

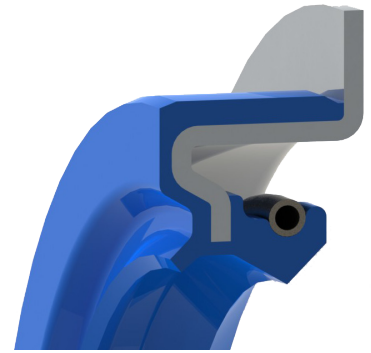
PROFILES

ESP International has created an organized Profile Selection Matrix that is customer friendly and easy to understand. Although it helps to be rehearsed in how system sealing parameters can affect lip and OD styles it is not required. To fully utilize this section a brief explanation is needed to provide instruction and explanation of its intended use.

The Profile Matrix is designed in rows and columns based on lip and case type designations. When moving from left to right the lip type remains constant as the case options change. In a similar manner, moving up and down reveals different lip options. The “type” designation and description are at the beginning of each column and row. These descriptions are intended to provide general usage information to aid in the selection process. For applications with limited profile choices the matrix has been reduced to single row format. If a profile option does not appear in the matrix please contact ESP International.

Various Operation Tables are placed after the Profile Matrix to help further determine the appropriate profile for an application. These tables can be used before and after profile selection. When using before profile selection, the type of lip style can be narrowed and help determine which profiles are designed to operate under the applications conditions.











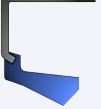























After a profile has been selected this table should be consulted to reaffirm proper selection. For parameters outside the ranges given for operation please contact ESP International.



Profiles.

If a profile option does not appear in the matrix please contact ESP International. Custom solutions can be provided upon request.

PROFILE MATRIX

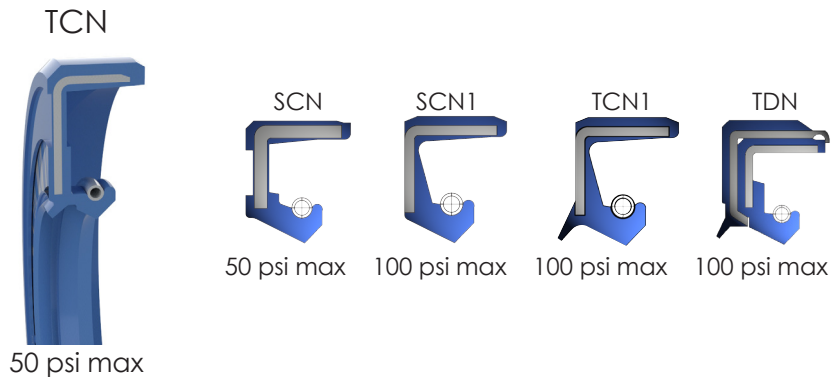
GENERAL APPLICATIONS		GENERAL APPLICATIONS				
		Cast or steel housing where structural rigidity is required	Cast or steel housing	Soft alloy or plastic housing or as replacements if housing surface is damaged	Soft alloy or plastic housing, ribs reduce installation forces	Steel or soft alloy housing, provides metal to metal fit and sealing ability of rubber, reducing springback
Lip Type	Case Type	A2 Dual metal case, metal OD	B2 Single metal case, metal OD	C Rubber coated case	G Rubber coated case with ribs added to OD	BC Single metal case, metal OD, with half/half design
	General standard pressure fluid sealing and severe grease sealing	S - Single spring loaded lip	SA2 	SB2 	SC 	SG 
General standard pressure fluid sealing and severe grease sealing with light duty exclusion of foreign materials	T - Single spring loaded lip with dust lip	TA2 	TB2 	TC 	TG 	TBC 
General standard pressure grease and viscous fluid sealing	V - Single lip	VA2 	VB2 	VC 	VG 	VBC 
General standard pressure grease and viscous fluid sealing with light duty exclusion of foreign materials	K - Single lip with dust lip	KA2 	KB2 	KC 	KG 	KBC 
General fluid sealing and severe grease sealing where separation of two fluids is required	D - Dual spring loaded lips	DA2 	DB2 	DC 	DG 	DBC 
General standard pressure grease retention with heavy duty exclusion of mud and water	U - Triple sealing lip	UA2 	UB2 	UC 	UG 	UBC 
General standard pressure grease retention with heavy duty exclusion of mud and water and sealing element contacting bore	OU - OD triple sealing lips	OUA2 	OUB2 	OUC 	OUG 	OUBC 

PROFILES

N STYLE

General medium pressure fluid sealing applications (50-100 PSI, 3.4-6.9 Bar max), seals are designed for soft alloy or steel housing.

