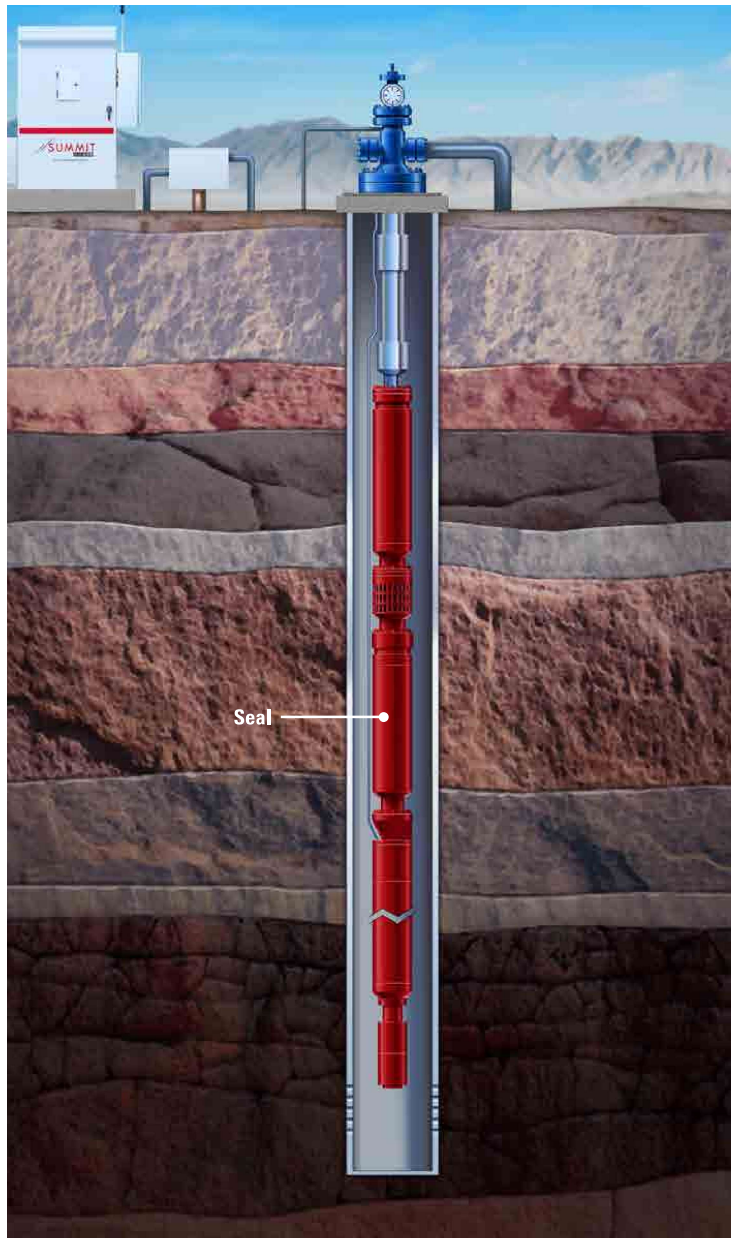


Artificial Lift



Seal
Sections



Defender® Seals

The seal section of an electric submersible pumping system is located between the intake and the motor. Its primary functions are to protect the motor and to support downward thrust generated by the pump.

In a typical installation, an electric submersible pumping system is submerged in fluid and lowered many thousands of feet into the ground. As the depth increases, a pressure differential is generated between the motor oil and the fluid in the well annulus. Summit ESP® – A Halliburton Service offers seal sections that allow the pressures to equalize while ensuring that wellbore fluids are not allowed to infiltrate and damage the motor. Additionally, our Defender® seals provide capacity to handle thermal expansion of motor oil during regular operation of the system.

The Defender seal is also equipped with a shaft-mounted thrust runner that transfers down-thrust forces from the pump shaft to a heavy-duty thrust bearing that is fixed to the housing. The positioning of this bearing allows Tiger Shark® pumps to be run in tandem configurations without the need for integrated thrust-handling capabilities.

Seal section chambers are either labyrinth or bag configurations. Labyrinth configurations permit well fluid to enter a chamber through a top-mounted vent port to allow pressures to equalize. The well fluid, which is typically heavier than motor oil, migrates to the bottom of the chamber, where it is isolated from the next chamber by a breather tube that only allows clean motor oil floating at the top of the chamber to pass between chambers.



Bag seals protect motor oil from well fluid through the use of a flexible elastomer bag contained within the seal housing. As with a labyrinth seal, wellbore fluid is allowed to enter the housing through a vent port, allowing the equalization of pressure, but the bag acts as a flexible barrier preventing motor oil contamination. As a rule of thumb, labyrinth-style chambers are used in vertical applications, and bag seals are used when the pump must be set in a wellbore with a horizontal deviation of more than 45 percent.

In high-horsepower applications or applications with extreme conditions, Defender® seals can be run in tandem configurations.



