



## Floating Seals ES Series

Your Technology Specialist

**simrit**<sup>®</sup>

# Simrit Sealing Solutions

Simrit is the industrial sealing products division of the Freudenberg and NOK Group Companies, a global supplier of elastomeric seals and custom molded products, with production facilities in 25 countries and annual sales of over \$12 billion in the service of all major technology industries.

While known for supplying superior sealing products with a history that spans over 150 years, Simrit is always looking toward the future. Innovation is the cornerstone of our company and we strive to bring that pioneering spirit to practical reality for our customers every day. Our expert engineers are dedicated to open and instant information exchange throughout the entire Freudenberg and NOK global network. It's our way of ensuring that only the very "best of breed" solutions rise to the surface.

The Simrit service package at a glance:

**World's largest product range**—Superior design solutions from a single source.

**Continuous innovation**—Technological prominence gives our customers competitive advantage.

**Unique expertise in materials and high-quality standards**—The end-to-end leader for safe, cost-effective applications.

**A vast range of integrated services**—Holistic support from development through product deployment.

**"Globality"**—Global expertise united with the knowledge of local market requirements and customer demands.

## ES Series Floating Seals

Earth-moving and heavy construction equipment constantly undergo the stresses of the job environment and service conditions require robust mechanical systems. Moisture, natural contaminants such as sand and fiber, harsh weather including radical temperature fluctuation, ozone, and extended UV radiation are just some of the challenges to a system's integrity. When there is no room for error, when "time is money," seal system performance must remain optimal. Simrit, your technology specialist, provides the best solution in the industry.

For heavy equipment sealing, Simrit offers the ES series of floating seals designed and manufactured by Eagle Industry Co. Ltd. As part of the Freudenberg and NOK Group, Eagle Industry Co. brings our customers nearly 50 years of floating seal experience, providing the highest quality seals available.

Benefits of using Simrit ES Series Floating Seals include:

- Strong seal performance
- Excellent contamination resistance
- Longer intervals between services
- Lower labor and maintenance costs



*The Freudenberg and NOK group draws from more than 150 years of experience and offers quality, well-known brand names including Freudenberg®, NOK®, Eagle Industry, International Seal®, and Merkel™. Call Simrit today at 1-866-274-6748 to find out how our total sealing solutions can benefit you. Or visit [www.simrit.com](http://www.simrit.com).*

# Floating Seal Characteristics

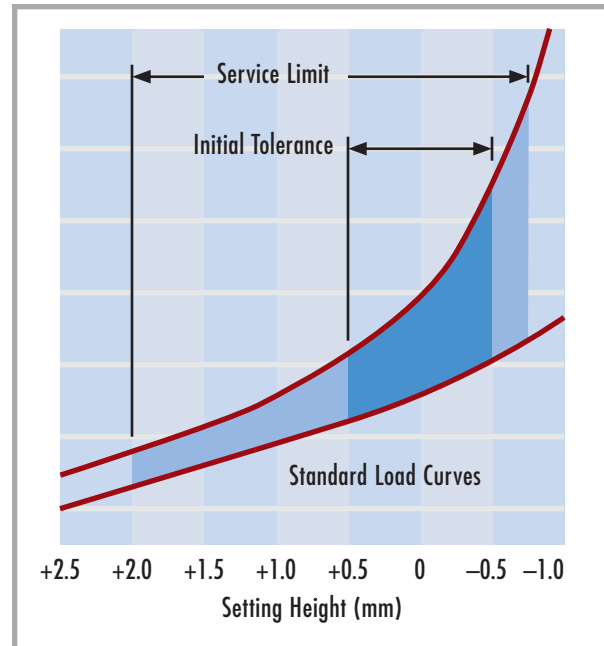
Simrit floating seals are noted for their reliable seal endurance characteristics. In laboratory tests simulating actual field service conditions (i.e., muddy water) at 1 m/s for over 1000 hours, track roller assemblies showed no leakage and essentially no seat wear using standard 80W-90 gear oil as the lubricant. There was also no noticeable deformation or deterioration of elasticity in the floating seal O-rings.