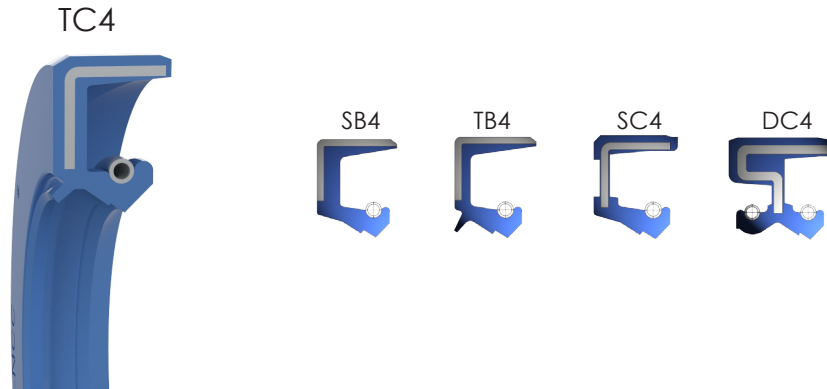
PROFILES



RECOMMENDED OPERATING CONDITIONS			
Maximum shaft dynamic runout (DRO)	RPM	0-2000	
	TIR	0.003" 0.08 mm	
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-2000 (0-610)	
	STBM	0.005" 0.13 mm	
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	7639
		2" (50.8 mm)	3820
		3" (76.2 mm)	2546
	FPM (MPM)		2000 (610)

4 STYLE

General standard pressure applications where linear movement is prevalent, seals with metal OD are designed for cast or steel housing while rubber OD seals are for soft alloy or plastic housing.



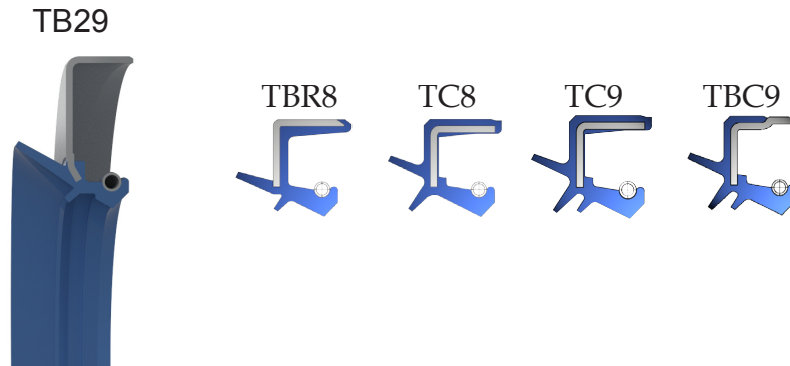
PROFILES

RECOMMENDED OPERATING CONDITIONS				
Maximum shaft dynamic runout (DRO)	RPM	0-1000	1000-2500	2500-4500
	TIR	0.020" 0.51 mm	0.015" 0.38 mm	0.010" 0.25 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-3600 (305-1097)	
	STBM	0.015" 0.38 mm	0.010" 0.25 mm	
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)	2000-3600 (610-1097)
	PSI (BAR)	10 (0.69)	5 (0.34)	0 (0)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	13751	
		2" (50.8 mm)	6875	
		3" (76.2 mm)	4584	
	FPM (MPM)	3600 (1097)		

8-9 STYLE

General standard pressure applications, lip on outside face is designed to act as rotary axial face seal, seals with metal OD are design for cast or steel housing while rubber OD seals are for soft alloy housing.

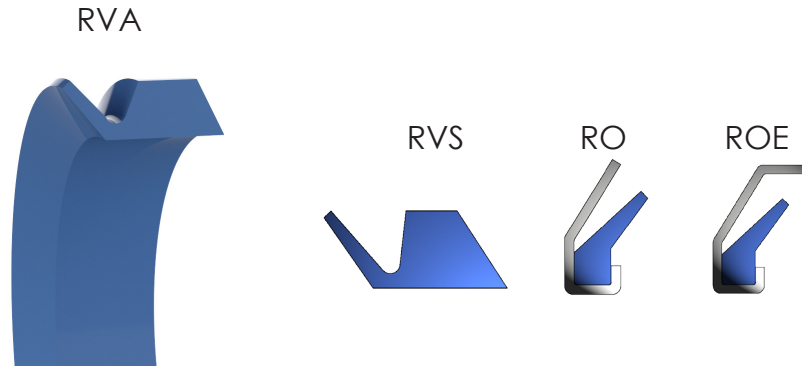
PROFILES



RECOMMENDED OPERATING CONDITIONS				
Maximum shaft dynamic runout (DRO)	RPM	0-1000	1000-2500	2500-4500
	TIR	0.020" 0.51 mm	0.015" 0.38 mm	0.010" 0.25 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-3600 (305-1097)	
	STBM	0.015" 0.38 mm	0.010" 0.25 mm	
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)	2000-3600 (610-1097)
	PSI (BAR)	10 (0.69)	5 (0.34)	0 (0)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	13751	
		2" (50.8 mm)	6875	
		3" (76.2 mm)	4584	
	FPM (MPM)	3600 (1097)		

R STYLE

General standard pressure axial face seal for heavy duty foreign material exclusion. Metal case might be used to protect the elastomer from being destroyed.



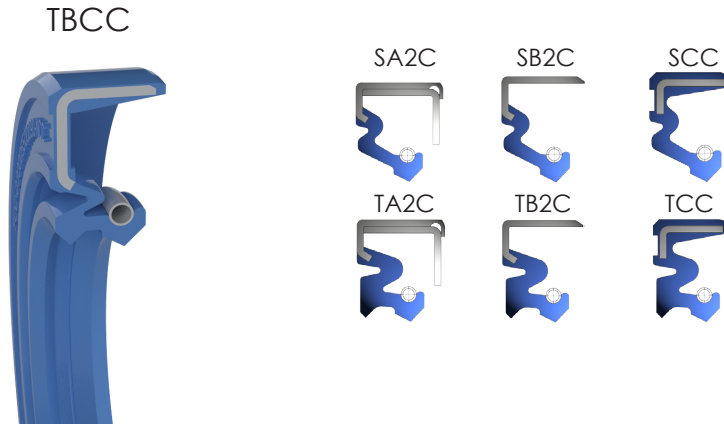
PROFILES

RECOMMENDED OPERATING CONDITIONS				
Maximum shaft dynamic runout (DRO)	RPM	0-1000	1000-2500	2500-4500
	TIR	0.020" 0.51 mm	0.015" 0.38 mm	0.010" 0.25 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-3600 (305-1097)	
	STBM	0.015" 0.38 mm	0.010" 0.25 mm	
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)	2000-3600 (610-1097)
	PSI (BAR)	10 (0.69)	5 (0.34)	0 (0)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	13751	
		2" (50.8 mm)	6875	
		3" (76.2 mm)	4584	
	FPM (MPM)	3600 (1097)		

