

Extractables Testing Summary:

Two additional extraction tests were done in this study. The media used was Hydrofluoric Acid and Piranha fluid. The 2-214 O-ring samples were again placed in PTFE containers under the specified conditions. After the immersions, the leachate of each container was tested for 30 extractable trace metals using Inductively Coupled Plasma-Mass Spectrometry

(ICP-MS). The specific test conditions for each media are given below:

- Hydrofluoric Acid – 49%, 7 days, room temperature
- Piranha Fluid – 100%, 1 month, 80°C

The results of the HF testing can be found in Charts 4a, 4b, and 4c. The results of the Piranha fluid testing can be found in Charts 5a, 5b, and 5c.

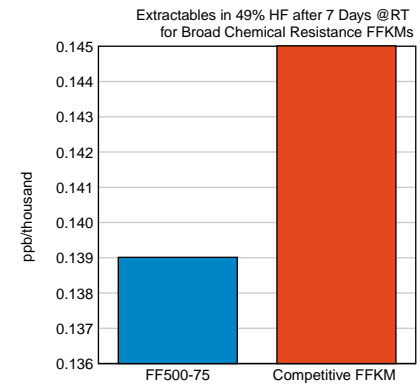


Chart 4a

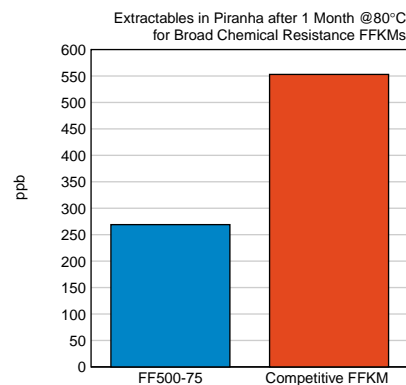


Chart 5a

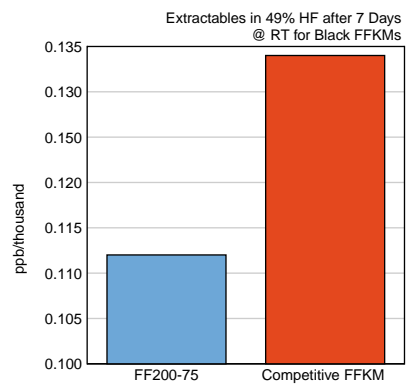


Chart 4b

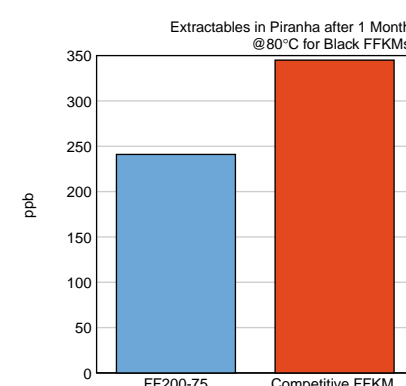


Chart 5b

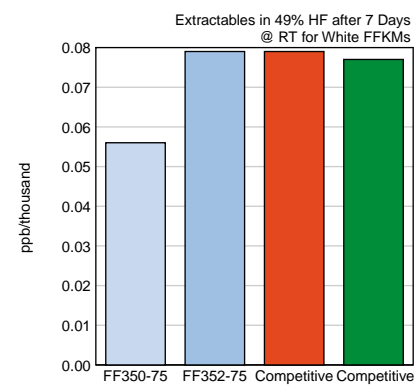


Chart 4c

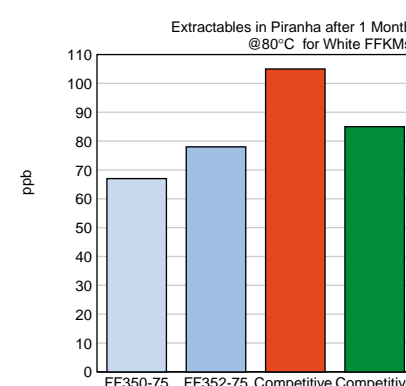


Chart 5c

Conclusions:

The data obtained from this study provides a baseline for comparing various perfluorinated elastomer technologies. Care should be taken in the analysis of low level extractables and plasma resistance data as many factors may influence the extractable analysis results. It is quite useful, however, to evaluate competitive technologies in the same manner in order to obtain a relative performance profile between the various vendors.