Simrit floating seals are designed to operate under the following conditions:

- Lubricant pressure within seal cavity of 1.5 kg/cm<sup>2</sup> (maximum 2 kg/cm<sup>2</sup>)
- Circumferential speed of 2 meters/second, maximum
- Temperature range:  
-40°C to +100°C for standard materials

For particular requirements that do not fit the above specifications, please contact Simrit to find the right solution for your individual applications.

## Setting Length



*Installation of the Simrit floating seals requires a recommended setting height of  $\pm 0.5$  mm, but they will continue to function beyond these parameters during normal service life.*

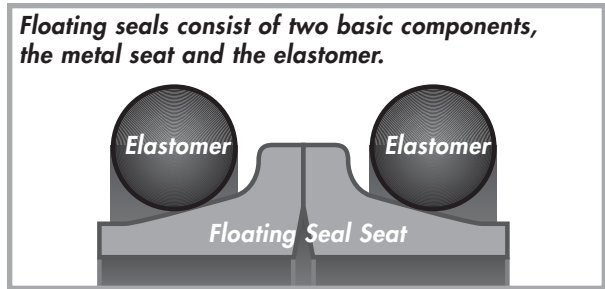


*Simrit ES Series Floating Seals from Eagle Industry Co. offer dependability in the most demanding conditions. As the only manufacturer of both energizers and metal seal rings, our expertise spans product design*

*and testing, including custom designs for the most challenging applications. Design validation includes lab testing, field return analysis, and design variation testing to ensure optimum performance.*

# Floating Seal Materials

The effectiveness of floating seals is dependent on the combination of tough materials used in a unique configuration of the floating seal and the O-ring. As the world's leading elastomer developer, Simrit can provide the best material to match the requirements of each application.



## Floating Seal Seat Material

- Special corrosion-resistant cast iron alloy

## O-Ring Elastomer Materials

- Nitrile (NBR)

**Description:** Commonly used because of its good mechanical properties and low cost, standard nitrile is also known as Buna-N. It has excellent resistance to petroleum-based oils and fuels, water and alcohols. Nitrile also has good resistance to acids and bases, except those with a strong oxidizing effect.

**Limitations:** Avoid highly polar solvents (Acetone, MEK, etc.) and direct exposure to ozone and sunlight.

**Temperature Range:** -50°C to 100°C

- Hydrogenated Nitrile (HNBR)

**Description:** HNBR is obtained by partially or fully hydrogenating NBR, leading to considerable improvement of the resistance to heat, ozone, and aging.

**Temperature Range:** -40°C to 120°C

- Standard Fluoroelastomers (FKM)

**Description:** FKM compounds provide excellent resistance to petroleum products and solvents, delivering very good high-temperature performance.

**Limitations:** Avoid polar solvents, amines, anhydrous ammonia, SKYDROL, hydrazine, and hot acids.

**Temperature Range:** -20°C to 200°C

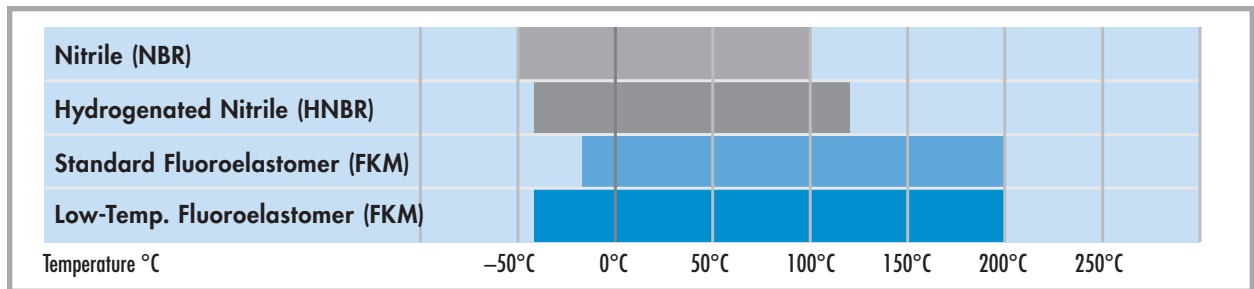
- Low Temperature Fluoroelastomers (FKM)

**Description:** Like the standard fluoroelastomer, the low-temperature compound has excellent resistance to petroleum products and solvents, and very good high-temperature performance; but in addition, there is an extended low-end temperature advantage.