C STYLE

General standard pressure fluid sealing and severe grease sealing with light duty exclusion of foreign materials, designed for applications where shaft eccentricity is excessive (0.060", 1.5 mm max).

PROFILES

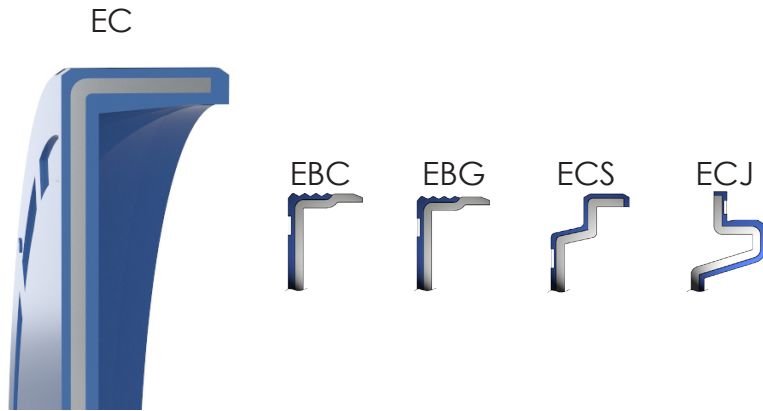


RECOMMENDED OPERATING CONDITIONS

Maximum shaft dynamic runout (DRO)	RPM	0-1000	1000-2500	2500-4500
	TIR	0.050" 0.51 mm	0.030" 0.38 mm	0.020" 0.25 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-3600 (305-1097)	
	STBM	0.040" 0.38 mm	0.020" 0.25 mm	
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)	2000-3600 (610-1097)
	PSI (BAR)	10 (0.69)	5 (0.34)	0 (0)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	13751	
		2" (50.8 mm)	6875	
		3" (76.2 mm)	4584	
	FPM (MPM)	3600 (1097)		

E STYLE

Solid cap (no center hole) for sealing additional shaft location holes.



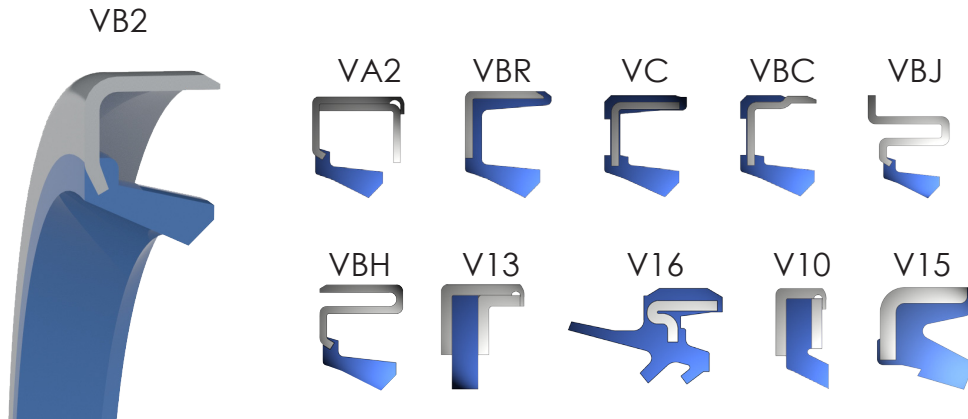
PROFILES

RECOMMENDED OPERATING CONDITIONS		
Maximum pressure	PSI (BAR)	20 (1.4)

V STYLE

Single lip without spring for general standard pressure grease and viscous fluid sealing, install with lip facing to the air side for maximum dirt exclusion, not typically recommended for oil retention.

PROFILES

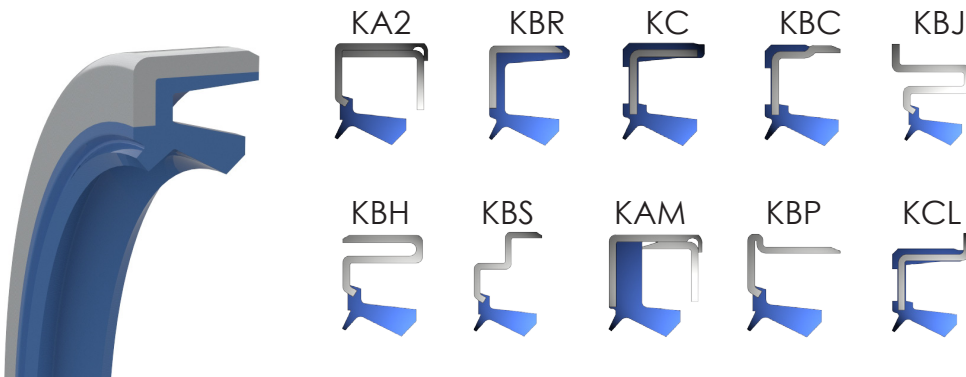


RECOMMENDED OPERATING CONDITIONS			
Maximum shaft dynamic runout (DRO)	RPM	0-2000	
	TIR	0.003" 0.08 mm	
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-2000 (0-610)	
	STBM	0.005" 0.13 mm	
Maximum pressure	FPM (MPM)	0-2000 (0-610)	
	PSI (BAR)	3 (0.21)	
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	7639
		2" (50.8 mm)	3820
		3" (76.2 mm)	2546
	FPM (MPM)		2000 (610)

