

RFN™ TREATMENT

Sealing components made of elastomeric materials can have inherently high surface energies (tackiness) and a high coefficient of friction (COF). Whenever an elastomeric seal makes contact with the mating component, the interface of the two surfaces can produce a “stiction” effect. This can be detrimental when the contact is intermittent. Applications that require low stiction and long service life such as valve sealing components and diaphragms can greatly benefit from RFN treatment.

The RFN (Reduced Friction by Nanotechnology) process consists of applying a proprietary surface modification to rubber components to reduce the COF. RFN generates surfaces with high abrasion resistance, low COF, resistance to aggressive fluids, and improved long-term service. Applications where release performance, quick response time, and load/torque reduction are required can benefit from the RFN process.

RFN—HOW IT WORKS

Rubber sealing components are placed into the RFN equipment. Necessary medias are introduced and the process is commenced. A subsequent surface modification takes place within the equipment and results in a permanent surface change. All process input variables are automatically controlled. Process output control comprises both visual inspection and COF testing on each process lot. Freudenberg–NOK Sealing Technologies has over 12 years of experience with the RFN process for various applications including semiconductor seals, solenoid plunger valves, and fuel caps seals.

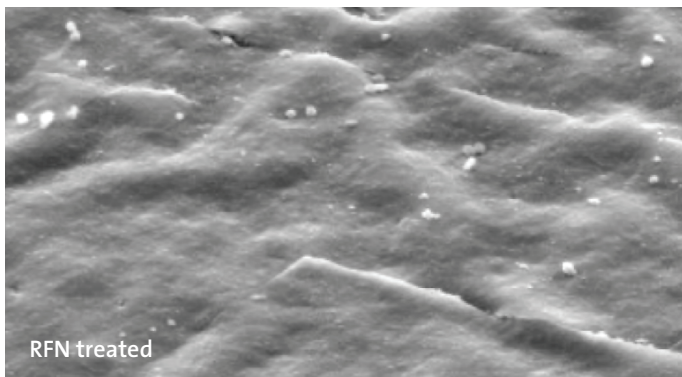
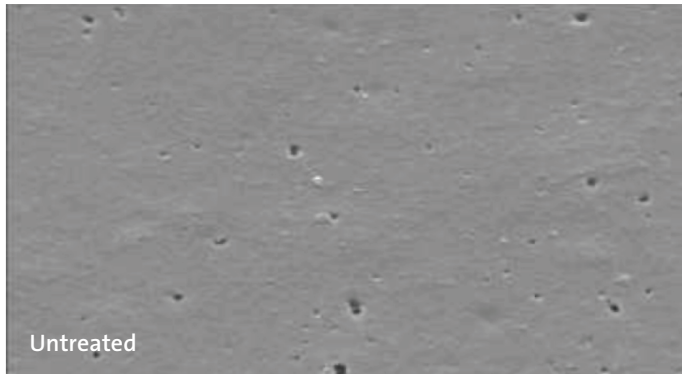
VALUES FOR THE CUSTOMER

- Low coefficient of friction results in improved performance
- Longer service life potential—highly abrasion resistant surfaces
- Lower torque and loading—valve seals, cap seals, and applications with intermittent loading
- Aggressive media resistance—coefficient of friction remains constant with increased holding time, as opposed to untreated materials which deteriorate with increased holding time
- Sealing performance is maintained with no compromise to the physical properties of the elastomer
- Adhesion to the elastomer and the ability to flex is maintained without micro cracking down to -40°C (-40°F), even with high forces
- Freudenberg–NOK Sealing Technologies works with customers to develop an RFN treatment that is best suited to individual applications

FEATURES AND BENEFITS

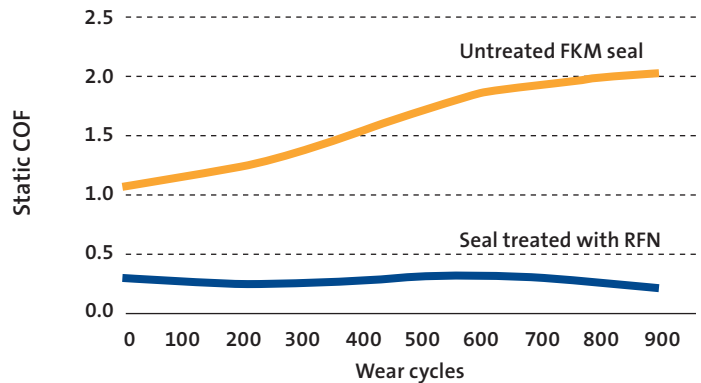
- The RFN treatment is inert and compatible in applications that require purity
- The RFN treatment is odorless and translucent in color
- Comparative testing of untreated and treated specimens have consistently shown a 70% reduction in static COF
- Long-term conditioning in fuel, ozone, and wear testing has consistently resulted in no increase of surface COF, while untreated specimen exhibit 80–100% increase in COF

RFN TOPOLOGY COMPARISON



Test Condition	Untreated FKM	FKM treated with RFN
Baseline	1.09	0.30
Fuel C @ 168 hours	1.11	0.21
Fuel CM20 @ 168 hours	1.43	0.27
Fuel B100 FAME @ 168 hours	1.23	0.23
Fuel CE85 @ 168 hours	1.88	0.25
Ozone	1.54	0.19
Wear Cycles = 900	2.05	0.23

Comparative effect of RFN treatment



RFN treatment at 10,000X magnification



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