**Limitations:** Avoid polar solvents, amines, anhydrous ammonia, SKYDROL, hydrazine, and hot acids.

**Temperature Range:** -40°C to 200°C

## Floating Seals Materials Comparative Temperature Ranges



Simrit's 55,000-square-foot Technology Center based in Plymouth, Michigan, is a \$25 million marvel of state-of-the-art testing capabilities. Our engineers develop and extensively test materials in collaboration with the finest chemists from our lead centers throughout the world. New material compounding for target applications is part of this continuous process.

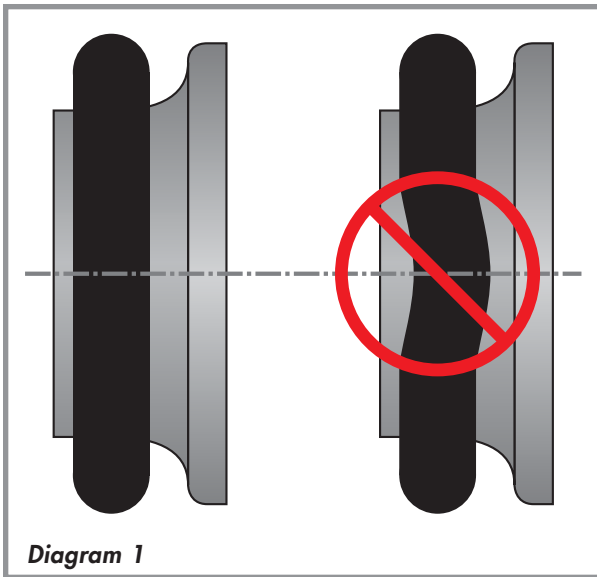


# Installation and Maintenance of Floating Seals

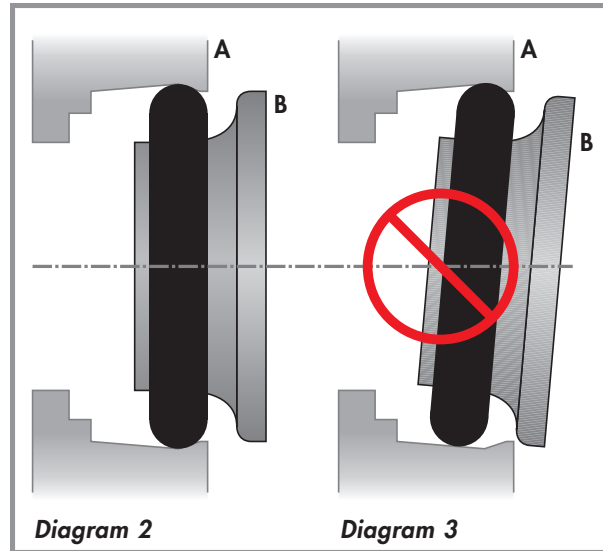
Long-term endurance testing on Simrit floating seals demonstrates that properly installed seals in track roller applications provide over 3000 hours of maintenance-free performance without the need for oil replenishment. Correct installation of the seal is critical to long service life. If at any time the assembly housing or floating seal is disassembled, a new seal should be installed before reassembly and use of equipment. Failure to do so may result in oil leakage and a shortened seal life.

## Proper Method of Seal Installation

**Step One:** Be sure that the installation opening of the housing is clean and clear of burrs, scratches, and dust. The O-ring must be correctly fitted on the floating seal without distortion (Diagram 1).



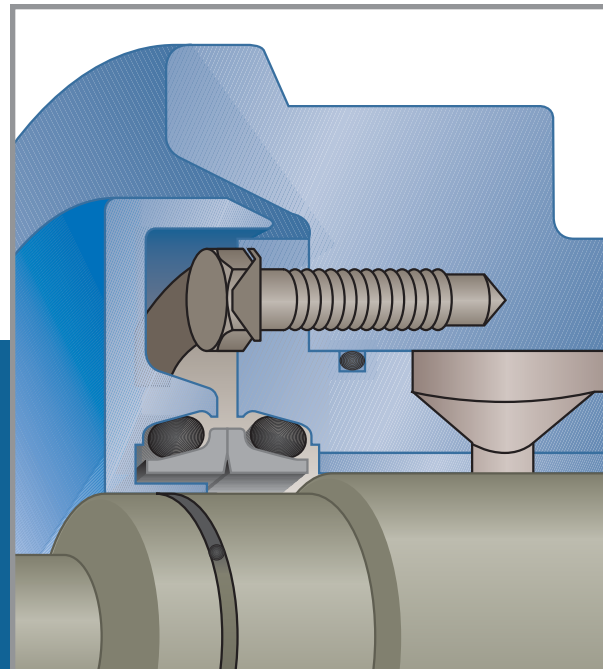
**Step Two:** Install the floating seal with the properly fitted O-ring in the housing (Diagram 2). At this time, confirm that the end of the housing (A in the diagrams) will be



