

DuPont™ Kalrez® Sahara™ 8575

For Semiconductor Applications

Technical Information—Rev. 7, July 2010

Product Description

DuPont™ Kalrez® Sahara™ 8575 perfluoroelastomer parts are a white product for “select” etching, ashing/stripping and deposition process applications. It offers low weight loss in oxygen and fluorine-based plasmas, low outgassing, and excellent elastic recovery properties. Kalrez® Sahara™ 8575 has excellent vacuum and long-term sealing performance, good mechanical properties and is well-suited for both static and dynamic sealing applications (e.g., gas inlets, chamber lid seals, slit valve doors). A maximum continuous service temperature of 300 °C is suggested. Ultrapure post-cleaning and packaging is standard for all parts made of Kalrez® Sahara™ 8575.

Key Performance Features Contribute to Extended Seal Life

- Excellent resistance to oxygen and fluorine-based plasmas, as well as chlorinated cleaning gasses (e.g., ClF_3)
- Low weight loss in reactive plasmas
- Very low outgassing properties
- Excellent (low) compression set properties
- Excellent elastic recovery properties

Suggested Applications

- Chamber lids
- Gas inlets
- Quartz windows
- Throttle valves
- Other plasma applications

Fabs Choose Kalrez® Sahara™ 8575 for Improved Performance

Kalrez® Sahara™ 8575 has been reported to significantly improve wafer production in semiconductor etching and ashing applications. In evaluations by a fab line customer, Kalrez® Sahara™ 8575 exhibited longer seal life compared to a competitive perfluoroelastomer in both dynamic and static sealing applications.

Typical Physical Properties¹

Color	White
Hardness, Shore A (pellet) ²	62
Hardness, Shore M (O-ring) ³	72
100% Modulus ⁴ , MPa	2.47
Tensile Strength at Break ⁴ , MPa	12.04
Elongation at Break ⁴ , %	230
Compression Set ⁵ , %, 70 hr at 204 °C	29
Max. Continuous Service Temperature ⁶ , °C	300

¹ Not to be used for specification purposes

² ASTM D2240 (pellet test specimens)

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

⁴ ASTM D412 test method (dumbbell test specimens)

⁵ ASTM D395B (pellet test specimens)

⁶ DuPont proprietary test method



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Case Report #1

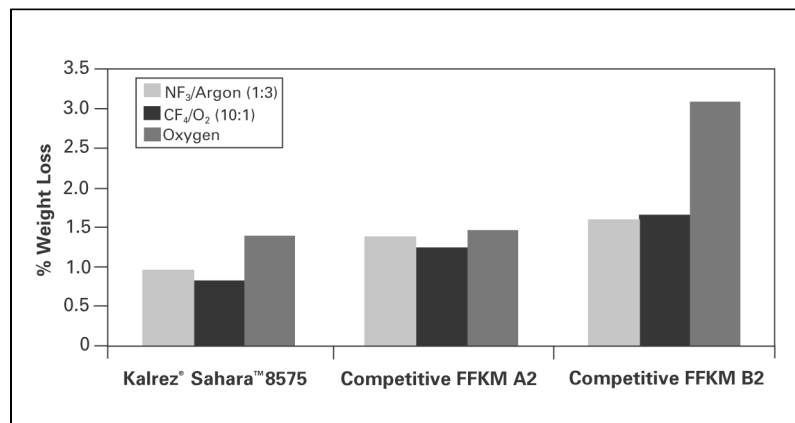
Customer	U.S. East Coast Fab Line
Equipment	TEL Unity
Process Type	Deep Trench Etch
Components	End Point Window Seal (229 O-ring) (most difficult location for seal performance)
Process Gasses	HBr, O ₂ , SF ₆ , NF ₃
Rf Power	1500 Watts
Process Temperature	~70 °C
Incumbent Material	Competitive FFKM A2
Incumbent Performance	After 6 months, fluoroelastomer was half eroded, competitive FFKM became brittle, developed cracks and leaked
DuPont™ Kalrez® Sahara™ 8575	Evaluated in application for over 10 months without failure
Performance:	Based upon this success, customer evaluated complete seal set (15 sizes) and has changed all competitive FFKM to DuPont™ Kalrez® Sahara™ 8575

Plasma Performance

Because there is no industry standard to characterize elastomer plasma resistance, OEMs and fab lines rely on in-use testing and actual performance. To further assist the industry in proper seal selection, DuPont has developed a test method that approximates chamber conditions to quantify seal resistance to plasma. In this test, O-rings are placed on a silicon wafer in a process chamber and directly exposed to extremely damaging plasma environments. Kalrez® Sahara™ 8575 exhibited low weight loss upon exposure to reactive plasmas versus the competitive perfluoroelastomers tested.