For further information on the relative resistance of Parker's recipes versus the various competitive technologies, please contact our applications engineers at (859) 269-2351.

The overall conclusion that can be drawn from this study would be the excellent cleanliness and resistance performance of Parofluor ULTRA™ materials to both plasma environments as well as the aggressive fluid exposures. In addition to material cleanliness the designer must also consider mechanical sealing properties (i.e. compression set, seal force retention, etc.).

For additional information, please visit our website at

www.parofluor.com



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Perfluorinated Elastomers Cleanliness Evaluation

The challenge of continually improving the cleanliness of elastomeric seals for semiconductor applications recently prompted our technology team to conduct a comprehensive study of perfluorinated elastomer (FFKM) materials.

The study focused on relative cleanliness testing of Parofluor ULTRA™ perfluorinated elastomers against a variety of competitive perfluorinated elastomers. The conditions included aggressive chemistries, plasma environments and UPDI.

Aggressive Environments:

Five environments were evaluated in this study. These are summarized as follows:

1. C2F6/O2 plasma resistance after 4 hours
2. NF3/N2/O2 plasma resistance after 4 hours
3. Extractables in Ultrapure Deionized Water after one month
4. Extractables in 49% Hydrofluoric Acid after 7 days
5. Extractables in Piranha fluid after one month

Parker Seals Parofluor ULTRA compounds evaluated*

Parker Compound	Color	Normal Hardness (Shore A)	Temperature Range	Feature
FF200-75	Black	75	-15°C to 320°C 5°F to 608°F	High temperature Low compression set Chemical resistance
FF350-75	White	75	-15°C to 316°C 5°F to 600°F	High purity High temperature
FF352-75	White	75	-15°C to 316°C 5°F to 600°F	High temperature
FF500-75	Black	75	-15°C to 275°C 5°F to 525°F	Broad chemical resistance

*For additional Parofluor materials please visit

www.parofluor.com

ULTRA news is published quarterly by Parker Hannifin's O-Ring Division.

For subscription information, or to order extra copies, call (859) 268-5067.

For more information about ULTRA series perfluorinated elastomers and other Parker Seal Group Products, call 1-800-C-PARKER or visit us at www.parofluor.com

Plasma Testing Summary:

Two plasma environments were evaluated in this study, namely C2F6/O2 and NF3/N2/O2. These two environments were chosen due to the widespread use of these plasmas in industry. For both tests, 2-214 O-rings were used as the test specimens.

The data generated is summarized in Charts 1a, 1b, 1c, 2a, 2b, and 2c.