K STYLE

Dual lip without spring for general standard pressure grease and viscous fluid sealing, secondary lip is designed for light duty exclusion of foreign materials, not typically recommended for oil retention.

KB2



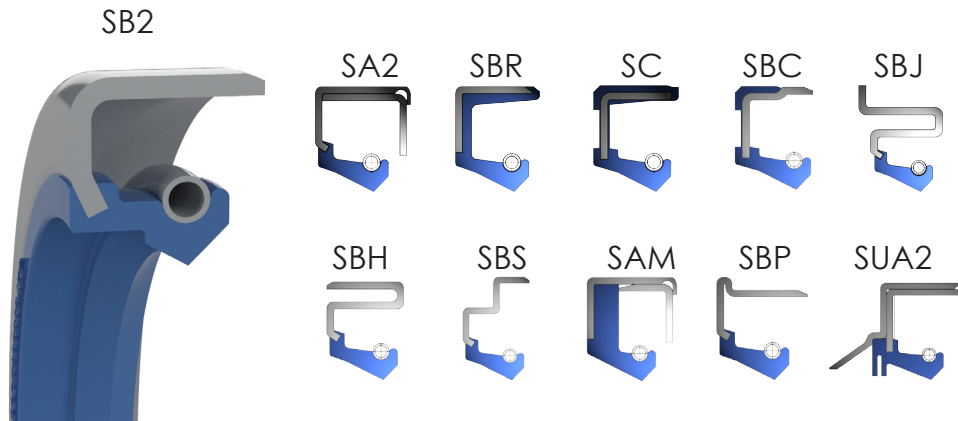
PROFILES

RECOMMENDED OPERATING CONDITIONS			
Maximum shaft dynamic runout (DRO)	RPM	0-2000	
	TIR	0.003" 0.08 mm	
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-2000 (0-610)	
	STBM	0.005" 0.13 mm	
Maximum pressure	FPM (MPM)	0-2000 (0-610)	
	PSI (BAR)	3 (0.21)	
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	7639
		2" (50.8 mm)	3820
		3" (76.2 mm)	2546
	FPM (MPM)		2000 (610)

S STYLE

Single spring loaded lip for general standard pressure fluid sealing and severe grease sealing applications.

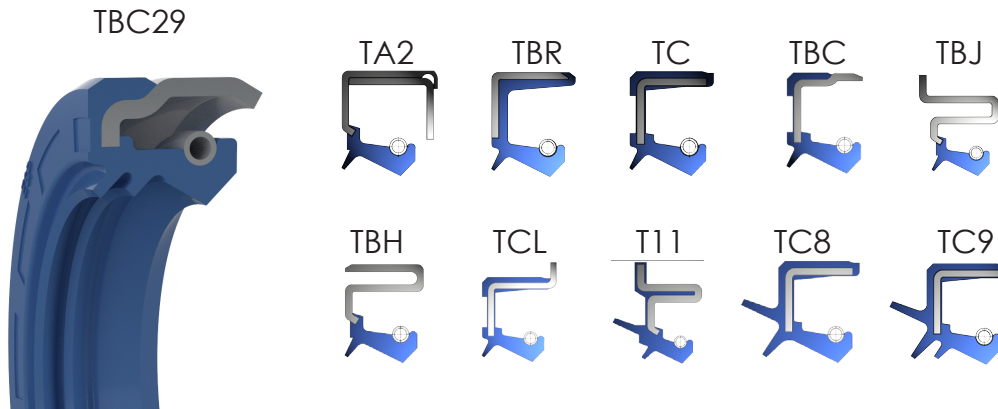
PROFILES



RECOMMENDED OPERATING CONDITIONS				
Maximum shaft dynamic runout (DRO)	RPM	0-1000	1000-2500	2500-4500
	TIR	0.020" 0.51 mm	0.015" 0.38 mm	0.010" 0.25 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-3600 (305-1097)	
	STBM	0.015" 0.38 mm	0.010" 0.25 mm	
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)	2000-3600 (610-1097)
	PSI (BAR)	10 (0.69)	5 (0.34)	0 (0)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	13751	
		2" (50.8 mm)	6875	
		3" (76.2 mm)	4584	
	FPM (MPM)	3600 (1097)		

T STYLE

Single spring loaded lip with dust lip for general standard pressure fluid sealing and severe grease sealing applications, secondary lip is designed for light duty exclusion of foreign materials.



