SEALMAC

RADIAL SHAFT SEALS

Seals, to your size

OEM
INTERNATIONAL, INC.

ISO 9001:2000 CERTIFIED

THE SEALMAC SEAL

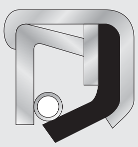
Sealmac seals are heavy-duty, metal-clad, radial shaft seals suitable for applications requiring lubrication or fluid retention and/or contaminant exclusion. An unlimited selection of sizes, styles and materials can be provided. In addition to standard inch and hard metric dimensions, Sealmac's construction process allows for unique sizes and tolerances to meet your specifications.

Styles

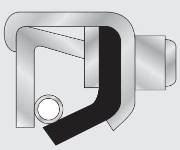
Sealmac seals are constructed using heavy-duty fabricated metal cases. All spring-loaded sealing lip designs utilize metal end plates, offering additional strength and stability. Spring-loaded designs may be manufactured to withstand pressures up to 10 bar (150psi). Special designs are available to 25 bar (375spi). External lip configuration is available with most styles.

The Sealmac Styles
Standard • Single Lip
Semi-Dual • Double Lip
Dual • Tandem Lip
Special Designs

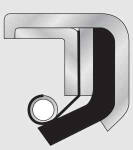
Standard • Single Lip



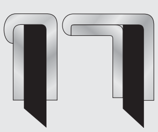
SCS
Single, spring-loaded lip. This is the most common design used when primary function is either exclusion or retention.



SCS/L
Single, spring-loaded lip. Adjustable or fixed spacing buttons on back of seal. Used to set the gap between seals, when used in pairs, allowing lubricant to reach both sealing lips.

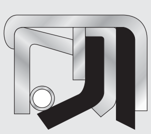


SCSQ
Single, spring-loaded lip. A garter spring is retained by a flat, leaf-spring closure. Used in applications that must exclude the possibility of spring separation

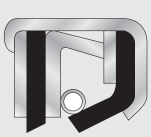


SCSO & SMSO
Single, springless lip. Used when axial/radial space restrictions prevent the use of a SCS seal. Also used as a shaft wiper.

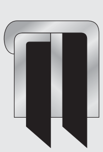
Semi-Dual • Double Lip



SCD
Spring-loaded primary sealing lip with a springless secondary dust lip at the back of the seal. Used where material or fluid exclusion is needed in addition to fluid or liquid retention.

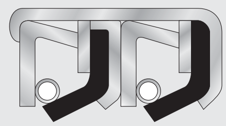


SCDD
Spring-loaded primary sealing lip with a springless secondary dust lip at the front of the seal. Used in space-limited applications requiring a single function design.

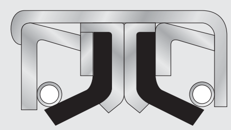


SCDO
Springless double lip. Used when axial and radial space restrictions preclude the use of a SCDC seal.

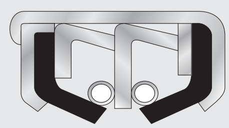
Dual • Tandem Lip



SCTT
Two spring-loaded lips facing the same direction in a single case. Used in a single purpose, severe duty environment as an excluder or for fluid/lubricant retention.

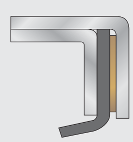


SCTF
Two spring-loaded lips in a single case with faces exposed on each side of the case. Used when positive sealing is required from two directions or when necessary to seal/separate fluids.

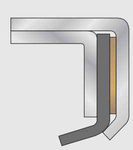


SCTB
Two spring-loaded lips in a single case with seal backs exposed on each side of the case. Used when a large amount of lubricant is required due to inability to re-lubricate.

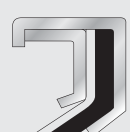
Special Designs



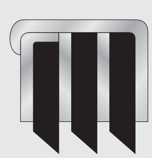
STMSO
Single, springless, PTFE lip with fluorocarbon static sealing washer. Used for higher speeds, pressures, and temperatures. Good for corrosive environments.



STMSOE & STMSOH
Single, springless, PTFE lip with fluorocarbon static sealing washer. For higher pressures. **STMSOE** used for pressures to 10 bar (150psi). **STMSOH** used for pressures to 25 bar (375psi).



SMS/F
Patented Failsafe design. Sealing lip is energized without the use of metal springs. Used when space is limited and use of a loose garter spring could result in component damage.



SCTO
Three, springless lips in a single case. Used in low-pressure applications when retention of grease and heavy oils is required.

Sizes

Within manufacturing limitations, any size seal, inch or hard metric, is available thus eliminating the need to consult a manufacturer's catalogue for tooled sizes. There is no charge for tooling, minimum production quantities or for special tolerances. Extended life for a damaged housing bore or shaft is possible by machining to correct the problem then selecting a Sealmac seal to meet the new dimensional requirements.

Standard, Semi-Dual, and **Dual** style Sealmac Seals are available in any Outside Diameter (OD) from 2.500 inches to 48.000 inches (65mm through 1220mm). Seal Inside Diameter (ID) and width for a given OD is subject to a minimum producible section. The chart to the right lists the minimum seal section for each range of seal OD's. These values calculate a seals maximum ID and minimum width.

Springless and high-pressure seal designs have different minimum section. Leather seals may have smaller ID. Information on seal ID and width limitations is available from OEM International.

Bore Size Inch / Metric							
OD			Up to 3.000 (76.2 mm)	3.001 - 6.000 (76.2 - 152.4 mm)	6.001 - 15.000 (152.4 - 381 mm)	15.001 - 20.000 (381 - 508 mm)	20.001 Up (508 mm)
Standard Single Lip	Minimum Width	inch	0.375	0.375	0.500	0.625	0.750
		mm	9.52	9.52	12.70	15.88	19.05
	Minimum Section	inch	0.375	0.375	0.500	0.625	0.750
		mm	9.52	9.52	12.70	15.88	19.05
Semi-Dual Double Lip	Minimum Width	inch	0.500	0.500	0.625	0.750	0.875
		mm	12.70	12.70	15.88	19.05	22.23
	Minimum Section	inch	0.438	5.000	0.625	0.750	0.875
		mm	11.11	12.70	15.88	19.05	22.23
Dual Tandem Lip	Minimum Width	inch		0.750	1.000	1.500	1.750
		mm		19.05	25.40	38.10	44.45
	Minimum Section	inch		0.750	1.000	1.250	1.500
		mm		25.40	25.40	31.75	38.10

Materials

The correct selection of elastomeric and metal case materials is critical for optimal seal performance in any application. All materials have characteristics and properties that predict their response in specific environments. The most commonly used materials are listed below. Detailed information on these and other, more specialized, materials is available from OEM International.

Lips

Sealmac's manufacturing method allows selection of the most application appropriate lip material for any style.

Material	ASTM D2000	Temperature Range ° F Low	Temperature Range ° F High	Temperature Range ° C Low	Temperature Range ° C High	Shaft Speed Ft/Min Max	Shaft Speed M/Sec Max	General Characteristics
Nitrile	NBR	-40	250	-40	120	3500	18	General, all-purpose material, resistant to most petroleum products.
Fluorocarbon	FKM	-5	400	-20	200	6900	35	Excellent for high temperature and high speed applications.
Silicone	VMQ	-60	340	-50	170	6900	35	Good low temperature properties. Can tear easily.
Polyacrylate	ACM	-20	300	-30	150	4900	25	Use with EP type lubricants. Good ozone resistance.
Hydrogenated Nitrile	HNBR	-60	300	-50	150	4900	25	A nitrile base with high operating temperature & abrasion resistance.
Carboxylated Nitrile	XNBR	-20	250	-30	120	3500	18	Very high abrasion resistance.
Ethlene Proprene	EPDM	-65	300	-50	150	4900	25	Resistant to phosphate-ester fluids, steam and ozone.
Leather	LEA	-95	210	-70	100	2900	15	Use where shaft shows extreme wear. Good in limited lube areas.
Felt		-65	200	-55	95	750	4	Great for excluding dust and dirt.
Polytetrafluoroethylene	PTFE	-120	450	-85	235	7700	40	Excellent chemical resistance. Use in dry running applications.
Perfluoroelastomer	FFKM	-10	600	-20	315	5700	30	Highest possible chemical resistance. Softer at upper temperatures.

Cases

Sealmac's metal case materials are also available in any seal size. **Mild Carbon Steel** is a general-purpose material, SAE 1006-1008, cold rolled. It is treated for protection during handling. **Stainless Steel** is available when corrosion resistance is required. SAE 304 or SAE 316 may be selected. **Brass** and **Aluminum** cases are available for applications requiring non-ferris materials.

Springs

Sealmac springs are sized for optimal performance based on diameter and application material requirements.

Technical Data

Housing Bore

Bore and seal tolerances are critical to seal fit and life. Tolerances shown are for both inch and hard metric dimensions and apply to ferrous bore and seal materials only. For additional information on housing bore materials, contact OEM, International

Housing Bore					
ISO / DIN H8		Bore Tolerance		Seal OD Tolerance	
Over	To	From	To	From	To
6	10	-0.000	0.022	0.10	0.20
10	18	-0.000	0.027	0.10	0.20
18	30	-0.000	0.033	0.10	0.20
30	50	-0.000	0.039	0.10	0.20
50	80	-0.000	0.046	0.13	0.23
80	120	-0.000	0.054	0.15	0.25
120	180	-0.000	0.063	0.18	0.28
180	250	-0.000	0.072	0.20	0.30
250	300	-0.000	0.081	0.20	0.30
300	315	-0.000	0.081	0.20	0.30
315	400	-0.000	0.089	0.23	0.35
400	500	-0.000	0.097	0.23	0.35
500	630	-0.000	0.110	0.23	0.35
630	800	-0.000	0.125	0.33	0.43
800	1,000	-0.000	0.140	0.33	0.43
1,000	1,250	-0.000	0.165	0.33	0.43

Housing Bore						
BSI		Bore Tolerance		Nominal Press-Fit	Seal OD Tolerance	
Over	To	From	To		From	To
Up to	2.000	-0.001	0.001	0.005	0.0015	0.0045
2.000	3.500	-0.001	0.001	0.005	0.0025	0.0055
3.500	4.375	-0.0015	0.002	0.005	0.003	0.007
4.375	8.000	-0.0015	0.002	0.006	0.004	0.008
8.000	8.500	-0.002	0.002	0.007	0.005	0.009
8.500	9.000	-0.002	0.002	0.007	0.006	0.010
9.000	30.000	-0.006	0.002	0.008	0.008	0.012
30.000	and Above	-0.006	0.002	0.008	0.013	0.017

Bore finish is important in maintaining an OD static seal. A finish of 100 microinches Ra (2.5 micrometers) or smoother should be maintained on applications where lubricant pressure to 3 psi (20 kPa) is present against the OD of the seal. If this finish is maintained, OD leakage problems can be eliminated.

If the bore is rougher than 100 microinches Ra (2.5 micrometers), we recommend use of a bore sealer or a change to a rubber OD style. Bore sealers, usually resinous materials, fill in minor bore imperfections during seal installation. No bore sealant is required when the application is to seal grease.

The lead corner or entering edge of the bore should be chamfered to 15º to 30º. Rough corners or burrs may scratch the seal outside diameter and cause leakage.

Shafts

To maintain a positive sealing surface, shaft diameter tolerances shown in the following table should be maintained. Tolerances greater than those shown should be used only if agreed upon between user and supplier

Shafts			
ISO / DIN h11		Shaft Tolerance	
Over	To	From	To
6	10	+0.00	-0.09
10	18	+0.00	-0.11
18	30	+0.00	-0.13
30	50	+0.00	-0.16
50	80	+0.00	-0.19
80	120	+0.00	-0.22
120	180	+0.00	-0.25
180	250	+0.00	-0.29
250	315	+0.00	-0.32
315	400	+0.00	-0.36
400	500	+0.00	-0.40
500	630	+0.00	-0.44
630	800	+0.00	-0.50
800	1,000	+0.00	-0.56
1,000	1,250	+0.00	-0.66

Shafts		
BSI		Shaft Tolerance
Over	To	
Up To	4.000	± 0.003
4.001	6.000	± 0.004
6.001	10.000	± 0.005
10.001	& Above	± 0.006

Shaft finish, vital in the functioning of a lip seal, should be specified as 10-20 microinches Ra (0.20 0.60 microinches Ra) with no machine lead. The most accepted method for obtaining this finish is plunge grinding.

Shafts contacted by the lip should be hardened to Rockwell C30 minimum. Rockwell C45 minimum is recommended to help avoid damage to shafting due to handling. Rockwell C55 is recommended for stainless steel shafts.

Most installation problems are due to inadequate shaft chamfer. To aid in installation and help prevent damage to The seal lip, the leading edge of the Shaft should be chamfered to 15º to 30º or radiused to 0.125" (3 mm).

Certain technical information obtained from RMA.

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