parallel to the sliding surface of the floating seat (B). If the seal comes out of alignment, even partially (Diagram 3), abnormal wear and deformation of the O-ring will result, shortening the service life of the seal.

**Step Three:** After insertion, make sure that the sliding surfaces are absolutely free of foreign matter, then lightly apply lubricant oil to the sliding surfaces. Upon completion of the seal installation, reassemble the housings and fill with lubricating oil.

*When properly installed, the two mated metal surfaces seal against each other for maximum sealing. A thin film of lubrication between the surfaces minimizes wear. The O-ring energizers provide pressure to ensure positive sealing.*



# Type ES100 Floating Seal

The ES100 floating seal was developed as a seal for the track rollers used in construction machinery and vehicles. It is simple in construction, consisting of O-rings and floating seats made of special cast iron. Its performance is dependent on the sealing capabilities and elastic distortion of the O-rings, as the floating seats are supported by the O-rings. The seal effectively excludes sand, dirt, and water and is widely used in bulldozer and excavator under-carriage applications. The ES100 is generally the most common and most cost-effective solution, but requires precise machining of the housing bore (see page 7).

## ES100 Seal Construction

The seal seat is a special alloy cast iron. The O-ring component is standard material NBR A627, or optional materials, FKM F201 and HNBR G969.

## Specifications—Standard Material

Lubricant pressure within seal cavity: 2 kg/cm<sup>2</sup>, maximum.

Circumferential speed: 2m/sec., maximum

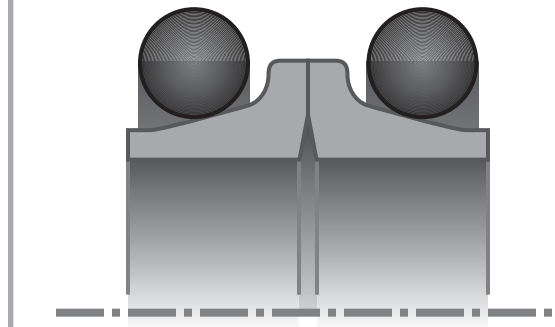
Temperature range: -40°C to 100°C

Fluid retained: lubricating oil

Foreign material excluded: soil, sand, mud, water, etc.

Sizes: 38 mm to 429 mm (inside diameters)

Type ES100 Seal Cross Section



# Type ES764 Floating Seal

A sister product of the type ES100 seal, the ES764 allows for a simpler housing design and construction. The housing is easier to machine (see page 9), but more housing space is required and fewer tooled sizes are available. This economy of design provides reduced manufacturing costs in agricultural equipment and other field machinery. The ES764 has a higher pressure capability and range compared to the type ES100 seal. The type ES764 seal utilizes a unique wing-form elastomeric packing with floating seats made of special alloy cast iron.

## ES764 Seal Construction

The seal seat is a special alloy cast iron. The O-ring component is standard material NBR A627.