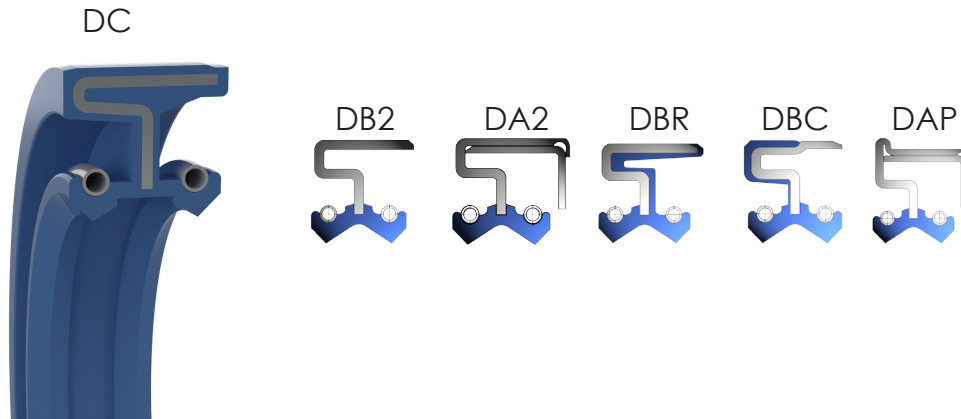
PROFILES

RECOMMENDED OPERATING CONDITIONS				
Maximum shaft dynamic runout (DRO)	RPM	0-1000	1000-2500	2500-4500
	TIR	0.020" 0.51 mm	0.015" 0.38 mm	0.010" 0.25 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-3600 (305-1097)	
	STBM	0.015" 0.38 mm	0.010" 0.25 mm	
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)	2000-3600 (610-1097)
	PSI (BAR)	10 (0.69)	5 (0.34)	0 (0)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	13751	
		2" (50.8 mm)	6875	
		3" (76.2 mm)	4584	
	FPM (MPM)	3600 (1097)		

D STYLE

Dual spring loaded lips, typically used to separate two fluids but can also be used in high contamination situations to keep out foreign materials and to retain fluid.

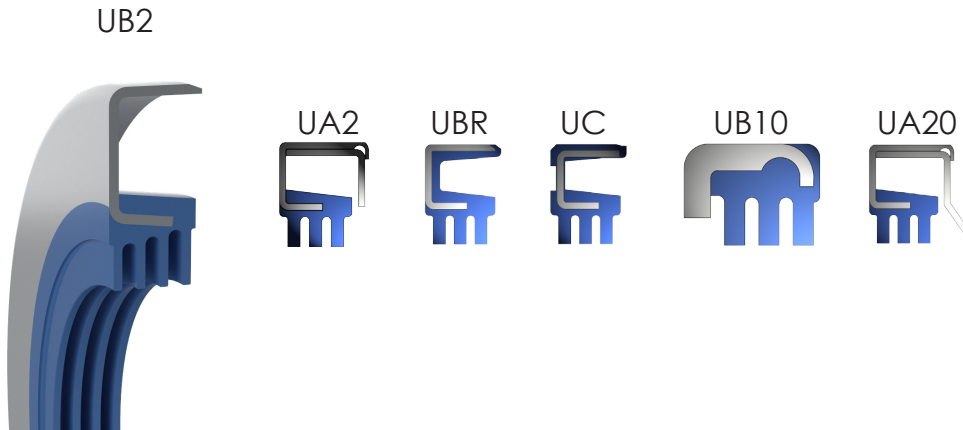
PROFILES



RECOMMENDED OPERATING CONDITIONS			
Maximum shaft dynamic runout (DRO)	RPM	0-1000	1000-2000
	TIR	0.010" 0.25 mm	0.005" 0.13 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-610)
	STBM	0.010" 0.25 mm	0.005" 0.13 mm
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)
	PSI (BAR)	10 (0.69)	5 (0.34)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	7639
		2" (50.8 mm)	3820
		3" (76.2 mm)	2546
	FPM (MPM)	2000 (610)	

U STYLE

Triple flat lips for general standard pressure grease retention with heavy duty exclusion of mud and water, commonly used in agricultural equipment.



PROFILES

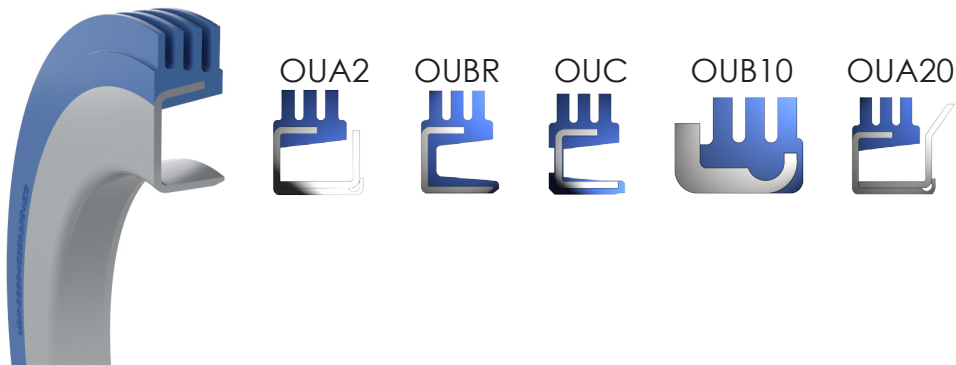
RECOMMENDED OPERATING CONDITIONS			
Maximum shaft dynamic runout (DRO)		RPM	0-800
		TIR	0.003" 0.08 mm
Maximum shaft to bore misalignment (STBM)		FPM (MPM)	0-500 (0-152)
		STBM	0.015" 0.38 mm
Maximum pressure		FPM (MPM)	0-500 (0-152)
		PSI (BAR)	3 (0.21)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	1910
		2" (50.8 mm)	955
		3" (76.2 mm)	637
	FPM (MPM)		500 (152)

OU STYLE

Triple flat lips for general standard pressure grease retention with heavy duty exclusion of mud and water, commonly used in agricultural equipment.