% Weight Loss

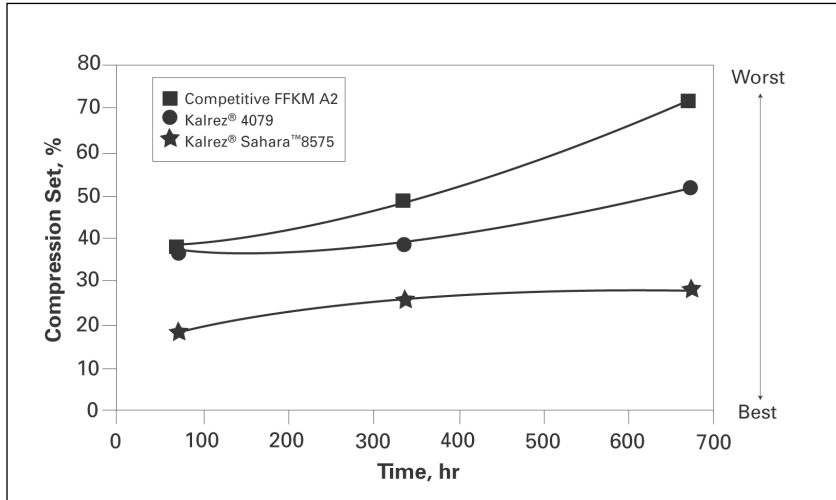
1 hr at 900 W, 0.1 Torr, Direct Exposure
Parallel Plate Reactor, RIE Mode



Compression Set Performance

Compression set is routinely used in the elastomers industry to compare relative sealing performance, particularly at elevated temperatures. However, in many cases, short-term data (70 hr) is used which is not representative of long-term performance. DuPont™ Kalrez® Sahara™ 8575 exhibits excellent long-term compression set performance.

Long-Term Compression Set Performance* at 204 °C

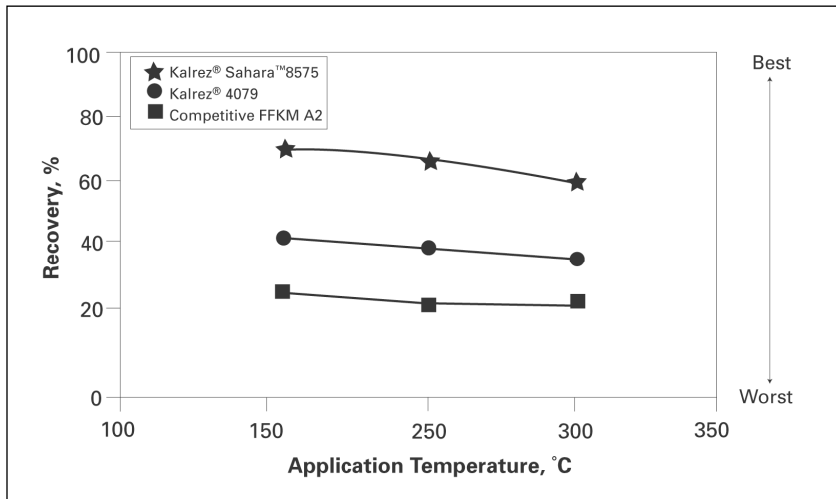


* ASTM D 395B and D 1414 (214 O-rings)

O-Ring Elastic Recovery Performance

While compression set results are an important measure of long-term sealing performance, this test method does not adequately reflect the elastic recovery of a seal that is cooled down under compression. Good elastic recovery properties enable a seal to recover quickly and be ready for service faster between process or maintenance cycles. Many compounds have good compression set values but poor elastic recovery after cool down under compression. The data below reflects O-ring recovery after samples were compressed 25% for 16 hours at elevated temperatures, then cooled down under compression. Percent recovery was measured 30 minutes following removal of compression plates. Kalrez® Sahara™ 8575 exhibits excellent elastic recovery properties.

Elastic Recovery Performance (214 O-rings)



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(06/05) Reference No. KZE-H88213-00-H0710



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