## Specifications, Standard Material

Lubricant pressure within seal cavity: 3 kg/cm<sup>2</sup>, maximum

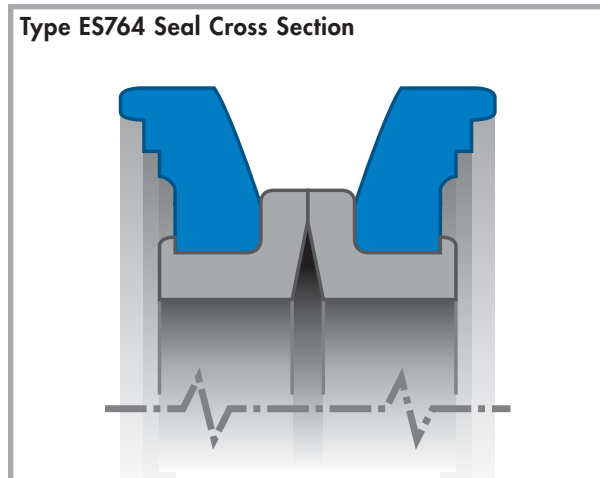
Circumferential speed: 2m/sec., maximum

Temperature range: -40°C to 100°C

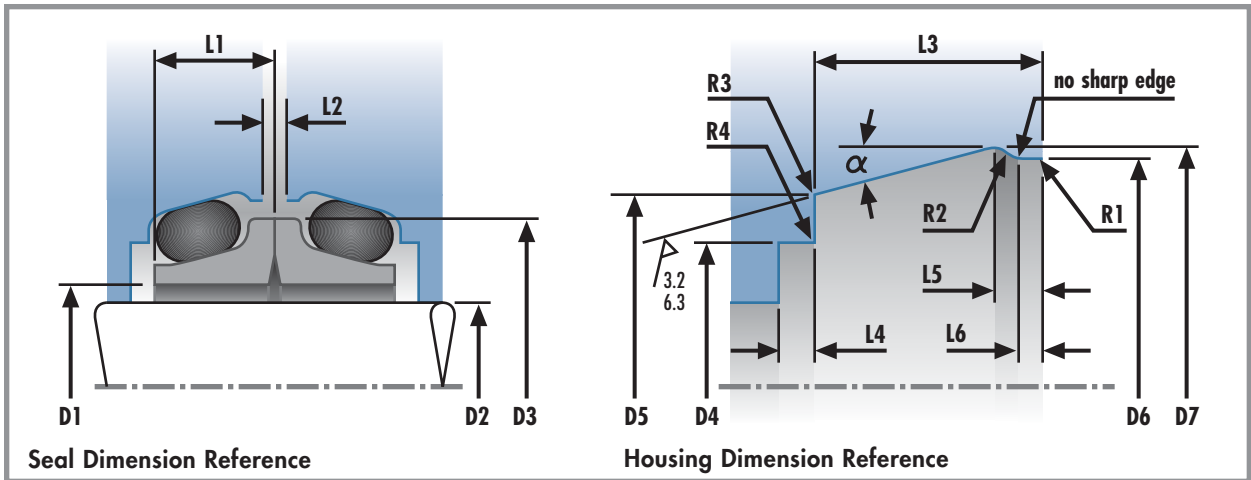
Fluid retained: lubricating oil

Foreign material excluded: soil, sand, mud, water, etc.

Sizes: 35 mm to 96 mm (inside diameters)



# Type ES100 Floating Seal Sizes



Metric Dimensions (mm)

