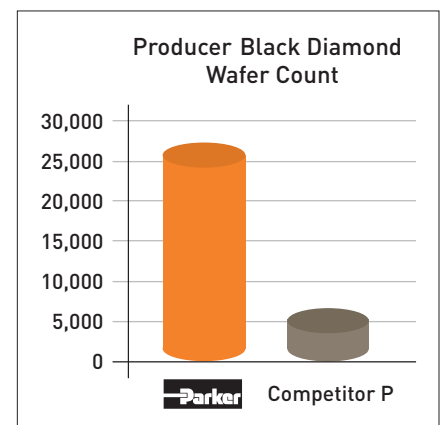
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Case Study:

- Tool: Applied Materials Producer Black Diamond
- Process Chemistry: tetramethyl silane (TMS), O₂
- Cleaning Chemistry: NF₃, Ar
- RF Energy: 1100 watts
- Temperature: 350°C
- Competitor: OEM-supplied bonded gate valve door with nano-silica filled FFKM
- Parker Solution: Patented Parker door with Parofluor Ultra FF370-75



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Three-Tier Parker Innovation Yields Superior UHP Gate Valve Door

Parofluor Ultra FF370-75

Perfluoroelastomer Technology

FF370-75 is a black opaque, non-filled FFKM elastomer specifically formulated by Parker for high purity semiconductor processing up to 300°C. This material was developed for aggressive oxygen and fluorine plasma applications requiring minimal erosions and particle generation.

Due to the purity and unique properties of the compound, this material minimizes the potential for particle generation in oxygen and fluorine rich plasmas. Through unique compounding techniques, the level of ionic contaminants is also reduced.

Advanced Bonding Technology

Parker's patented UHP gate valve door design increases bonded surface area up to 88% from the OEM bonded gate design for added robustness and rubber-to-metal bond durability. Parker employs advanced perfluoroelastomer bonding technology in the manufacture of the UHP gate valve door. The superior stability of the bond between door and sealing element provides improved abrasion resistance and seal integrity that result in extremely low particle generation and dramatically increased seal service life.

Parker Patented Engineered Seal

Parker addresses mechanical breakdown of current OEM bonded gates on angled lengths of seal to increase wafer yield by 5-times or more. Using nonlinear 3D finite-element analysis, sealing stresses on these angled lengths were reduced and optimized to increase mechanical durability while still maintaining vacuum sealing performance (see figure 1). The sealing element's exposure to plasma radicals has also been reduced by approximately 60%, dramatically extending seal life by reducing plasma attack.

Relative Particle Generation
RF 300 Watts — Plasma 90:10 O₂:CF₄

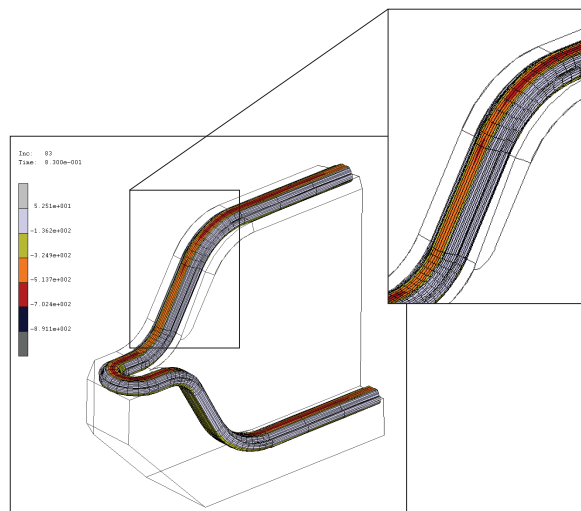
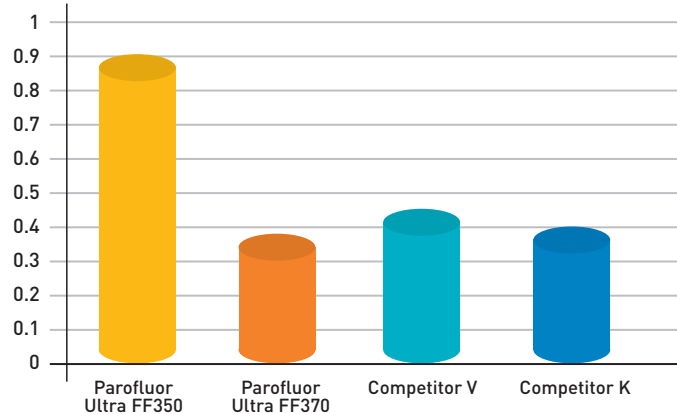


Figure 1: 3D FEA Stress-Strain Plot



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CSS 5123 rev. 10/22



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