# DuPont™ Kalrez® 9100

## For Photovoltaic Manufacturing Processes

Technical Information — Rev. 1, July 2010

### Product Description

DuPont™ Kalrez® 9100 perfluoroelastomers parts are an amber translucent product for PV cell manufacturing processes requiring resistance to fluorine-based plasma including amorphous/microcrystalline silicon thin film deposition. It exhibits very low weight loss and ultra-low particle generation in fluorine-based plasma, e.g., $NF_3$, $F_2$, etc. It also offers excellent resistance to dry process chemistry and has excellent thermal stability, compression set and outgassing properties. Kalrez® 9100 has good mechanical strength properties and is well suited for both static and dynamic sealing applications. A maximum continuous service temperature of 300 °C is suggested.

### Features/Benefits

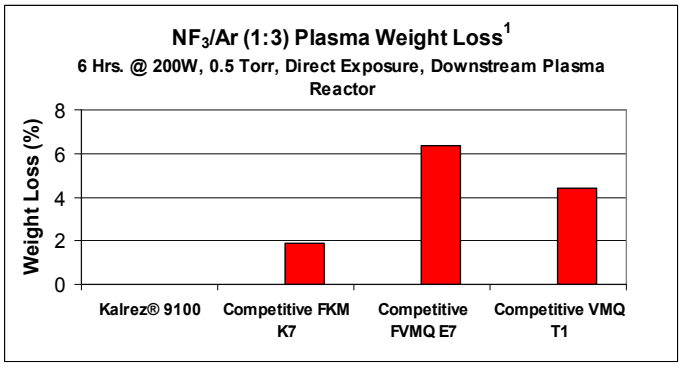
- Very low weight loss and ultra-low particle generation in fluorine-based plasma
- Excellent resistance to dry process chemistry
- Excellent thermal stability
- Excellent (low) compression set and outgassing properties

### Suggested Applications

- Gas valve/slit valve door seals
- Gas inlet/orifice seals
- Isolation valve seals
- Substrate handling pads
- Chamber lid seals

| Typical Physical Properties[1] | Kalrez® 9100 |
|---|---|
| Color | Amber Translucent |
| Hardness[2], Shore M (O-ring) | 74 |
| Maximum continuous service temperature[3], °C | 300 |
| Compression Set[4], %<br>70 hr at 204 °C | 17 |

[1] Not to be used for specification purposes
[2] ASTM D2240 and ASTM D1414 (AS568 K214 O-ring test specimens)
[3] DuPont proprietary test method
[4] ASTM D395B and ASTM D1414 (AS568 K214 O-ring test specimens)




[1] DuPont proprietary test method

### Plasma Resistance

Plasma can be a very aggressive media depending upon the power and chemistry employed. If not selected properly, elastomers can be eroded at an astonishing rate in plasma, leading to problems during pump-down or causing toxic gases to be released into the atmosphere. Figure 1 shows the % weight loss (erosion) properties of Kalrez® 9100 versus a typical fluoroelastomer (competitive FKM K7), fluorosilicone (competitive FVMQ E7) and silicone (competitive VMQ T1) product after direct exposure to $NF_3$/Ar (1:3) plasma for 6 hours. Kalrez® 9100 exhibited significantly lower weight loss (erosion) versus the other products tested.

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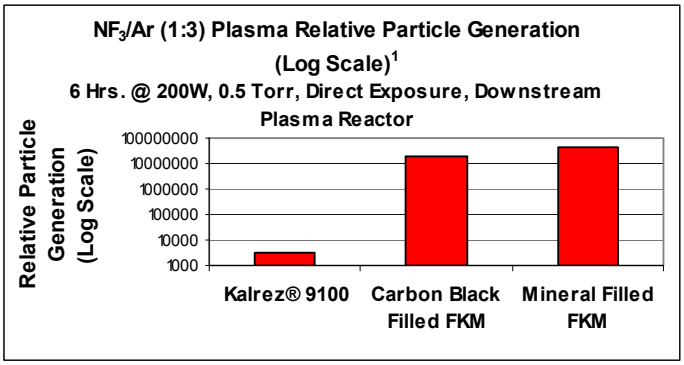
**Figure 2.**




[1] DuPont proprietary test method

## Particle Generation

Conventional sealing materials normally contain carbon black and/or mineral fillers. Newer products are either unfilled or formulated with polymeric fillers. Plasma resistance can be significantly different depending upon the type of filler used. If the filler has high resistance to plasma, it can "shield" the polymer to reduce erosion or weight loss but have high potential for particle generation by leaving discrete particles behind once the polymer has become etched. Unfilled and polymeric filled products can be completely etched to form volatiles, thereby significantly reducing the potential for contamination. Figure 2 illustrates the relative particle generation of DuPont™ Kalrez® 9100 versus typical carbon black and mineral filled fluoroelastomer products after exposure to $NF_3$/Ar (1:3) plasma for 6 hours. Kalrez® 9100 exhibited significantly lower particle generation versus the other products tested.

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Contact DuPont at the following regional locations:


**North America**
800-222-8377

**Latin America**
+0800 17 17 15

**Europe, Middle East, Africa**
+41 22 717 51 11

**Greater China**
+86-400-8851-888

**ASEAN**
+65-6586-3688

**Japan**
+81-3-5521-8484



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