Type & Size	D2 max.	D1 ref.	D3 ref.	L1 ref.	D4 ±0.5	D5 ref.	D6 ±0.1	D7 ±0.1	L2 ±0.5	L3 ±0.2	L4 ±0.5	L5 ±0.2	L6 ref.	R1 ±0.2	R2 ±0.1	R3 ±0.2	R4 ±0.2	α ±0.5°	O/R WD
ES100-38	35	38	51	10	46	51.2	53	53.7	3	9	2	1.6	0.4	0.2	2	1	0.5	10	6
ES100-45	42	45	58	10.5	53.4	58.7	60.8	61.6	3	10	2	1.8	0.5	0.3	2.5	1	0.5	10	6.4
ES100-48	45	48	62	12.5	58	64.4	67.2	68	3	12	2	2	0.5	0.3	3	1	0.5	10	7.5
ES100-51	48	51	65	11.5	60	65.4	67.4	68.2	3	10	1	1.9	0.5	0.3	2.5	1	0.5	10	6.7
ES100-56	53	56	70	13.2	66	72.5	75.2	76	3	12	2	2	0.5	0.3	3	1	0.5	10	7.7
ES100-58	55	58	75	13.5	67	75.2	78.6	79.4	3	13.5	2	2	0.5	0.3	3	1	0.5	10	8.6
ES100-60	57	60	74	10.9	70	75.4	77.4	78.4	3	9	2	1.9	0.35	0.3	2.5	1	0.5	12	6.4
ES100-63.5	60.5	63.5	82	16	74	82.6	86	86.8	3	15	2	3	1.2	0.5	4	1	0.5	10	9.6
ES100-64	61	64	78	13.2	74	80.2	83.8	84.6	3	12.5	2	2	0.5	0.3	3	1	0.5	12	8.1
ES100-66	63	66	86	14	78	85.8	89.2	90	3	14	2	2	0.5	0.3	3	1	0.5	10	8.9
ES100-69	66	69	84	12.5	78.5	85.7	88.6	89.6	3	11	2	1.9	0.35	0.3	2.5	1	0.5	12	7.9
ES100-70	67	70	90	14.5	84	90.6	94.7	95.5	3	13.5	2	2	0.5	0.3	3	1	0.5	12	9
ES100-73	70	73	92.1	16	84	92.1	95.4	96.2	3	15	2	3	1.2	0.5	4	1	0.5	10	9.4
ES100-76	73	76	94	14.5	89	97	100.6	101.4	3	14.5	2	2	0.5	0.3	3	1	0.5	10	9.3
ES100-80	77	80	100	14.5	92	100.5	104.2	105	3	14.5	2	2	0.5	0.3	3	1	0.5	10	9.3
ES100-82	79	82	98	13	91	98.9	101.3	102.3	3	12.5	2	2.8	0.6	0.5	5	1	0.5	10	8
ES100-90	87	90	109	16	100	107.7	112	112.9	3	14.5	2.5	2.1	0.5	0.3	3	1	0.5	12	9.2
ES100-90.1	87.5	90.1	109.5	16	101	109.5	112.8	113.6	3	15	2	3	1.2	0.5	4	1	0.5	10	9.7
ES100-95	92	95	114	16	107	114.8	119.2	120	3	15	2	2.5	1	0.5	3	1	0.5	12	9.5
ES100-100	97	100	118	16	111	119.3	122.4	123.2	3	14.5	2	2.5	1	0.5	3	1.5	0.5	10	9.5
ES100-102	99	102	122	16.7	115	121.8	126.2	127.2	3	15.5	2	2.5	0.8	0.5	3	1.5	0.5	12	9.3

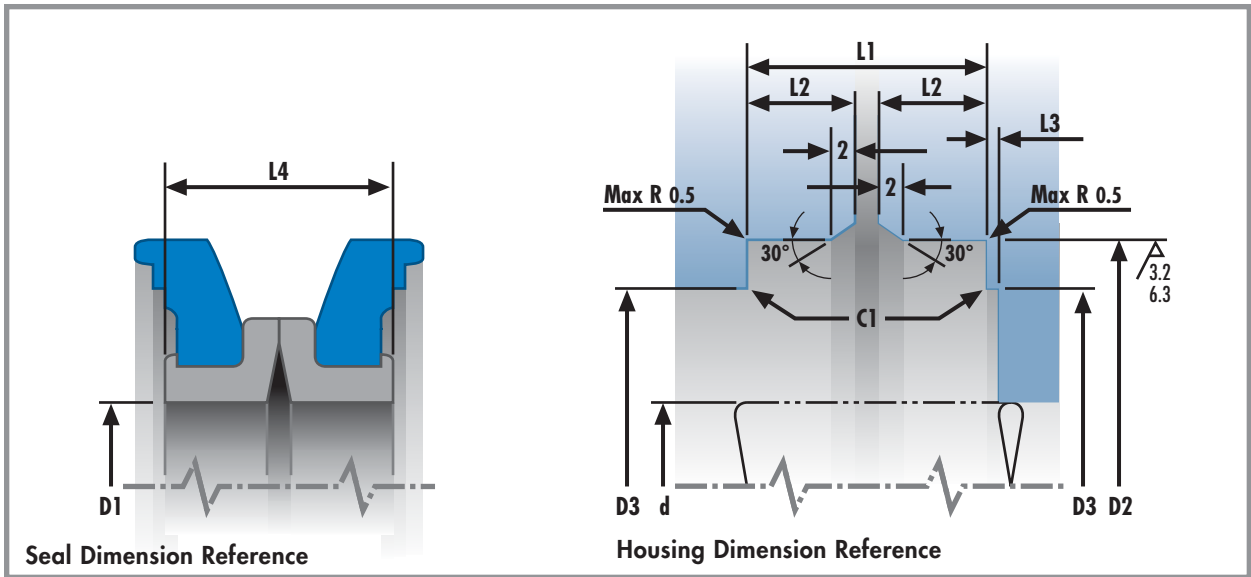
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## Type ES100 Floating Seal Sizes —*continued*