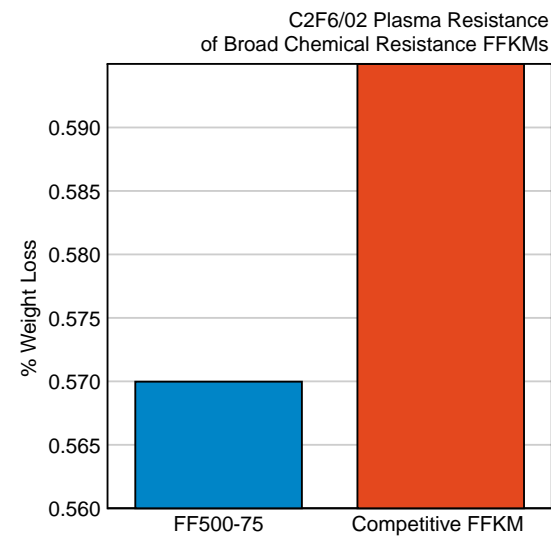


Chart 1a

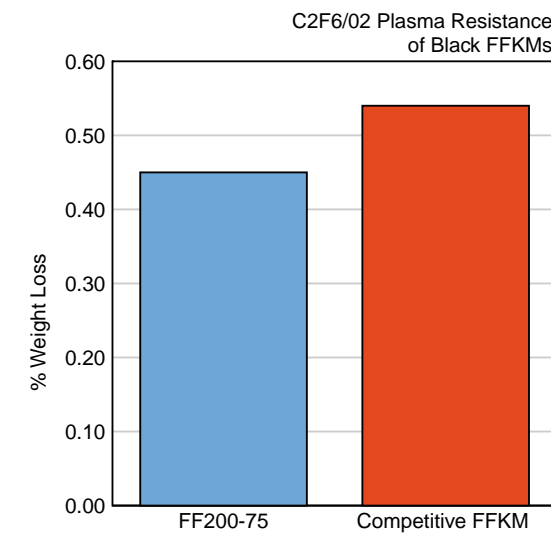


Chart 1b

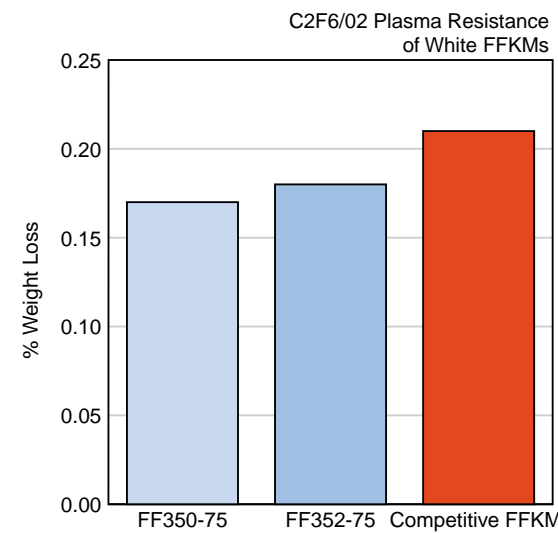


Chart 1c

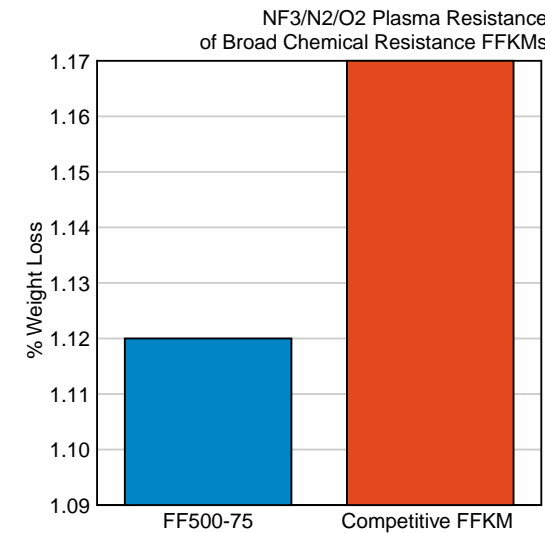


Chart 2a

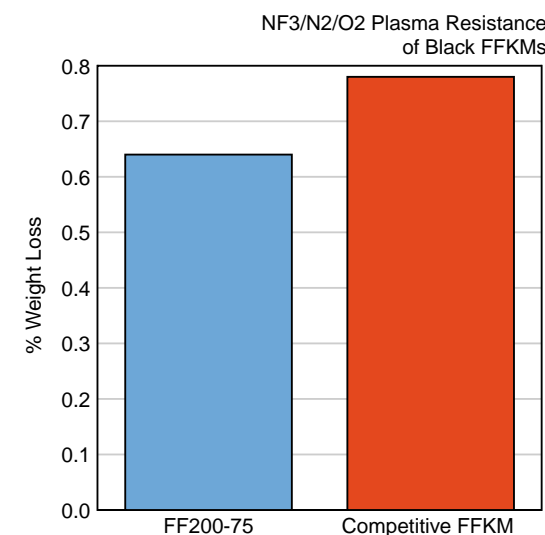


Chart 2b

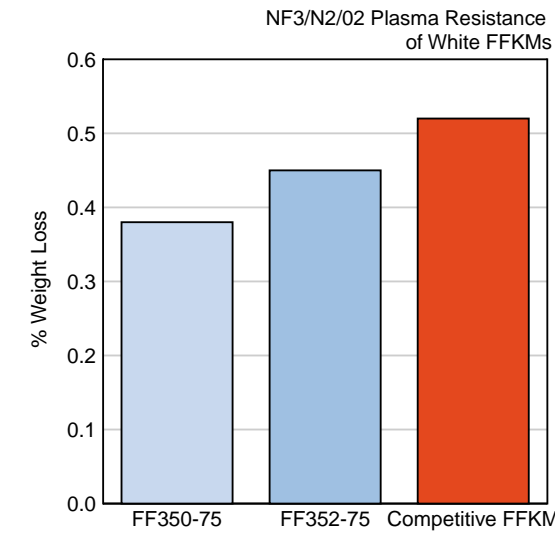


Chart 2c

UPDI Extractables Testing Summary:

This test consisted of placing the 2-214 O-ring samples in PTFE containers containing 250ml of ultrapure water for one month at 80°C. After the thirty-day period the leachate was analyzed using the following techniques:

1. The ionics were analyzed using Ion Chromatography.
2. The trace metals were analyzed using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS).
3. The Total Organic Carbon (TOC) was analyzed using a TOC analyzer.

