



# Magnetic Fluid Vacuum Seals

FOR SEMICONDUCTOR APPLICATIONS

**simrit**<sup>®</sup>

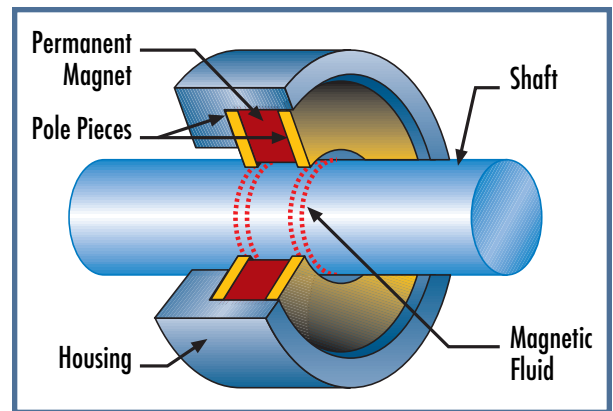
# Magnetic Fluid Vacuum Seals

Simrit is the industrial sealing products division of the Freudenberg and NOK Group companies, the world's largest supplier of elastomeric seals and custom molded products. Our track record of superior customer service

is evidenced by over \$7 billion in annual sales. Simrit offers a line of magnetic fluid vacuum seals designed and manufactured by our global partner, EKK Eagle Industries.

## Magnetic Fluid Vacuum Seals

Magnetic fluid vacuum seals use magnetic force to maintain the magnetic fluid in a specific position around the shaft. The suspended fluid provides a liquid sealing barrier to fluids and gases. This magnetic sealing method results in a very low friction hermetic seal which allows very little contamination. Simrit magnetic fluid vacuum seals are durable and particularly long-lived.



## Magnetic Seals Characteristics and Applications

Simrit magnetic fluid vacuum seals were specifically developed to be high-performance, low-friction, rotary seals for semiconductor applications. These seals offer excellent thermal resistance and minimum contamination in high-temperature environments.

- Temperature: up to 200°C with a flange at 0.1 Pa without any cooling systems
- Corresponding to ultra-high vacuum ( $10^{-9}$ Pa at 23°C)
- Low vapor pressure and small gas generation
- Peripheral velocity: up to 1.0 m/sec
- Excellent thermal resistance
- Minimum contamination
- Excellent high-vacuum resistance
- Non-burst

Simrit magnetic fluid vacuum seals provide superior performance in these semiconductor industry applications:

- Deposition: LPCVD, APCVD, HDPCVD, PECVD, RPCVD, SACVD
- Ashing
- Plasma etch: poly, oxide and metal
- Metalization: PVD
- Ion Implant

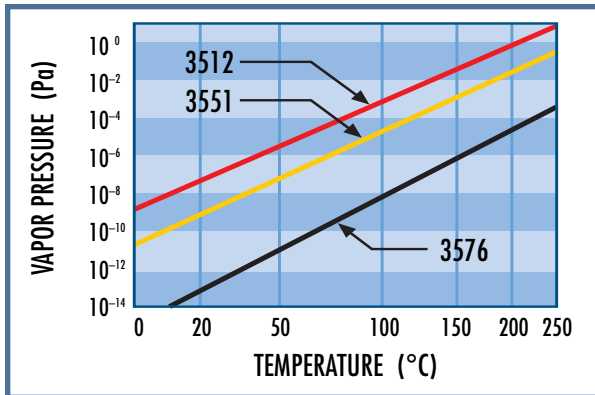


# Magnetic Fluid Specifications

## Magnetic Fluids

Magnetic fluids are colloid dispersion liquids in which the surfactant is adsorbed to a magnetic particle surface and stably dispersed. These are functional fluids which combine the “ferromagnetism” properties of magnets and “fluidity” property of a liquid.

## Vapor Curves for Specific Magnetic Fluids



## Magnetic Fluid Types

Fluid Number	3512	3551	3576
Saturation Magnetization mT	35	35	35
Viscosity (at 25°C) mPa • s	3500	<10000	<10000
Vapor Pressure (at 20°C) Pa	6.0x10 <sup>-8</sup>	7.0x10 <sup>-10</sup>	8.2x10 <sup>-14</sup>

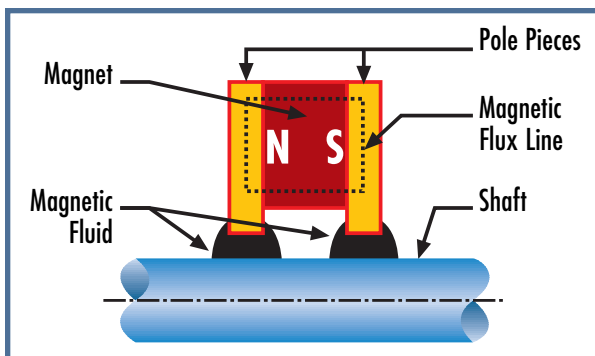
Magnetic fluids will be selected based upon required specifications. Magnetic fluids themselves are not for sale.

## Outgassing and Leak Rate

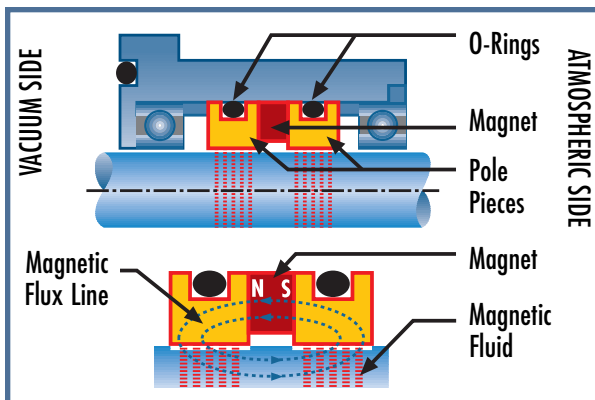
- Fluid Type 3512  
7.73 x 10<sup>-10</sup> Pa • m<sup>3</sup>/sec  
(5.8 x 10<sup>-9</sup> Torr • ltr/sec, 4.58 x 10<sup>-7</sup> SCCM)
- Fluid Type 3551  
3.07 x 10<sup>-11</sup> Pa • m<sup>3</sup>/sec  
(2.3 x 10<sup>-10</sup> Torr • ltr/sec, 1.82 x 10<sup>-8</sup> SCCM)
- Fluid Type 3576  
less than Fluid Type 3551

# Magnetic Seal Structure

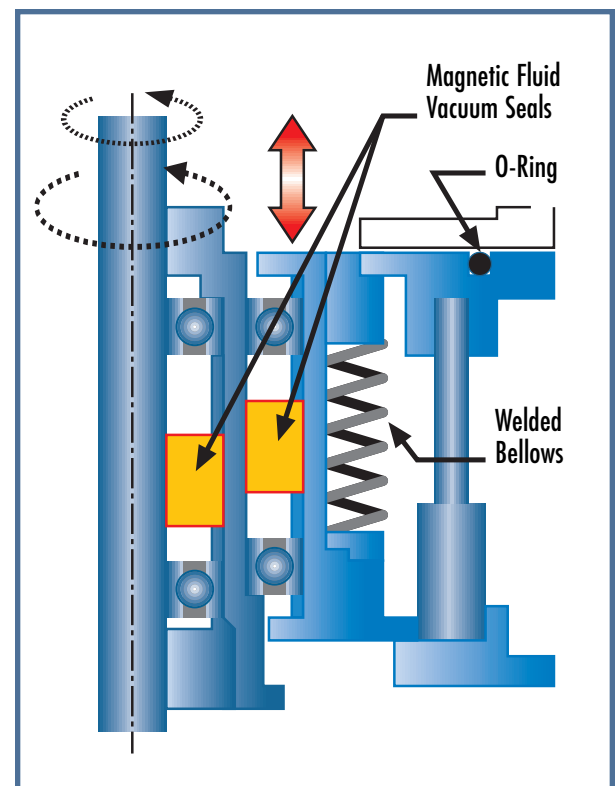
## Dust Seal Structure



## Single-Shaft-Type Seal Structure



## Two-Axle Reciprocation Vacuum Seal with Bellows Structure





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