Type & Size	D2 max.	D1 ref.	D3 ref.	L1 ref.	D4 ±0.5	D5 ref.	D6 ±0.1	D7 ±0.1	L2 ±0.5	L3 ±0.2	L4 ±0.5	L5 ±0.2	L6 ref.	R1 ±0.2	R2 ±0.1	R3 ±0.2	R4 ±0.2	α ±0.5°	O/R WD
ES100-109	106	109	132	16	124	132.1	135.6	136.6	3	15.5	2	2.5	0.8	0.5	3	1.5	0.5	10	9.5
ES100-110	107	110	128	16	121	127.7	132	133	3	15	2	2.5	0.8	0.5	3	1.5	0.5	12	9
ES100-115	112	115	137	15.5	130	137.6	140.8	141.8	3	14.5	2	2.5	0.8	0.5	3	1.5	0.5	10	9.2
ES100-120	117	120	142	19.5	133	143.8	148	149	4	17	2	2.5	0.8	0.5	3	1.5	0.5	10	11
ES100-127	124	127	141	12.5	136	140.8	143.2	144	4	11.5	2	2.5	1	0.5	3	1	0.5	10	6.4
ES100-130	127	130	152	19.2	144	153.4	158	159	3	18.5	2	2.5	0.8	0.5	3	1.5	0.5	10	11.3
ES100-137	134	137	153	15	152.1	155.9	159	159.7	4	13	2	2.5	1.2	0.5	2.5	-	-	10.5	9.2
ES100-143	140	143	157	12.5	152	156.7	158.9	159.7	4	11.5	2	2.5	1	0.5	3	1	0.5	10	6.4
ES100-146	143	146	168	19	159	171.7	175.8	176.8	4	18	2	3	1	0.5	4	1.5	0.5	10	12.7
ES100-148	145	148	170	17	164	171.3	174.6	175.6	4	15	2	2.5	0.8	0.5	3	1.5	0.5	10	9.6
ES100-150	147	150	172	20	165	173.5	178	179	4	18	2	2.5	0.8	0.5	3	2	0.5	10	11.3
ES100-154	151	154	168	13	164	167.8	170.2	171	4	11.5	2	2.5	0.8	0.5	3	1	0.5	10	6.3
ES100-155	152	155	177	20	170	179.4	184.6	185.6	4	20	2	2.9	1	0.5	4	1	0.5	10.5	12
ES100-163	160	163	188	19	178.6	191.1	195.4	196.4	4	18	2	3	1	0.5	4	2	0.5	10	13.1
ES100-178	175	178	200	19	192	205	209.6	210.6	4	19	2	3	1	0.5	4	2	0.5	10	13.1
ES100-182	179	182	207	18	197.6	210	214.4	215.4	4	18	2	3	1	0.5	4	2	0.5	10	13
ES100-188	185	188	205	14	199	207.1	209.5	210.5	3	12.5	2	2.5	0.8	0.5	3	1	1.5	10	8.3
ES100-192	189	192	215	17	207	216	219.8	220.8	4	16.5	2	3	1	0.5	4	2	0.5	10	10.4
ES100-204	201	204	225.5	16	218	227.4	230.5	231.5	3	14.5	2	2.5	0.8	0.5	3	1	1.5	10	9.5
ES100-209	206	209	234	21	224	236.6	241.6	242.6	4	19.5	2	3	1	0.5	4	2	0.5	10	13
ES100-220	217	220	246	20.5	236	248.3	253.6	254.6	4	20.5	2	3	1	0.5	4	2	1	10	13
ES100-225	222	225	252	18.5	241	252.1	257	258	4	19	2	3	1	0.5	4	2	1	10	12
ES100-239	236	239	268	20	257	268.6	273.2	274.2	4	19	2	3	1	0.5	4	2	1	10	12
ES100-250	247	250	276	22	266	278.4	283.6	284.6	4	20.5	2	3	1	0.5	4	2	1	10	13
ES100-265	262	265	290	18.5	280.2	292.5	296.9	297.9	4	18.5	2	3	1	0.5	4	2	1	10	13
ES100-300	297	300	328	20	315	327.1	332	333	4	19.5	2.5	3	1	0.5	4	2	1	10	12.5
ES100-318	315	318	343	18.5	333.8	346.1	350.6	351.6	4	18.5	2.5	3	1	0.5	4	2	1	10	12.7
ES100-340	337	340	369	20.2	358	369	373.8	374.8	4	19	2.5	3	1	0.5	4	2	1	10	12
ES100-356	353	356	381	19	370	384.2	388.5	389.5	4	18.5	2.5	3	1	0.5	4	2	1	10	12.7
ES100-366	363	366	391	18.5	381.8	394	398.5	399.5	4	18.5	2.5	3	1	0.5	4	2	1	10	12.7
ES100-429	426	429	454	18.5	444.6	456.9	461.3	462.3	4	18.5	2.5	3	1	0.5	4	2	1	10	12.7