The data generated from this test is summarized in Charts 3a, 3b, and 3c.

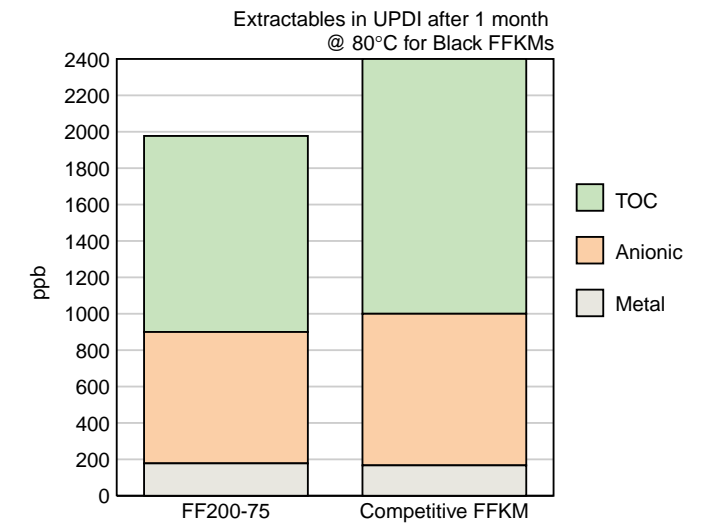


Chart 3b

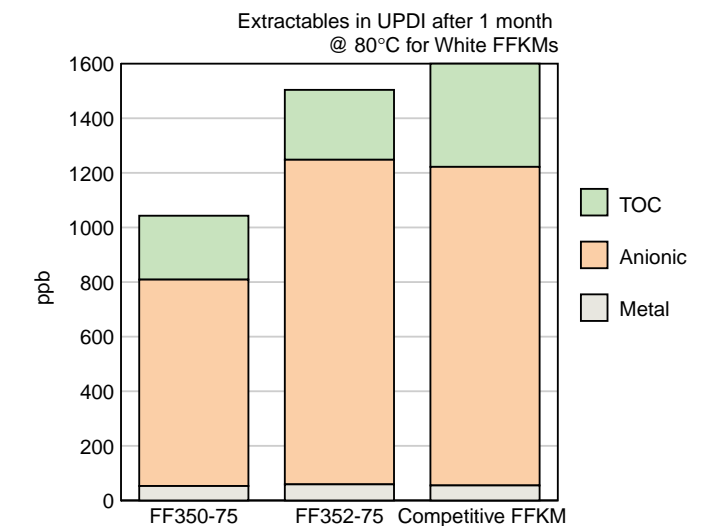


Chart 3c

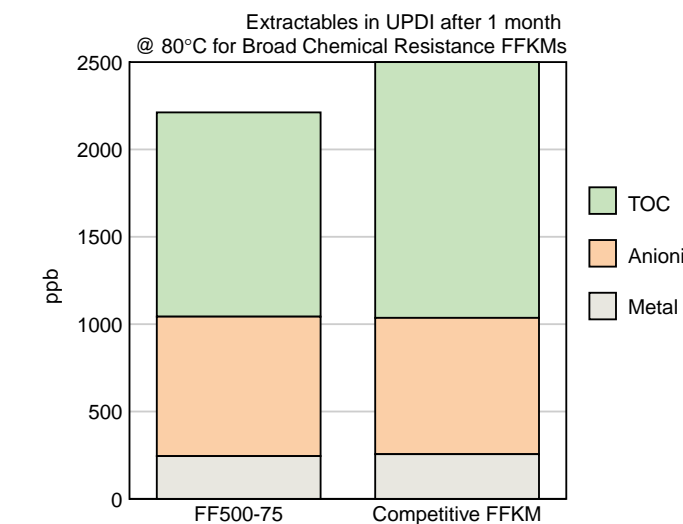


Chart 3a