Seal Configuration Nomenclature

Defender® seal product descriptions are formulated to give insight into the configuration of a seal section.

Seal chamber types are denoted with capital letters:

- » L = Labyrinth seal section
- » B = Bag seal section

Lower-case letters between the upper-case chamber designations denote whether the chambers are in series or parallel:

- » s = In series (mechanical seal is present)
- » p = In parallel (no mechanical seal is present)

Seal Technical Information – All Series

Description		338 Series	400 Series	513 Series
Housing Diameter	in.	3.38	4.00	5.13
	mm	85.85	101.60	130.30
Shaft Diameter	in.	0.875	0.875	1.1875
	mm	22.225	22.225	30.163
Shaft Area	in. ²	0.601	0.601	0.886
	mm ²	387.741	387.741	571.612
Standard Shaft BHP Limit	HP	283	283	628
	kW	211	211	468
HS Shaft BHP Limit	HP	472	472	1,048
	kW	352	352	781
Max. Thrust Bearing Load	(lb) (HL)	3,213	4,680	5,106
Max. Thrust Bearing Load	(lb) (EHL)	5,654	8,236	9,200

338 Series Seal

Description		Length		Weight	
		ft	m	lb	kg
LsL	Labyrinth series Labyrinth	5.9	1.8	130	59
LsB	Labyrinth series Bag	5.9	1.8	135	61.2
BsL	Bag series Labyrinth	5.9	1.8	135	61.2
BsB	Bag series Bag	5.9	1.8	135	61.2
LsLsL	Labyrinth series Labyrinth series Labyrinth	8.2	2.5	160	72.6
LsLsB	Labyrinth series Labyrinth series Bag	8.2	2.5	170	77.1
LsBpB	Labyrinth series Bag parallel Bag	8.2	2.5	170	77.1
LsBsB	Labyrinth series Bag series Bag	8.2	2.5	180	81.6
BpBsL	Bag parallel Bag series Labyrinth	8.2	2.5	180	81.6

Standard Features: Carbon steel head, base, and housing. Monel® K-500 Shaft, Aflas® bag top premium face seal, high load thrust bearing
Optional Features: AR radial support; Inconel® shaft; premium face seal; SuperSand head; stainless steel head, base, and housing; EHL bearing; Monel mechanical hardware; high-temperature bag; diamond pad thrust bearing

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400 Series Seal

Description		Length		Weight	
		ft	m	lb	kg
LsL	Labyrinth series Labyrinth	5.9	1.8	155	70.5
LsB	Labyrinth series Bag	5.9	1.8	155	70.5
BsL	Bag series Labyrinth	5.9	1.8	155	70.5
BsB	Bag series Bag	5.9	1.8	155	70.5
LsLsL	Labyrinth series Labyrinth series Labyrinth	8.2	2.5	190	86.3
LsLsB	Labyrinth series Labyrinth series Bag	8.2	2.5	200	86.3
LsBpB	Labyrinth series Bag parallel Bag	8.2	2.5	200	86.3
LsBsB	Labyrinth series Bag series Bag	8.2	2.5	205	93
BpBsL	Bag parallel Bag series Labyrinth	8.2	2.5	205	93

Standard Features: Carbon steel head, base, and housing. Monel® K-500 shaft, Aflas® bag top premium face seal, high load thrust bearing

Optional Features: AR radial support; Inconel® shaft; premium face seal; SuperSand head; stainless steel head, base, and housing; EHL bearing; Monel mechanical hardware; high-temperature bag; diamond pad thrust bearing

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513 Series Seal

Description		Length		Weight	
		ft	m	lb	kg
LsL	Labyrinth series Labyrinth	6.5	2	275	124.7
LsB	Labyrinth series Bag	6.5	2	280	127
BsL	Bag series Labyrinth	6.5	2	280	127
BsB	Bag series Bag	6.5	2	290	131.5
LsLsL	Labyrinth series Labyrinth series Lab	8.9	2.7	370	167.8
LsLsB	Labyrinth series Labyrinth series Bag	8.9	2.7	370	167.8
LsBpB	Labyrinth series Bag parallel Bag	8.9	2.7	380	172.4
LsBsB	Labyrinth series Bag series Bag	8.9	2.7	370	167.8
BpBsL	Bag parallel Bag series Lab	8.9	2.7	380	172.4
BsBsL	Bag series Bag series Lab	8.9	2.7	370	167.8
LsLsBpB	Labyrinth series Labyrinth series Bag parallel Bag	11.5	3.5	445	201.8
BpBsBpB	Bag parallel Bag series Bag parallel Bag	11.5	3.5	445	201.8

Standard Features: Carbon steel head, base, and housing. Monel® K-500 shaft, Aflas® bag top premium face seal, high load thrust bearing
Optional Features: AR radial support; Inconel® shaft; premium face seal; SuperSand head; stainless steel head, base, and housing; EHL bearing; Monel mechanical hardware; high-temperature bag; diamond pad thrust bearing

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