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# Type ES764 Floating Seal Sizes



Metric Dimensions (mm)

Type & Size	d max.	D1 ref.	D2 ±0.07	D3 ±0.5	L1 ±0.5	L2 ±0.2	L3 min.	L4 max.
ES764-35	32	34.5	56	46	18	7.5	1.5	19
ES764-46	44	45.5	66	56	20	9	1.5	18
ES764-53	50.5	52.5	76	66	15	6	2.3	17.2
ES764-60	57	59.5	86	73	20	8.5	1.5	21
ES764-73	70	72.5	101	87	22	9.5	1.5	21
ES764-84	81.8	83.5	114.3	97.36	25.81	12.06	0.38	23
ES764-96	88.9	95.5	125.81	109.12	27.84	12.98	1.5	26.6

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Your online connection to finding a particular Simrit product is [www.simrit.com](http://www.simrit.com). Our full-service website features client log-in, order tracking, and expert support. Log on for access to the complete catalog of approximately 500,000 Simrit parts featuring over 250,000 cross-reference numbers.

# Sealing Solutions from Simrit

Whatever application you choose, Simrit will meet or surpass your production demands. We provide total sealing solutions with one-stop shopping for all your sealing needs. Simrit offers product availability, engineering expertise, and advanced technology that exceeds industry standards. Not only do we supply the highest quality products on the market, but our efficient global network and production facilities also make us cost competitive. O-rings, shaft seals, Plug & Seals, and a complete line of fluid power seals are just some of the superior products available from Simrit.

## Fluid Power Products

Simrit provides a large variety of fluid power products in standard and non-standard sizes, with standardized cross-sections, including rod seals, piston seals, wiper seals, wear rings, and backup rings. We feature:

- **Disogrin®** polyurethane materials
- **Quantum™** PTFE materials
- **Simrit Xpress™** seals
- **Disogrin®** O-rings
- **Merkel** hydraulic components

## Shaft Seals

Simrit provides shaft seals in standard and non-standard sizes in a wide variety of materials.

- Patented crankshaft seal designs
- PTFE crankshaft seals
- Special two-piece valve stem seals
- High-performance cassette seals
- Track roller seals



## ISC O-Rings

Simrit offers off-the-shelf availability for standard O-rings. We supply **Disogrin®** polyurethane O-rings, the highest standard in the industry for toughness, tear strength, reliance, extrusion resistance, and compression set, providing positive, leak-free sealing up to 10,000 psi. Simrit O-ring materials also include:

- Ethylene propylene (EPR/EPDM)
- Fluorocarbon (FKM)
- Fluorosilicone (FVMQ)
- Hydrogenated nitrile (HNBR)
- Liqui-Last™ (pFKM)
- Nitrile (NBR)
- Silicone (VMQ)
- **Simriz®** perfluoroelastomer (FFKM)



*Plug & Seals. Designed as rubber-coated pipe sections, Plug & Seals create a safe, leak-free connection between housings. Reliable even under high pressure, Plug & Seals are a secure, low-cost solution for the transport of air, water, and oils. They can combine several functions in a single component and compensate for conduit misalignment and tolerance variations. Plug & Seals are available in a wide variety of elastomer coatings.*

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