OUB2

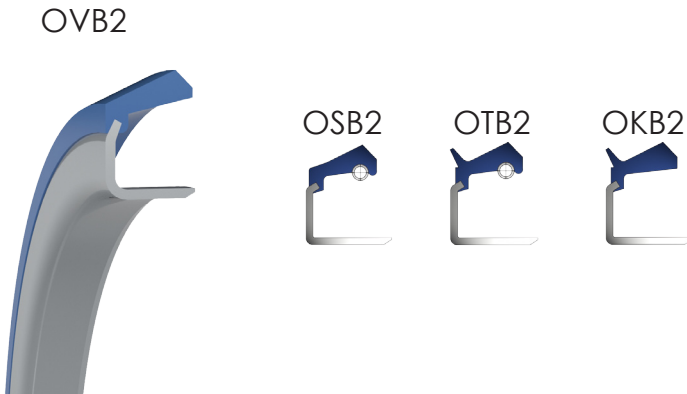
PROFILES



RECOMMENDED OPERATING CONDITIONS			
Maximum shaft dynamic runout (DRO)	RPM	0-800	
	TIR	0.003" 0.08 mm	
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-500 (0-152)	
	STBM	0.015" 0.38 mm	
Maximum pressure	FPM (MPM)	0-500 (0-152)	
	PSI (BAR)	3 (0.21)	
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	1910
		2" (50.8 mm)	955
		3" (76.2 mm)	637
	FPM (MPM)	500 (152)	

O STYLE

External lip seals designed to press-fit on shaft or spindle with sealing element contacting bore, all may be used with lip facing outward to exclude dirt and allow purging.



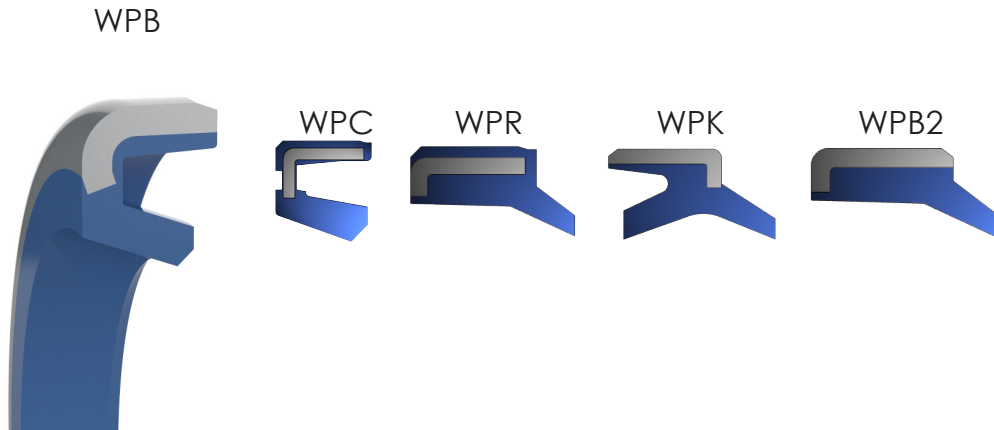
PROFILES

RECOMMENDED OPERATING CONDITIONS					
Maximum shaft dynamic runout (DRO)		Oil Lip			Grease Lip
	RPM	0-1000	1000-2500	2500-4500	0-2000
	TIR	0.020" 0.51 mm	0.015" 0.38 mm	0.010" 0.25 mm	0.003" 0.08 mm
Maximum shaft to bore misalignment (STBM)	FPM (MPM)	0-1000 (0-305)	1000-3600 (305-1097)		0-1000 (0-610)
	STBM	0.015" 0.38 mm	0.010" 0.25 mm		0.005" 0.13 mm
Maximum pressure	FPM (MPM)	0-1000 (0-305)	1000-2000 (305-609)	2000-3600 (610-1097)	0-2000 (0-610)
	PSI (BAR)	10 (0.69)	5 (0.34)	0 (0)	3 (0.21)
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	13751		7639
		2" (50.8 mm)	6875		3820
		3" (76.2 mm)	4584		2546
	FPM (MPM)	3600 (1097)		2000 (610)	

WP STYLE

This style of lip is used for scraping and wiping in hydraulic and pneumatic cylinder applications.

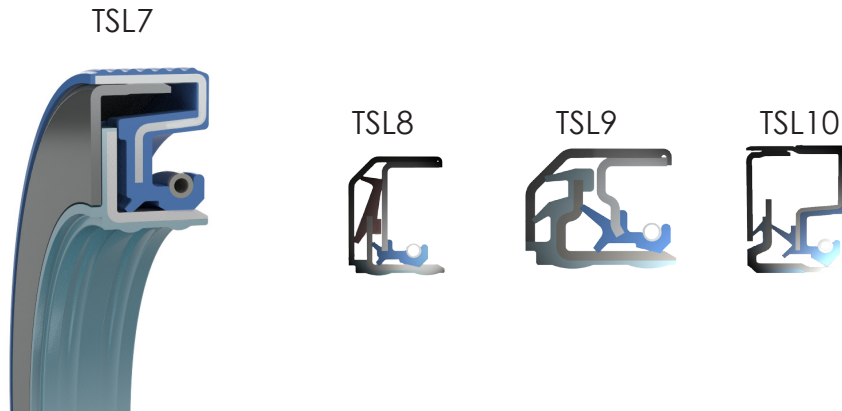
PROFILES



RECOMMENDED OPERATING CONDITIONS		
Maximum shaft to bore misalignment (STBM)	STBM	0.008" 0.20 mm
	FPM (MPM)	0-200 (0-60)
Maximum pressure	PSI (BAR)	4 (0.28)
	FPM (MPM)	0-200 (0-60)
Maximum Shaft Surface Speed	FPM (MPM)	Linear velocity 200 (60) maximum stroke length 78" (1.98 m)

TSL STYLE

General standard pressure fluid sealing and severe grease sealing, seals are designed for exclusion of foreign materials, usually used in harsh environments where seals will see large amount of dirt and debris.



PROFILES

RECOMMENDED OPERATING CONDITIONS			
Maximum shaft dynamic runout (DRO)	TIR	0.010" 0.08 mm	
	RPM	0-2500	
Maximum shaft to bore misalignment (STBM)	STBM	0.010" 0.25 mm	
	FPM (MPM)	0-500 (0-152)	
Maximum pressure	PSI (BAR)	10 (0.69)	
	FPM (MPM)	0-500 (0-152)	
Maximum shaft surface speed	RPM for given shaft size	1" (25.4 mm)	1910
		2" (50.8 mm)	955
		3" (76.2 mm)	637
	FPM (MPM)	500 (152)	

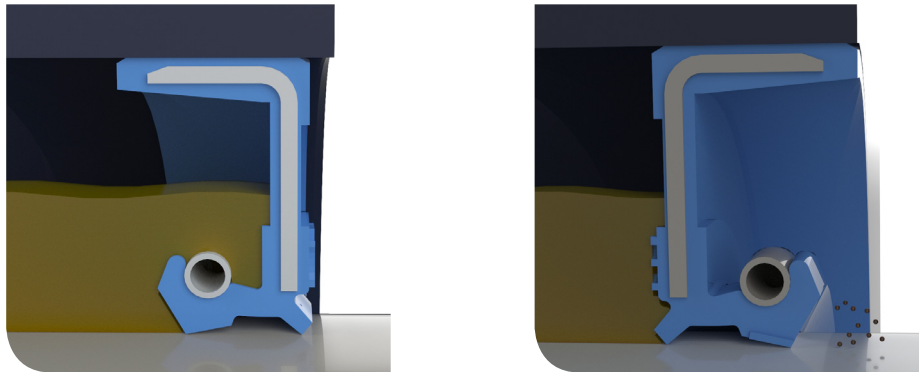
INSTALLATION DIRECTION

The installation direction determines the primary task of the seal.

It can be installed facing the air side, this is the common way to use a seal, this way the seal function is to keep the oil inside of the application.

If the function of the seal is to keep contamination out it may be installed facing the oil side. In some applications where both function are required two seals may be used, for specific applications please contact ESP International.

PROFILES



Installation direction.

The installation direction determines the primary concern of the seal, it can be to keep the oil inside or to keep the contamination out.

HYDRODYNAMIC AID DESIGNS

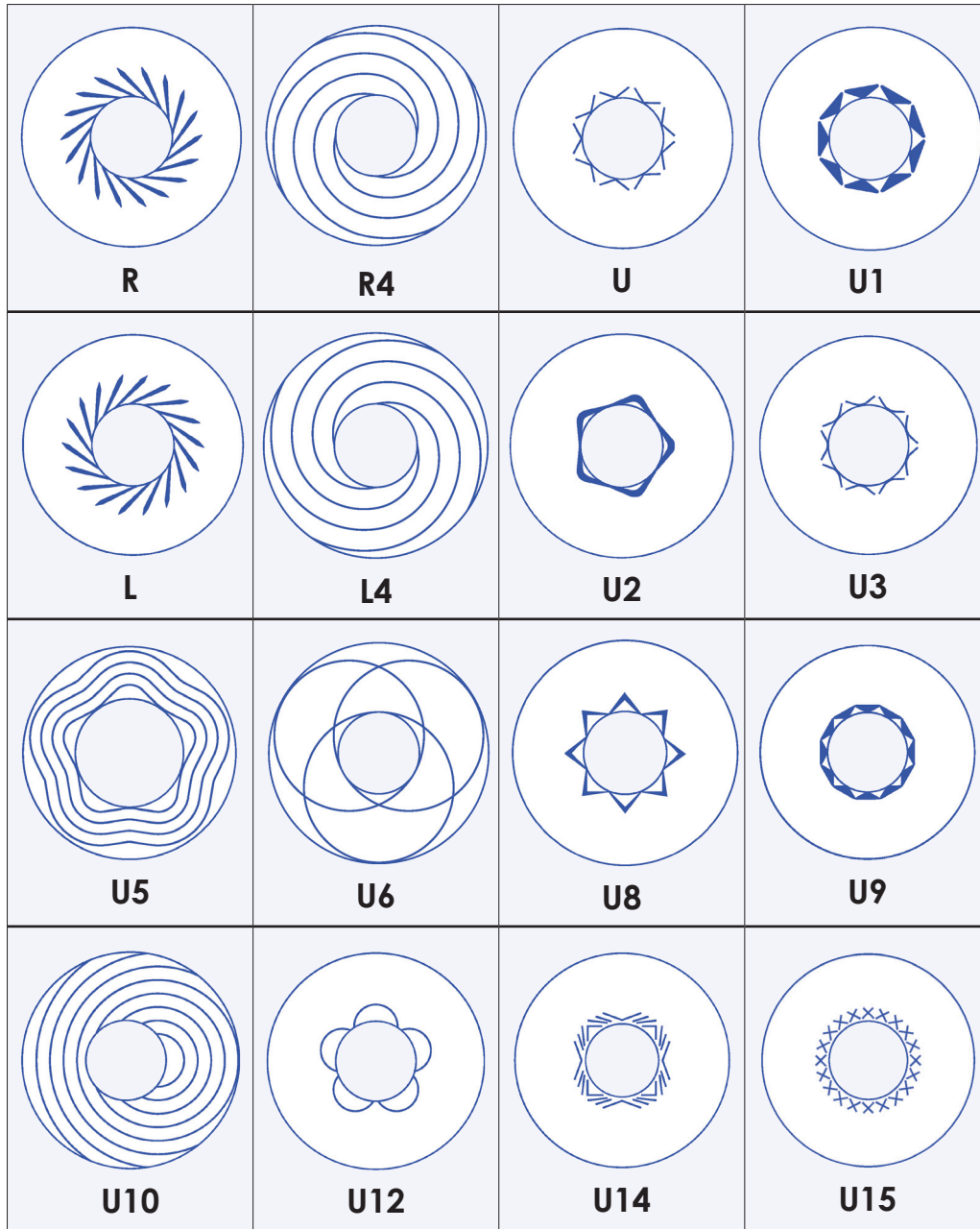
Hydrodynamic aids can provide vital sealing assistance for a given lip style. This section provides a 2-D view of the air side angle with an aid style designation. The use of a hydrodynamic aid is represented by placing an “H” in front of the radial shaft seal profile designation. If a “TC” profile utilizes a hydrodynamic aid the designation would be “HTC”. More specifically, the aid style will be attached to the end of the profile designation. For a “U5” style aid, in the above example, the complete profile designation would be “HTCU5”.

For example, the “L” style aid is a series of molded ribs located on the air side at an angle of 15° to 20° to the circumferential contact width.

PROFILES

PARAMETER	HYDRODYNAMIC AID
Shaft only rotates in clockwise direction	Type “R”
Shaft only rotates in counter-clockwise direction	Type “L”
Shaft rotates in both clockwise and counter-clockwise direction	Type “U”

PROFILES



For more information on hydrodynamic aids contact ESP International



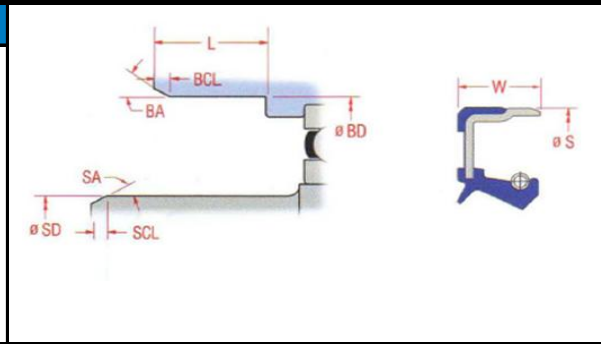
Request for Quotation

ESP International
 5920 Dry Creek Lane NE
 Cedar Rapids, IA 52402
 Ph: 319-393-4310
 Fax: 319-393-5327
 www.espint.com

Company:
 Contact Name:
 Phone:

Date:
 E-Mail:
 Fax:

Dim	Description	Value
SD	Shaft Diameter	
BD	Bore Diameter	
L	Bore Depth	
SA	Shaft Chamfer Angle	
SCL	Shaft Chamfer Length	
BA	Bore Chamfer Angle	
BCL	Bore Chamfer Length	
W	Seal Width	



Shaft

Horizontal Vertical

Material:

Hardness:

Surface Finish:

Lead Angle:

Dynamic Runout:

Shaft Offset:

Bore

Straight Counterbore

Material:

Hardness:

Surface Finish:

Chamfer: Yes No

Shaft Motion

Rotating Normal Max

RPM:

Shaft Speed (ft / min) **

1 2 3 4 5

(0-500) (500-750) (750-1750) (1750-4000) (4000-up)

Reciprocating Oscillating

Stroke Length: Degrees of Arc

Cycle / Min: Normal Max

Contamination Level **

1 2 3 4 5

Particle Type:

% of Exposure:

% Submerged:

Temperature ** F C

Sump: Underlip: Outside:

Pressure (PSI) **

Standard (0-10) Med/Low (10-50) Med (500-1000) High (< 1000)

Assembly

Removal: Rare Often

Space Restrictions: Yes No

Pilot Gap: ** Yes No

Shaft Installation Direction

Installation Direction into Bore

Fluid / Lubrication

Grease Oil

Type:

VI Index:

Sump Fill Level:

Usage **

Continuous Intermittent

Cycle Time: 1 2 3 4 5

Down Time: 1 2 3 4 5

Application Description: