

# MECHANICAL SEALS



**PRIMO ENERGY INTERNATIONAL, INC.**

Office: 713.936.2070  
[www.primoenergyintl.com](http://www.primoenergyintl.com)

Distributor

## Shaft Seal Program

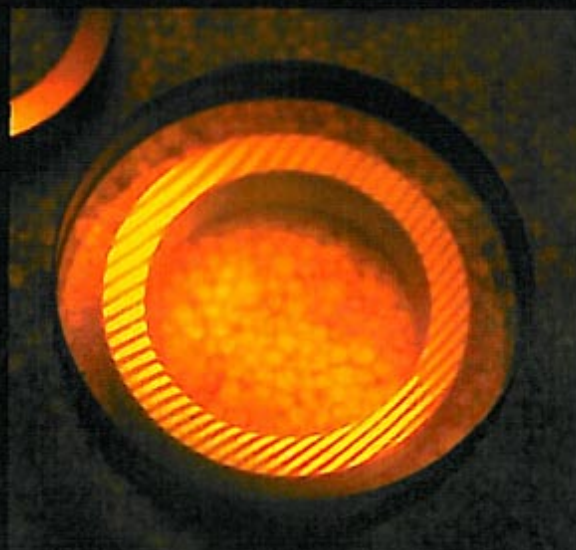
- Equivalents to all industry standards: Types 1, 2, 21, 6, MG-1
- Low overhead and fair margins allow for some of the most aggressive price structures in the country
- Same day shipments for most styles and sizes
- One of North America's largest inventories of metric shaft seals
- Experts at cross referencing all pumps and unique seals
- Incredible prices on hard faced seals

**Call the factory for our detailed shaft seal brochure and price list!**



## Seal Repair

- Repair of all manufacturers
- Low cost alternatives to typical fixed cost approaches – “pay only for goods and services provided”
- Full machine and lapping services
- Detailed failure analysis available upon request
- Tried and true solutions to common “bad actors”
- Engineered upgrades for challenging sealing applications
- Retesting after final assembly of all seals
- Mixer and agitator seal repairs





## S-1

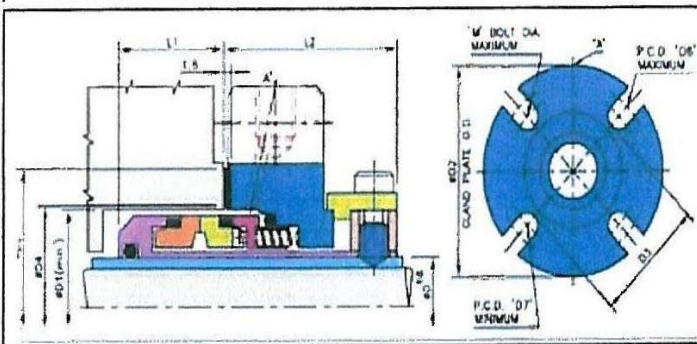
### SINGLE CARTRIDGE SEAL

- One of the industry's most aggressively priced stationary cartridges
- Easy cartridge installation
- Stationary multiple spring design
- Springs isolated from product
- Rugged face design
- Identical seal face shapes make repairs easy and economical
- Hydraulically balanced design
- Handles pressure reversals and vacuum
- Flush connection standard
- Vent and Drain connections available upon request
- Big Bore gland alternatives
- Interchangeable parts with D2 dual cartridges
- User friendly setting clips
- Confined gland gaskets

# S-1



### INSTALLATION DIMENSIONS



### INCH SIZES

NU	ØD1	ØD2	D3	ØD4	ØD5	MAX P.C.D. D6	MIN P.C.D. D7	L1	L2	M
1.000	1.625	4.000	2.224	1.772	2.106	3.606	2.834	0.952	1.460	3/8"
1.125	1.750	4.125	2.421	1.910	2.283	3.750	2.874	0.952	1.460	3/8"
1.250	2.000	4.250	2.500	2.037	2.362	3.877	2.952	0.952	1.460	3/8"
1.375	2.000	4.250	2.696	2.145	2.539	3.877	3.149	0.952	1.460	3/8"
1.500	2.250	4.500	2.815	2.368	2.736	4.000	3.346	0.952	1.460	3/8"
1.625	2.375	4.500	2.972	2.460	2.854	4.000	3.582	0.952	1.460	1/2"
1.750	2.500	5.000	3.062	2.578	2.992	4.500	3.594	0.952	1.460	1/2"
1.875	2.625	5.250	3.188	2.755	3.110	4.750	3.720	0.952	1.460	1/2"
2.000	2.750	5.500	3.307	2.834	3.267	5.000	3.838	0.952	1.460	1/2"
2.125	2.875	5.750	3.503	2.952	3.385	5.248	4.133	0.952	1.460	1/2"
2.250	3.000	6.500	3.622	3.110	3.503	5.875	4.488	0.952	1.460	5/8"
2.375	3.125	6.500	3.818	3.228	3.700	5.875	4.645	0.952	1.460	5/8"
2.500	3.375	7.000	3.976	3.464	3.858	6.375	4.960	1.311	1.622	5/8"
2.625	3.500	7.000	4.055	3.543	3.937	6.375	5.078	1.311	1.622	5/8"
2.750	3.625	7.000	4.370	3.779	4.251	6.377	5.216	1.311	1.622	5/8"
3.000	3.875	7.500	4.488	3.976	4.370	6.875	5.448	1.311	1.622	5/8"

DIMENSIONS IN INCH SUBJECT TO CHANGE

### Parameters

- PRESSURE:** Up to 300 PSI/20 Bar
- TEMP.:** From -40° to 535° Fahrenheit\*  
-40° to 280° Celsius\*
- SPEED:** 66ft/s  
20 m/spd

### Materials

**METAL:** 316 SS, Alloy 20, Hast B+ C\*

### FACES:

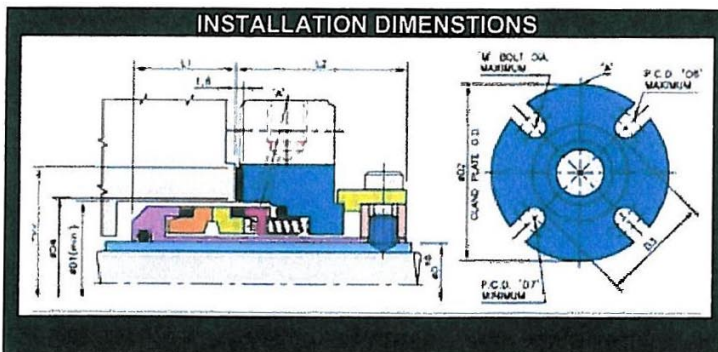
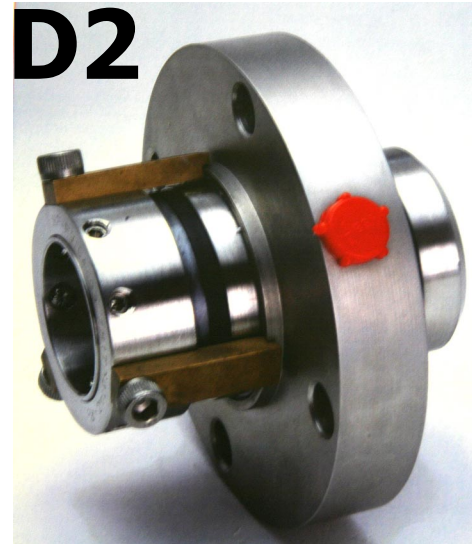
Carbon / Silicon Carbide  
Silicon Carbide / Silicon Carbide

### ELASTOMERS

Viton\*, Buna, PTFE, Neoprene,  
EPR, Kalrez\*, FEP, AFLAS\*

## DUAL CARTRIDGE SEAL

- For critical, toxic and non-lubricating fluids
- Stationary multiple spring cartridge design
- Easy cartridge installation
- Interchangeable components with S1 single cartridge
- ANSI pump-compatible
- Non-clogging in stuffing box
- Springs protected from the product
- Compensates for pressure reversals
- Inboard silicon carbide vs silicon carbide face combination is standard
- User friendly setting clips
- Pumping ring designs available upon request



### INCH SIZES

WD	ØD1	ØD2	D3	ØD4	ØD5	MAX P.C.D. D6	MIN P.C.D. D7	L1	L2	M
1.000	1.625	4.000	2.224	1.772	2.106	3.606	2.834	0.952	1.460	3/8"
1.125	1.750	4.125	2.421	1.910	2.283	3.750	2.874	0.952	1.460	3/8"
1.250	2.000	4.250	2.500	2.037	2.362	3.877	2.952	0.952	1.460	3/8"
1.375	2.000	4.250	2.696	2.145	2.539	3.877	3.149	0.952	1.460	3/8"
1.500	2.250	4.500	2.815	2.368	2.736	4.000	3.346	0.952	1.460	3/8"
1.625	2.375	4.500	2.972	2.460	2.854	4.000	3.582	0.952	1.460	1/2"
1.750	2.500	5.000	3.062	2.578	2.992	4.500	3.594	0.952	1.460	1/2"
1.875	2.625	5.250	3.188	2.755	3.110	4.750	3.720	0.952	1.460	1/2"
2.000	2.750	5.500	3.307	2.834	3.267	5.000	3.838	0.952	1.460	1/2"
2.125	2.875	5.750	3.503	2.952	3.385	5.248	4.133	0.952	1.460	1/2"
2.250	3.000	6.500	3.622	3.110	3.503	5.875	4.488	0.952	1.460	5/8"
2.375	3.125	6.500	3.818	3.228	3.700	5.875	4.645	0.952	1.460	5/8"
2.500	3.375	7.000	3.976	3.464	3.858	6.375	4.960	1.311	1.622	5/8"
2.625	3.500	7.000	4.055	3.543	3.937	6.375	5.078	1.311	1.622	5/8"
2.750	3.625	7.000	4.370	3.779	4.251	6.377	5.216	1.311	1.622	5/8"
3.000	3.875	7.500	4.488	3.976	4.370	6.875	5.448	1.311	1.622	5/8"

DIMENSIONS IN INCH/SUBJECT TO CHANGE

### Parameters

PRESSURE: Up to 300 PSI/20 Bar

SUGGESTED DIFFERENTIAL: 25 PSI/ 2 Bar

TEMP.: From -40° to 535° Fahrenheit\*  
-40° to 280° Celsius\*

SPEED: 66ft/s  
20 m/spd

### Materials

METAL: 316 SS, Alloy 20, Hast B+C\*

INBOARD FACES: Silicon Carbide/Silicon Carbide

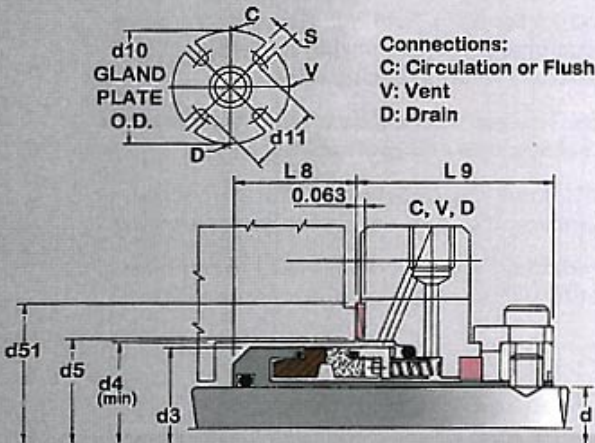
OUTBOARD FACES Carbon/Silicon Carbide

ELASTOMERS Viton\*, Buna, PTFE, Neoprene, EPR, Kalrez\*, FEP, AFLAS\*



# S1CVD

## Single Cartridge Seal



**Connections:**  
**C:** Circulation or Flush  
**V:** Vent  
**D:** Drain

d	d3	d4	d5	d51	d10	d11	L8	L9	S
1.000	1.595	1.625	1.771	2.106	4.000	2.224	0.952	1.460	0.551
1.125	1.708	1.750	1.909	2.283	4.125	2.421	0.952	1.460	0.551
1.250	1.865	2.000	2.037	2.362	4.250	2.500	0.952	1.460	0.551
1.375	1.950	2.000	2.145	2.539	4.250	2.696	0.952	1.460	0.551
1.500	2.172	2.250	2.368	2.736	5.000	2.815	0.952	1.460	0.551
1.625	2.283	2.375	2.460	2.854	4.500	2.972	0.952	1.460	0.551
1.750	2.401	2.500	2.578	2.992	5.000	3.062	0.952	1.460	0.551
1.875	2.537	2.625	2.755	3.110	5.250	3.188	0.952	1.460	0.551
2.000	2.670	2.750	2.834	3.267	5.500	3.307	0.952	1.460	0.551
2.125	2.795	2.875	2.952	3.386	5.750	3.503	0.952	1.460	0.709
2.250	2.913	3.000	3.110	3.504	6.500	3.622	0.952	1.460	0.709
2.375	3.037	3.125	3.228	3.700	6.500	3.818	0.952	1.460	0.709
2.500	3.288	3.375	3.464	3.858	6.500	3.976	1.311	1.622	0.709
2.625	3.410	3.500	3.543	3.937	7.000	4.055	1.311	1.622	0.709
2.750	3.562	3.625	3.780	4.252	7.000	4.370	1.311	1.622	0.709
2.875	3.685	3.750	3.905	4.377	7.500	4.614	1.311	1.772	0.709
3.000	3.795	4.000	4.188	4.944	7.480	5.079	1.311	1.772	0.709
3.125	3.937	4.125	4.307	5.062	7.677	5.197	1.311	1.772	0.709
3.250	4.045	4.250	4.425	5.181	7.677	5.315	1.311	1.772	0.709
3.375	4.170	4.375	4.543	5.299	7.795	5.472	1.311	1.772	0.866
3.500	4.350	4.500	4.681	5.437	7.795	5.591	1.354	1.772	0.866
3.625	4.438	4.625	4.799	5.555	8.071	5.709	1.354	1.772	0.866
3.750	4.547	4.750	4.937	5.692	8.189	5.827	1.354	1.897	0.866
3.875	4.670	4.875	5.059	5.826	8.189	5.945	1.354	1.897	0.866
4.000	4.795	5.000	5.157	5.944	8.583	6.063	1.354	1.897	0.866
4.250	5.045	5.250	5.413	6.181	9.000	6.625	1.394	2.094	0.866
4.500	5.295	5.500	5.669	6.456	9.500	7.000	1.394	2.094	0.866
4.750	5.545	5.750	5.905	6.692	10.00	7.322	1.394	2.094	0.944
5.000	5.881	6.000	6.122	6.751	10.00	7.322	1.394	2.094	0.944

For 1 3/8" only



### Features and Benefits:

- Incorporates Circulation, Vent and Drain gland for quenching and safety
- Throttle bushing standard
- One of the industry's most aggressively priced stationary cartridges
- Easy cartridge installation
- Stationary multiple spring design with circulation vent and drain connections
- Springs isolated from product
- Rugged face design
- Identical seal face shapes make repairs easy and economical
- Hydraulically balanced design
- Handles pressure reversals and vacuum
- Big Bore gland alternatives
- Interchangeable parts with D2 dual cartridges
- User friendly setting clips
- Confined gland gaskets

### Standard Materials of Construction:

#### • Faces:

- Carbon / Silicon Carbide
- Silicon Carbide / Silicon Carbide
- (Note: Tungsten Carbide and Antimony Carbon also available)

#### • Elastomers:

- Viton<sup>®</sup>, Buna, PTFE, Neoprene, EPR, Kalrez<sup>®</sup>, AFLAS<sup>®</sup>, Chemraz<sup>®</sup>

#### • Metallurgy:

- 304, 316, Monel, Alloy 20, Hast B+ C<sup>®</sup>
- Bronze Throttle Bushing

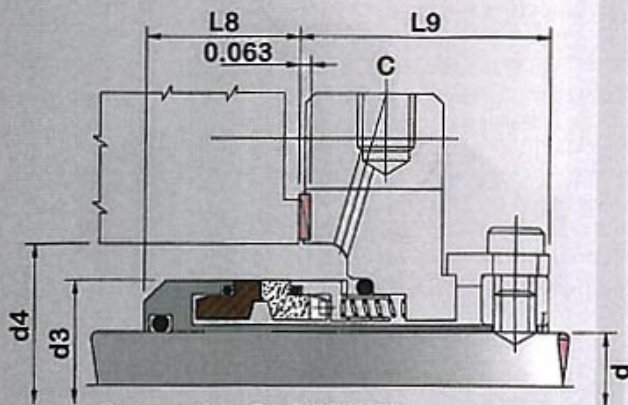
### Operating Limits:

- Pressure:  
Up to 250  
PSI/17 Bar
- Temperature:  
-40° to 235 °  
Celsius<sup>®</sup>



# S1BB

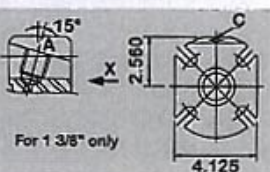
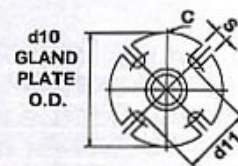
Single Cartridge with Enlarged Gland to fit Standard Big Bore Pumps



Connection C - 3/8" NPT



d	d3	d4		d10	d11	L8	L9	S
		MIN	MAX					
1.125	1.708	2.625	2.750	4.900	3.108	0.952	1.460	0.551
1.375	1.950	2.725	3.000	5.250	3.548	0.952	1.460	0.551
1.750	2.401	3.500	3.750	6.500	4.369	0.952	1.460	0.551
1.875	2.537	3.625	3.875	6.500	4.154	0.952	1.460	0.551
2.125	2.795	3.880	4.000	7.250	4.622	0.952	1.460	0.709
2.250	2.913	4.000	4.250	7.250	4.741	0.952	1.460	0.709
2.500	3.288	4.500	5.000	8.250	5.497	1.311	1.622	0.709
2.625	3.410	4.625	4.750	8.000	5.122	1.311	1.622	0.709
3.000	3.795	4.875	5.125	8.250	5.622	1.311	1.772	0.709



For 1 3/8" only

## Features and Benefits:

- Enlarged gland to fit standard big bore pumps
- Easy cartridge installation
- Stationary multiple spring design
- Springs isolated from product
- Rugged face design
- Identical seal face shapes make repairs easy and economical
- Hydraulically balanced design
- Handles pressure reversals and vacuum
- Flush connection standard
- Vent and Drain connections available upon request
- Interchangeable parts with D2 dual cartridges
- User friendly setting clips
- Confined gland gaskets

## Standard Materials of Construction:

- **Faces:**
  - 316 SS, Alloy 20
  - Silicon Carbide / Silicon Carbide (Note: Tungsten Carbide and Antimony Carbon also available)
- **Elastomers:**
  - Viton\*, Buna, PTFE, Neoprene, EPR, Kalrez\*, AFLAS\*, Chemraz\*
- **Metallurgy:**
  - 304, 316, Monel, Hast B+ C\* Carbon / Silicon Carbide

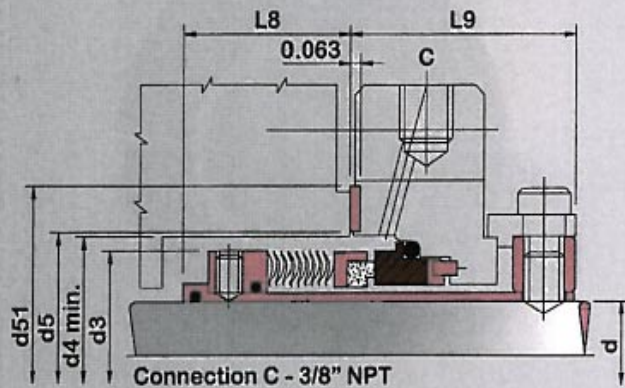
## Operating Limits:

- Pressure: Up to 250 PSI/17 Bar
- Temperature: -40° to 235 ° Celsius\*

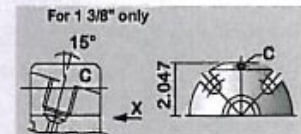
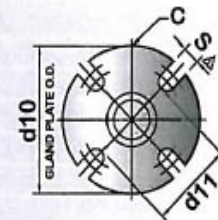


# S1WBC

## Single Welded Bellows Cartridge



d	d3	d4	d5	d51	d10	d11	L8	L9	S
1.000	1.687	1.750	1.771	2.106	4.000	2.224	1.383	1.460	0.551
1.125	1.694	1.750	1.909	2.283	4.125	2.421	1.445	1.460	0.551
1.250	1.937	2.000	2.037	2.362	4.250	2.500	1.570	1.460	0.551
1.375	1.944	2.000	2.145	2.539	4.250	2.696	1.570	1.460	0.551
1.500	2.187	2.250	2.368	2.736	4.500	2.814	1.570	1.460	0.551
1.625	2.311	2.375	2.460	2.854	4.500	2.972	1.570	1.460	0.551
1.750	2.437	2.500	2.578	2.992	5.000	3.062	1.633	1.460	0.551
1.875	2.561	2.625	2.755	3.110	5.250	3.188	1.633	1.460	0.551
2.000	2.687	2.750	2.834	3.267	5.500	3.307	1.633	1.460	0.551
2.125	2.811	2.875	2.952	3.386	5.750	3.503	1.696	1.460	0.709
2.250	2.937	3.000	3.110	3.504	6.500	3.622	1.696	1.460	0.709
2.375	3.187	3.125	3.228	3.700	6.500	3.818	1.696	1.460	0.709
2.500	3.311	3.375	3.464	3.858	7.000	3.976	1.838	1.622	0.709
2.625	3.437	3.500	3.543	3.937	7.000	4.055	1.838	1.622	0.709
2.750	3.562	3.625	3.780	4.252	7.000	4.370	1.838	1.622	0.709



### Features and Benefits:

- Easy cartridge installation
- Static "O" rings - No shaft fretting
- Universal gland design conforms to most common bolt circles
- Fits all ANSI pumps without modification
- Self cleaning plates minimizes clogging
- Face lubrication enhanced by even face loading
- Balanced design - 300 PSI without modification
- Fits into narrow cross section pumps

### Standard Materials of Construction:

- **Faces:**
  - Carbon, Tungsten Carbide, Silicon Carbide, Antimony Carbide

### Elastomers:

- Viton®, Buna, PTFE, Neoprene, EPR, Kalrez®, FEP, AFLAS®, Teflon Jacketed Viton

### Metallurgy:

- 316 SS, Hastelloy C, AM 350, Titanium, Alloy 20

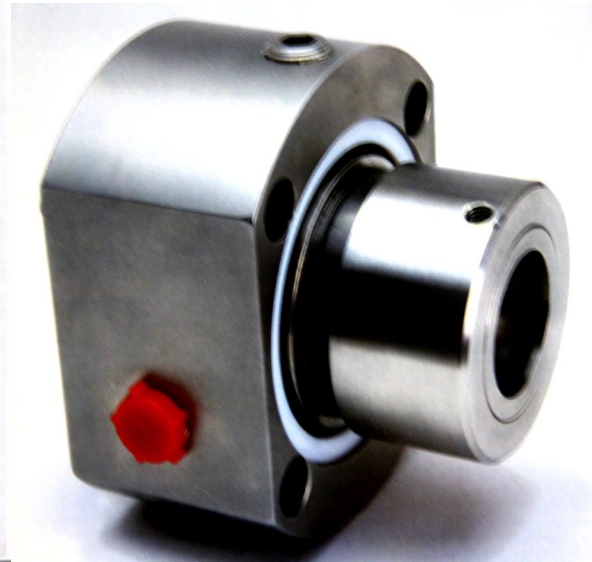
### Operating Limits:

- Temperature: From -100° to 400° Fahrenheit\*  
-73° to 205° Celsius (depending upon elastomer)
- Pressure: Up to 300 PSI / 20 Bar

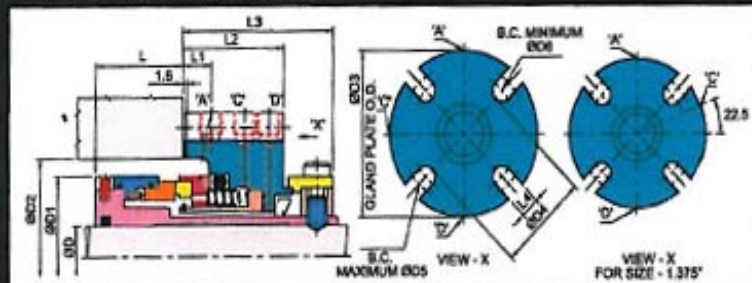
# HDS

## Heavy Duty Single Cartridge

- Heavy duty construction
- Can replace double seals in many applications
- Flush, Quench and Drain standard
- Guided Quench
- Specially designed for large bore pumps
- Large radial clearances to allow for shaft deflection and/or eccentric installations
- Floating carbon bushing
- Excellent in crystallizing liquid
- Large cross section dynamic "O" ring
- Shrunken in stationary face
- Non-clogging design
- Available in semi-cartridge with incorporated hook sleeves



### INSTALLATION DIMENSIONS



### INCH SIZES

SEAL SIZE	SEAL O.D.	MIN. BORE	MAX. BORE	GLAND O.D.	SLOT I.D.	B.C. MAX.	B.C. MIN.	INS. L.G.	S.B. TO FLUSH	S.B. TO GLAND	DIST. H.O.	SLOT SIZE
ØD	ØD1	ØD2	ØD3	ØD4	ØD5	ØD6	ØD7	L1	L2	L3	L4	
0.500	1.811	1.929	2.244	4.133	2.637	3.346	3.090	1.338	0.590	1.519	2.047	0.452
0.750	2.062	2.181	2.372	4.330	2.755	3.543	3.208	1.338	0.590	1.519	2.047	0.452
0.875	2.185	2.303	2.498	4.527	2.875	3.740	3.326	1.338	0.590	1.519	2.047	0.452
1.000	2.311	2.429	2.625	4.645	2.992	3.858	3.444	1.338	0.590	1.519	2.047	0.452
1.125	2.437	2.555	2.750	4.901	3.107	4.150	3.559	1.338	0.590	1.519	2.047	0.452
1.250	2.562	2.682	2.818	5.039	3.228	4.251	3.681	1.338	0.590	1.519	2.047	0.452
1.375	2.688	2.807	3.000	5.250	3.348	4.500	4.000	1.338	0.590	1.519	2.047	0.452
1.500	2.811	2.929	3.055	5.433	3.522	4.488	4.153	1.338	0.590	1.519	2.047	0.531
1.625	2.937	3.055	3.181	5.629	3.779	4.688	4.311	1.338	0.590	1.519	2.047	0.531
1.750	3.062	3.181	3.750	6.500	4.368	6.900	4.900	1.397	0.590	1.519	2.047	0.531
1.875	3.188	3.307	3.875	6.500	4.153	5.600	4.885	1.397	0.590	1.519	2.047	0.531
2.000	3.311	3.429	3.779	6.692	4.251	6.748	4.783	1.397	0.590	1.519	2.047	0.531
2.125	3.437	3.555	4.000	7.250	4.622	6.000	5.309	1.456	0.590	1.519	2.149	0.688
2.250	3.562	3.681	4.212	7.519	4.763	6.290	5.452	1.456	0.590	1.519	2.149	0.688
2.375	3.688	3.807	4.448	7.718	4.821	6.456	5.610	1.456	0.590	1.519	2.149	0.688
2.500	3.818	3.944	5.000	8.250	5.496	7.000	6.184	1.456	0.590	1.519	2.149	0.688
2.625	4.153	4.279	4.750	8.000	5.121	6.624	5.809	1.456	0.590	1.519	2.149	0.688
3.000	4.688	4.811	5.125	8.250	5.821	7.000	6.309	1.456	0.590	1.519	2.149	0.688

DIMENSIONS SUBJECT TO CHANGE HIGHER SIZE DIMENSIONS UP TO 4.000" AVAILABLE UPON REQUEST

### Parameters

- PRESSURE:** Up to 365 PSI / 25 Bar
- TEMPERATURE:** From - 40° to 535° Fahrenheit\*  
- 40° to 280° Celsius\*
- SPEED:** 66 ft/s  
20 m/spd

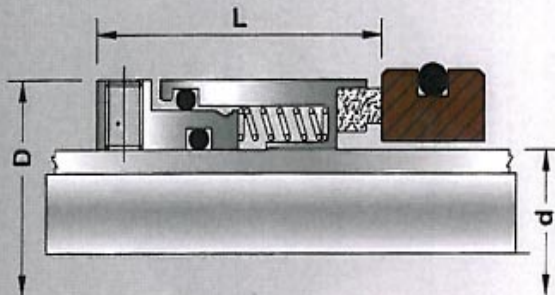
### Materials

- METAL:** 316 SS, Alloy 20, Hast B + C\*
- FACES:** Carbon / Silicon Carbide  
Silicon Carbide / Silicon Carbide  
Tungsten Carbide / Tungsten Carbide
- ELASTOMERS:** Viton\*, Buna, PTFE, Neoprene, EPR, Kalrez\*, FEP, AFLAS\*

\*depending upon elastomer  
Trademarks: Hastelloy - Raynes / Viton - DuPont / Kalrez - DuPont / AFLAS - ASHAI Glass



# CP1



d	D	L1
1.000	1.535	1.181
1.125	1.654	1.260
1.250	1.850	1.260
1.375	1.930	1.260
1.500	2.126	1.338
1.625	2.322	1.338
1.750	2.401	1.338
1.875	2.520	1.338
2.000	2.637	1.319
2.125	2.795	1.319
2.250	3.070	1.515
2.375	3.149	1.515
2.500	3.267	1.515
2.625	3.464	1.476
2.750	3.543	1.771
2.875	3.625	1.771
3.000	3.897	1.771



## ▲ Features and Benefits:

- Non-clogging multi-spring design
- Springs protected from the product
- Rugged drive lugs, no drive pins
- Balanced
- Bi-directional rotation
- No shaft fretting
- Excellent in moderate slurries and crystallizing solutions
- Fits ANSI, DIN, API pumps
- Unitized compression unit
- Compatible with common "O" ring groove seats
- Retained face
- Metric versions
- Available for sterile applications
- Available in cartridge design

## ▲ Standard Materials of Construction:

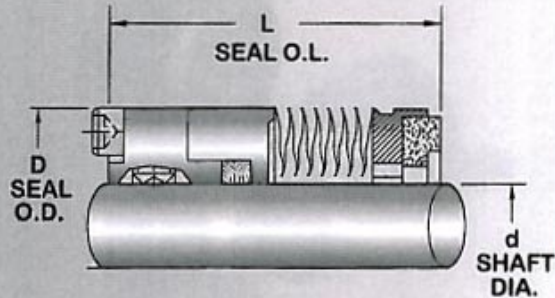
- **Faces:**
  - Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide
- **Elastomers:**
  - Buna, Viton®, Aflas®, Neoprene, EPDM, Kalrez®
- **Metallurgy:**
  - 316, Alloy 20, Hast-C

## ▲ Operating Limits:

- Pressure: 25 Bar, 360 psi
- Temperature:
  - 40°C to 205°C / -40°F to 400°F
  - (depending on materials used).

# WB 800

## High Temperature Welded Bellows Component



d	D	L
1.000	1.625	1.531
1.125	1.750	1.562
1.250	1.875	1.593
1.375	2.000	1.593
1.500	2.125	1.593
1.625	2.250	1.593
1.750	2.375	1.625
1.875	2.500	1.625
2.000	2.625	1.656
2.125	2.750	1.656
2.250	2.875	1.719
2.375	3.000	1.719
2.500	3.250	1.750
2.625	3.375	1.781
2.750	3.500	1.781
2.875	3.687	1.875
3.000	3.812	1.875



### ▲ Features and Benefits:

- Static Grafoil packings - No "O" rings
- Temperatures up to 800° F (405° C)
- Alloy 42 face retainers - faces are contained without metal expansion
- Self cleaning plates
- Face lubrication enhanced by even face loading
- Balanced Design - 300 PSI without modification

### ▲ Standard Materials of Construction:

- **Faces:**
  - Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide
- **Secondary Packing:**
  - Grafoil
- **Metallurgy:**
  - Retainer: Alloy 42; Core: Heat Treated AM 350; Hub: 316SS; Housing: 316SS

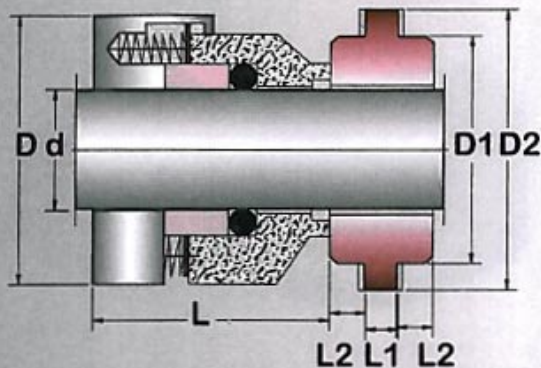
### ▲ Operating Limits:

- Pressure: Up to 300 PSI / 20 Bar
- Temperature: to 800° Fahrenheit / to 405° Celsius\*



# ACX

## Single Multiple Spring Outside Seal



d IN	dMM	D	L	D1	D2	L1	L2
0.750	18	1.732	1.500	1.433	1.850	0.315	0.189
	20	1.811	1.500	1.559	1.969	0.315	0.189
0.875	22	1.890	1.500	1.559	1.969	0.315	0.189
	24	1.969	1.500	1.681	2.087	0.315	0.189
1.000	25	2.047	1.500	1.681	2.087	0.315	0.189
1.125	28	2.165	1.500	1.996	2.480	0.433	0.315
	30	2.283	1.500	2.122	2.598	0.433	0.315
1.250	32	2.362	1.500	2.122	2.598	0.433	0.315
	33	2.362	1.500	2.122	2.598	0.433	0.315
1.375	35	2.441	1.500	2.244	2.717	0.433	0.315
1.500	38	2.559	1.500	2.496	2.992	0.433	0.315
1.625	40	2.677	1.500	2.496	2.992	0.433	0.315
	43	2.756	1.500	2.744	3.228	0.433	0.315
1.750	45	2.835	1.654	2.744	3.228	0.433	0.315
1.875	48	2.953	1.654	3.122	3.740	0.563	0.374
2.000	50	3.071	1.654	3.122	3.740	0.563	0.374
2.125	53	3.150	1.654	3.122	3.740	0.563	0.374
2.250	55	3.150	1.654	3.370	3.976	0.563	0.374
2.375	60	3.386	1.654	3.496	4.173	0.563	0.374
2.500	63	3.543	1.654	3.618	4.252	0.563	0.374
2.625	65	3.661	1.654	3.744	4.370	0.563	0.374
2.750	70	3.661	1.654	3.744	4.370	0.563	0.374
3.000	75	4.134	1.654	4.059	4.685	0.563	0.374



### Features and Benefits:

- Outside seal design for extreme corrosive applications
- Only inert materials exposed to the product
- All metal parts out of the fluid
- Clamp style drive – no set screws (for non metallic shafts)
- Hastelloy C Springs standard
- Multiple face and elastomer choices
- Many clamp style seats available
- Easy installation

### Standard Materials of Construction:

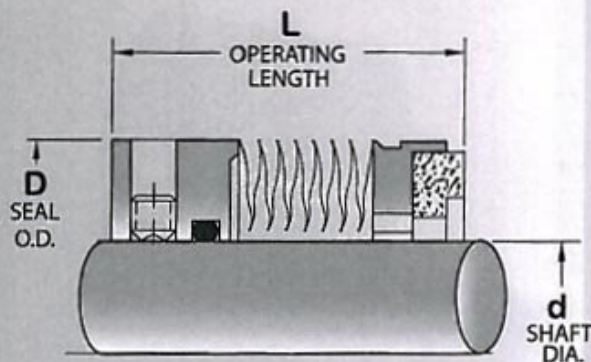
- **Faces:**
  - Carbon Graphite (Resin Impregnated), Silicon Carbide,
- **Elastomers:**
  - Buna, Viton®, Aflas®, Neoprene, EPDM, Kalrez®, Chemraz®
- **Metallurgy:**
  - 304, 316, Monel, Hastelloy C®, Alloy 20

### Operating Limits:

- Pressure: to 150 PSI.
- Temperature: -40°F to +400°F.

# WB 400 /450 /500

Welded Bellows Component



d	D	L
0.750	1.312	1.250
0.875	1.437	1.250
0.937	1.500	1.250
1.000	1.457	1.250
1.125	1.687	1.250
1.250	1.812	1.312
1.250X	1.694	1.312
1.375	1.937	1.437
1.500	2.062	1.437
1.500X	1.944	1.437
1.625	2.187	1.437
1.750	2.312	1.437
1.875	2.437	1.500
2.000	2.562	1.500
2.125	2.687	1.500
2.250	2.812	1.562
2.375	2.937	1.562
2.500	3.187	1.562
2.625	3.312	1.625
2.750	3.437	1.625
2.875	3.625	1.687
3.000	3.750	1.687
3.125	3.875	1.750
3.250	4.000	1.750
3.375	4.125	1.750
3.500	4.250	1.875
3.625	4.375	1.875
3.750	4.500	1.875

## Features and Benefits:

- Static "O" ring - no shaft fretting
- Self cleaning plates
- Single piece construction
- No springs to clog
- Face lubrication enhanced by even face loading
- Balanced design - 300 PSI without modification
- Fits into narrow cross section pumps
- Bellows have optimum 45° angle on I.D. to disperse stress in metal

## Standard Materials of Construction:

### • Faces:

- Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide

### • Elastomers:

- Buna, Viton®, Aflas®, Neoprene, EPDM, Teflon Encapsulated Viton, Kalrez®

### • Metallurgy:

#### • WB 400:

Retainer: 316 SS; Core: Hastelloy C; Hub: 316SS

#### • WB 450:

Retainer: 316 SS; Core: AM350; Hub: 316SS

#### • WB 500:

Retainer: Hastelloy C; Core: Hastelloy C; Hub: Hastelloy C

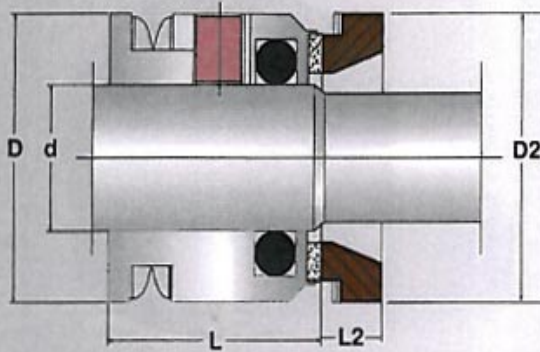
## Operating Limits:

- Pressure: Up to 300 PSI / 20 Bar
- Temperature: From -100° to 400° Fahrenheit\* / -73° to 280° Celsius\*



# SAN 7

## Sanitary Outside Seal



### METRIC

### INCHES

d	D	D2	L	L2	d	D	D2	L	L2
18	29.0	33.0	19.1	7.0	0.750	1.142	1.299	0.752	0.276
20	32.0	35.0	19.1	10.0					
22	35.0	37.0	19.1	10.0	0.875	1.378	1.457	0.752	0.394
24	37.0	39.0	19.1	10.0					
25	41.0	40.0	19.1	10.0	1.000	1.614	1.575	0.752	0.394
28	41.0	43.0	19.1	10.0	1.125	1.614	1.693	0.752	0.394
30	47.0	45.0	19.1	10.0					
32	47.0	48.0	19.1	10.0	1.250	1.850	1.890	0.752	0.394
33	48.0	48.0	19.1	10.0					
35	49.0	50.0	19.1	10.0	1.375	1.929	1.969	0.752	0.394
38	53.0	56.0	21.1	13.0	1.500	2.087	2.205	0.831	0.512
40	55.0	58.0	21.1	13.0	1.625	2.165	2.283	0.831	0.512
43	60.0	61.0	21.1	13.0					
45	60.0	63.0	21.1	13.0	1.750	2.382	2.480	0.831	0.512
48	65.0	66.0	21.1	13.0	1.875	2.559	2.598	0.831	0.512
50	65.0	70.0	21.1	14.0	2.000	2.559	2.756	0.831	0.551
53	74.0	73.0	22.1	14.0	2.125	2.913	2.874	0.870	0.551
55	74.0	75.0	22.1	14.0	2.250	2.913	2.953	0.870	0.551
60	79.0	80.0	25.8	14.0	2.375	3.110	3.150	1.016	0.551
63	87.0	83.0	25.8	14.0	2.500	3.425	3.268	1.016	0.551
65	87.0	85.0	25.8	14.0	2.625	3.425	3.346	1.016	0.551
70	93.0	92.0	25.8	16.0	2.750	3.661	3.622	1.016	0.630
75	98.0	97.0	25.8	16.0	3.000	3.858	3.819	1.016	0.630



### Features and Benefits:

- Wave spring design
- Easy wash down for sanitary applications
- Quick installation
- Rugged inserted seal face
- Tapered ID stationaries available for wash down access
- FDA approved materials available
- Compact size for tight seal areas

### Standard Materials of Construction:

#### • Faces:

- Carbon Graphite (Resin Impregnated), Silicon Carbide

#### • Elastomers:

- Buna, Viton®, Aflas®, Neoprene, EPDM, Kalrez®, Chemraz®

#### • Metallurgy:

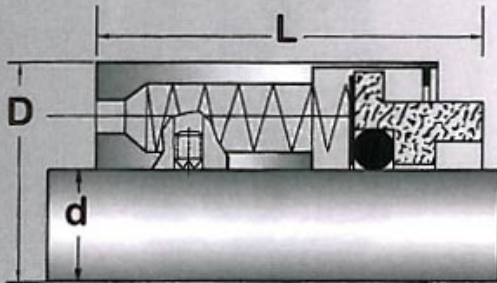
- 304, 316, Monel, Hastelloy C ®, Alloy 20

### Operating Limits:

- Pressure: to 150 PSI.
- Temperature: -40°F to +400°F.

# A8T

## Multi Spring Component Seal, O ring Design



d	D	L
0.500	0.987	0.937
0.625	1.062	0.937
0.750	1.187	0.937
0.875	1.312	0.937
1.000	1.437	1.000
1.125	1.562	1.000
1.250	1.687	1.000
1.375	1.937	1.375
1.375 S	1.937	1.125
1.500	1.937	1.125
1.625	2.250	1.156
1.750	2.312	1.375
1.875	2.500	1.375
2.000	2.625	1.375
2.125	2.812	1.687
2.250	2.843	1.375
2.375	3.000	1.687
2.500	3.125	1.375
2.625	3.250	1.687
2.750	3.375	1.687
2.875	3.500	1.687
3.000	3.625	1.687
3.125	3.750	1.687
3.250	3.875	1.687
3.375	4.000	1.687
3.500	4.125	1.687
3.625	4.250	1.687
3.750	4.375	1.687



### ▲ Features and Benefits:

- Compact narrow cross section design,
- Multiple Springs assures accurate face loading
- Flexible design compensates for shaft misalignment
- Variety of metals and O rings allow for broad base of applications
- All components are held together by a snap ring in a unitized construction design.
- Type A8T seals are available in a wide variety of elastomers for handling most industrial fluids
- Field repairable

### ▲ Standard Materials of Construction:

#### • Faces:

- Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide

#### • Elastomers:

- Buna, Viton®, Aflas®, Neoprene, EPDM, Kalrez
- Any standard rubber O ring can be utilized

#### • Metallurgy:

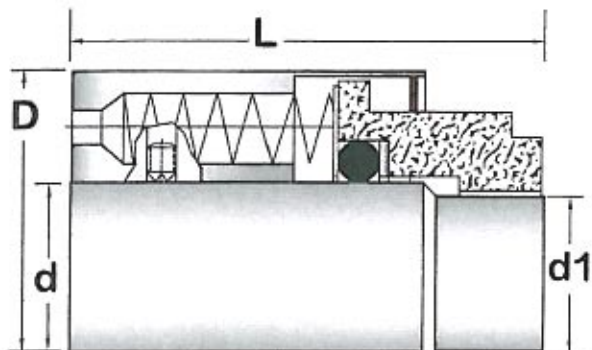
- 304, 316, Monel, Hastelloy C, Alloy 20

### ▲ Operating Limits:

- Pressure: 200 psi 13.8 Bar
- Temperature: -40°C to 260°C / -40°F to 500°F (depending on materials used).



# A8TB



d	d1	D	L
1.000	0.875	1.437	1.312
1.125	1.000	1.562	1.375
1.250	1.125	1.687	1.375
1.375	1.125	1.937	1.687
1.500	1.250	1.937	1.437
1.625	1.375	2.250	1.593
1.750	1.500	2.312	1.750
1.875	1.625	2.500	1.750
2.000	1.750	2.625	1.750
2.125	1.875	2.812	2.062
2.250	2.000	2.843	1.750
2.375	2.125	3.000	2.062
2.500	2.250	3.125	1.750
2.625	2.375	3.250	2.062
2.750	2.500	3.375	2.062
2.875	2.625	3.500	2.062
3.000	2.750	3.625	2.062
3.125	2.875	3.750	2.062
3.250	3.000	3.875	2.062
3.375	3.125	4.000	2.062
3.500	3.250	4.125	2.062
3.625	3.375	4.250	2.062
3.750	3.500	4.375	2.062
3.875	3.625	4.500	2.062
4.000	3.750	4.625	2.062

## Balanced Multi Spring Component Seal, O ring Design



### Features and Benefits:

- Designed for higher pressure applications
- Antimony Impregnated Carbon standard for strength and heat dissipation
- Compact narrow cross section design,
- Multiple Springs assures accurate face loading
- Flexible design compensates for shaft misalignment
- Variety of metals and O rings allow for broad base of applications
- All components are held together by a snap ring in a unitized construction design.
- Field repairable

### Standard Materials of Construction:

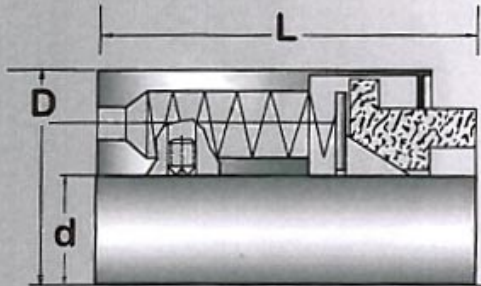
- **Faces:**
  - Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide
- **Elastomers:**
  - Buna, Viton®, Aflas®, Neoprene, EPDM, Kalrez
  - Any standard rubber O ring can be utilized
- **Metallurgy:**
  - 304, 316, Monel, Hastelloy C, Alloy 20

### Operating Limits:

- Pressure: 580psi 40 Bar
- Temperature: -40°C to 260°C / -40°F to 500°F (depending on materials used).

# A9T

## Multi Spring, PTFE Wedge Design



d	D	L
0.500	0.937	0.937
0.625	1.062	0.937
0.750	1.187	0.937
0.875	1.312	0.937
1.000	1.437	1.000
1.125	1.562	1.000
1.250	1.687	1.000
1.375	1.937	1.375
1.375 S	1.937	1.125
1.500	1.937	1.125
1.625	2.250	1.156
1.750	2.312	1.375
1.875	2.500	1.375
2.000	2.625	1.375
2.125	2.812	1.687
2.250	2.843	1.375
2.375	3.000	1.687
2.500	3.125	1.375
2.625	3.250	1.687
2.750	3.375	1.687
2.875	3.500	1.687
3.000	3.625	1.687
3.125	3.750	1.687
3.250	3.875	1.687
3.375	4.000	1.687
3.500	4.125	1.687
3.625	4.250	1.687
3.750	4.375	1.687

### Features and Benefits:

- Seals for extreme temperature and chemical services
- Compact narrow cross section design
- Multiple Springs assures accurate face loading
- Flexible design compensates for shaft misalignment
- All components are held together by a snap ring in a unitized construction design
- Setting clips standard
- Easy installation and removal
- Field Repairable

### Standard Materials of Construction:

- **Faces:**  
Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide
- **Elastomers:**
  - PTFE Wedge
- **Metallurgy:**
  - 304, 316, Monel, Hastelloy C, Alloy 20

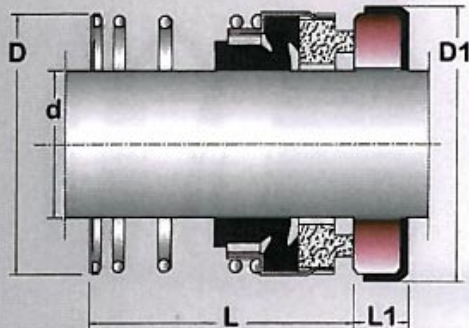
### Operating Limits:

- Pressure: 200psi 13.8 Bar
- Temperature: -40°C to 260°C / -40°F to 500°F



# A21

## Single Spring, Elastomer Bellows Seal



COMMON INDUSTRY #	d	D	L	D1	L1
290	0.625	1.062	0.875	1.250	0.406
358	0.750	1.187	0.875	1.375	0.406
309	0.875	1.312	0.937	1.500	0.406
295	1.000	1.687	1.000	1.625	0.437
356	1.125	1.812	1.062	1.750	0.437
185	1.250	1.937	1.062	1.875	0.437
177	1.375	2.062	1.125	2.000	0.437
758	1.500	2.187	1.125	2.125	0.437
238	1.625	2.500	1.375	2.375	0.500
446	1.750	2.625	1.375	2.500	0.500
340	1.875	2.750	1.500	2.625	0.500
267	2.000	2.875	1.500	2.750	0.500
543	2.125	3.000	1.687	3.000	0.562
1679	2.250	3.125	1.687	3.125	0.562
268	2.375	3.250	1.812	3.250	0.562
2120	2.500	3.343	1.812	3.375	0.562
2625	2.625	3.500	1.937	3.375	0.625
836	2.750	3.750	1.937	3.500	0.625
270	2.875	3.875	2.062	3.750	0.625
1696	3.000	4.000	2.062	3.875	0.625

### Features and Benefits:

- Cost effective seal common to many process pumps
- Bellows design helps compensate for face wear
- Bi-directional
- Multiple face and elastomer choices
- Equivalent to John Crane Type 21, Pac-Seal Type 21, US Seal C head

### Standard Materials of Construction:

#### • Faces:

- Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide

#### • Elastomers:

- Buna, Viton®, Aflas®, Neoprene, EPDM

#### • Metallurgy:

- 304, 316, Monel

### Operating Limits:

- Pressure: 150 psi 10.3 Bar
- Temperature: -40°F to +400°F.

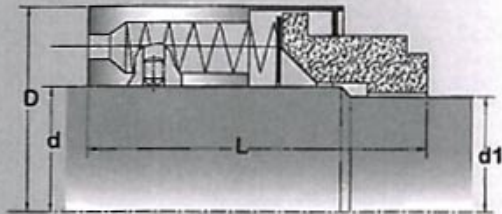
All industry standard "PS" numbers are available,

All seat styles available

Just provide us the "PS" number required or one used on previous orders

# A9TB

## Balanced Multi Spring Component Seal, PTFE Wedge Design



d	d1	D	L
1.000	0.875	1.437	1.312
1.125	1.000	1.562	1.375
1.250	1.125	1.687	1.375
1.375	1.125	1.937	1.687
1.500	1.250	1.937	1.437
1.625	1.375	2.250	1.593
1.750	1.500	2.312	1.750
1.875	1.625	2.500	1.750
2.000	1.750	2.625	1.750
2.125	1.875	2.812	2.062
2.250	2.000	2.843	1.750
2.375	2.125	3.000	2.062
2.500	2.250	3.125	1.750
2.625	2.375	3.250	2.062
2.750	2.500	3.375	2.062
2.875	2.625	3.500	2.062
3.000	2.750	3.625	2.062
3.125	2.875	3.750	2.062
3.250	3.000	3.875	2.062
3.375	3.125	4.000	2.062
3.500	3.250	4.125	2.062
3.625	3.375	4.250	2.062
3.750	3.500	4.375	2.062
3.875	3.625	4.500	2.062
4.000	3.750	4.625	2.062



### Features and Benefits:

- Designed for higher pressure applications
- Antimony Impregnated Carbon standard for strength and heat dissipation
- Compact narrow cross section design,
- Multiple Springs assures accurate face loading
- Flexible design compensates for shaft misalignment
- Setting clip standard
- All components are held together by a snap ring in a unitized construction design.

### Standard Materials of Construction:

#### • Faces:

- Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide

#### • Elastomers:

- PTFE Wedge

#### • Metallurgy:

- 304, 316, Monel, Hastelloy C, Alloy 20

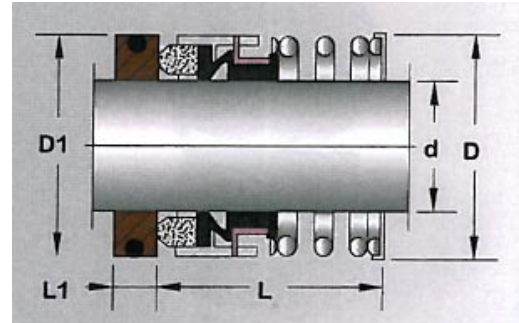
### Operating Limits:

- Pressure: 580 psi
- Temperature: -40°C to 260°C / -40°F to 500°F (depending on materials used).





# A1M Type 1 Single Spring Bellows Seal with Machined Head



d(in)*	D	L	D1	L1
0.500	0.937	1.187	1.000	0.312
0.623	1.093	1.312	1.250	0.406
0.750	1.218	1.312	1.375	0.406
0.875	1.348	1.375	1.500	0.406
1.000	1.500	1.562	1.625	0.437
1.125	1.625	1.625	1.750	0.437
1.250	1.812	1.625	1.875	0.437
1.375	1.875	1.687	2.000	0.437
1.500	2.000	1.687	2.125	0.437
1.625	2.250	2.000	2.375	0.500
1.750	2.375	2.000	2.500	0.500
1.875	2.500	2.125	2.625	0.500
2.000	2.625	2.125	2.750	0.500
2.125	2.812	2.375	3.000	0.562
2.250	2.937	2.375	3.125	0.562
2.375	3.062	2.500	3.250	0.562
2.500	3.187	2.500	3.375	0.562
2.625	3.375	2.750	3.375	0.625
2.750	3.500	2.750	3.500	0.625
2.875	3.625	2.875	3.750	0.625
3.000	3.750	2.875	3.875	0.625
3.125	4.000	3.125	4.000	0.781
3.250	4.125	3.125	4.125	0.781
3.375	4.250	3.125	4.250	0.781
3.500	4.375	3.125	4.375	0.781
3.625	4.500	3.250	4.500	0.781
3.750	4.625	3.250	4.625	0.781
3.875	4.750	3.375	4.750	0.781
4.000	4.875	3.375	4.875	0.781

## Features & Benefits:

- Machined head is standard to withstand more rigorous conditions
- Bellows design enhances alignment capabilities & helps compensate for face wear
- Bi-Directional
- Torque of Pump shaft drives through machined drive band & notches
- Rugged single spring minimizes clogging in stuffing box
- 316SS Standard Material to withstand wider variety of aggressive fluids
- Multiple face & elastomer choices
- All Styles of set screw lock collars available to improve setting & drive reliability
- Aflas bellows available for all sizes

## Standard Materials of Construction:

### Faces:

- Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide

### Elastomers:

- Buna, Viton, Aflas, Neoprene, EPDM

### Metallurgy:

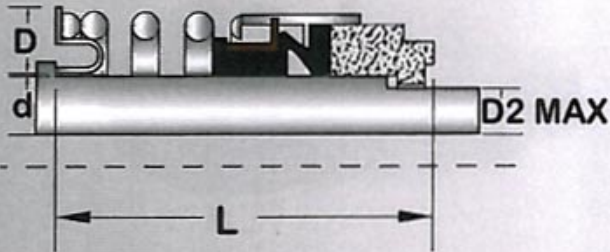
- 304,316, Monel

## Operating Limits:

- Pressure: to 200 PSI, 13.8 Bar
- Temperature: -40\* to +400\*, -40

# A1B

## Single Spring Seal for High Pressure



d(in)	D2	D	L
1.000	0.875	1.500	1.875
1.125	1.000	1.625	1.937
1.250	1.125	1.812	1.937
1.375	1.250	1.875	2.000
1.500	1.375	2.000	2.000
1.625	1.500	2.250	2.375
1.750	1.625	2.375	2.375
1.875	1.750	2.500	2.500
2.000	1.875	2.625	2.500
2.125	2.000	2.812	2.750
2.250	2.125	2.937	2.750
2.375	2.250	3.062	2.875
2.500	2.375	3.187	2.875
2.625	2.500	3.375	3.125
2.750	2.625	3.500	3.125
2.875	2.750	3.625	3.250
3.000	2.875	3.750	3.250
3.125	2.875	4.000	3.500
3.250	3.000	4.125	3.500
3.375	3.125	4.250	3.500
3.500	3.250	4.375	3.500
3.625	3.375	4.500	3.625
3.750	3.500	4.625	3.625
3.875	3.750	4.750	3.750
4.000	3.750	4.875	3.750

### Features and Benefits:

- Balanced face designs allow for higher pump pressures
- Machined head available to withstand more rigorous conditions
- Antimony Impregnated carbon faces improve durability and heat dissipation
- Bellows design enhances alignment capabilities and helps compensate for face wear
- Bi-directional
- Torque of pump shaft drives through machined drive band and notches
- Rugged single spring minimizes clogging in stuffing box
- Multiple face and elastomer choices

### Standard Materials of Construction:

- **Balanced Faces:**
  - Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide
- **Elastomers:**
  - Buna, Viton®, Aflas®, Neoprene, EPDM
- **Metallurgy:**
  - 304, 316, Monel

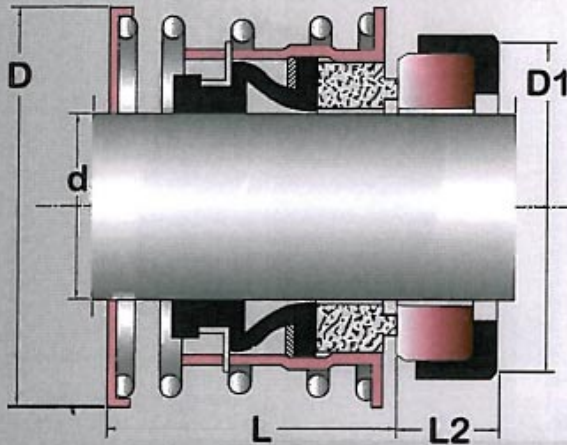
### Operating Limits:

- Pressure: Up to 1200 psi / 82 Bar g
- Temperature: -40°F to +400°F. / -40°C to 204°C.

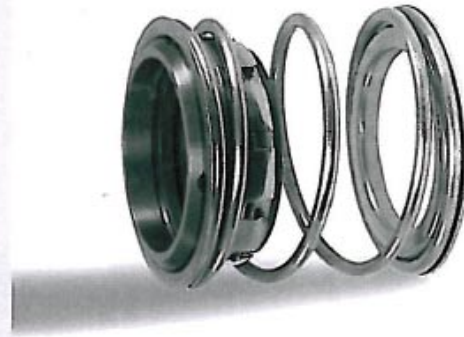


# A2

## Single Spring, Elastomer Bellows Seal



d(in)	D	L	D1	L2
0.625	1.312	0.875	1.250	0.406
0.750	1.437	0.875	1.375	0.406
0.875	1.562	0.937	1.500	0.406
1.000	1.812	1.000	1.625	0.437
1.125	1.875	1.062	1.750	0.437
1.250	2.062	1.062	1.875	0.437
1.375	2.250	1.125	2.000	0.437
1.500	2.375	1.125	2.125	0.437
1.625	2.718	1.375	2.375	0.500
1.750	2.750	1.375	2.500	0.500
1.875	2.875	1.500	2.625	0.500
2.000	3.000	1.500	2.750	0.500
2.125	3.250	1.687	3.000	0.562
2.250	3.375	1.687	3.125	0.562
2.375	3.500	1.812	3.250	0.562
2.500	3.625	1.812	3.375	0.562
2.625	3.875	1.937	3.375	0.625
2.750	4.000	1.937	3.500	0.625
2.875	4.125	2.062	3.750	0.625
3.000	4.250	2.062	3.875	0.625
3.125	4.562	2.187	4.000	0.781
3.250	4.687	2.187	4.125	0.781
3.375	4.812	2.187	4.250	0.781
3.500	4.937	2.187	4.375	0.781
3.625	5.125	2.312	4.500	0.781
3.750	5.250	2.312	4.625	0.781



### Features and Benefits:

- Designed for shorter operating lengths than A1
- Bellows design helps compensate for face wear
- Bi-directional
- Torque of pump shaft drives through drive band and notches
- Rugged single spring
- Multiple face and elastomer choices

### Standard Materials of Construction:

#### • Faces:

- Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide

#### • Elastomers:

- Buna, Viton®, Aflas®, Neoprene, EPDM

#### • Metallurgy:

- 304, 316, Monel

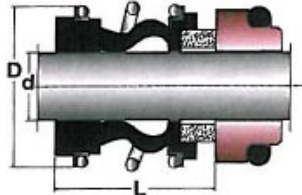
### Operating Limits:

- Pressure: to 150 PSI.
- Temperature: -40°F to +400°F.

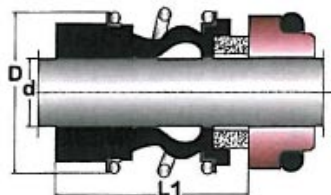
All industry standard "PS" numbers are available, just provide us the "PS" number required or one used on previous orders

# ES100/120/130 Single Spring Rubber Bellows Shaft Seal

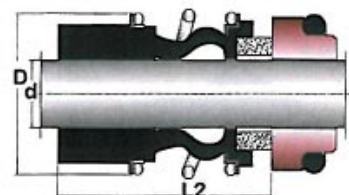
ES100



ES120



ES130



d	D	L	L1	L2
10	22.5	14.5	25.9	33.4
12	25.0	15.0	25.9	33.4
14	28.5	17.0	28.4	33.4
15	28.5	17.0	28.4	33.4
16	28.5	17.0	28.4	33.4
18	32.0	19.5	30.0	37.5
20	37.0	21.5	30.0	37.5
22	37.0	21.5	30.0	37.5
24	42.5	22.5	32.5	42.5
25	42.5	23.0	32.5	42.5
28	49.0	26.5	35.0	42.5
30	49.0	26.5	35.0	42.5
32	53.5	27.5	35.0	47.5
33	53.5	27.5	35.0	47.5
35	57.0	28.5	35.0	47.5
38	59.0	30.0	36.0	46.0
40	62.0	30.0	36.0	46.0
42	65.5	30.0	36.0	51.0
43	65.5	30.0	36.0	51.0
45	68.0	30.0	36.0	51.0
48	70.5	30.5	36.0	51.0
50	74.0	30.5	38.0	50.5
53	78.5	33.0	36.5	59.0
55	81.0	35.0	36.5	59.0
58	85.5	37.0	41.5	59.0
60	88.5	38.0	41.5	59.0
65	93.5	40.0	41.5	69.0
68	96.5	40.0	41.5	68.7
70	99.5	40.0	48.7	68.7
75	107.0	40.0	48.7	68.7
80	112.0	40.0	48.0	78.0
85	120.0	41.0	46.0	76.0
90	127.0	45.0	51.0	76.0
95	132.0	46.0	51.0	76.0
100	137.0	47.0	51.0	76.0

## Features and Benefits:

- The world's most common seal for metric shafts
- Very economical seal alternative
- Compact rugged design
- Seal faces are driven via the spring
- No torsional stress on the bellows
- Seal faces are encapsulated and protected in rubber bellows
- Large rubber cross sections and "surface grab" minimize tears and enhances seal life
- Faces match with several common seat designs
- Three common operating lengths for each shaft size
- Operates independently of shaft rotation
- Excellent in fluids with high solid content

## Standard Materials of Construction:

- **Faces:**
  - Carbon Graphite (Resin Impregnated), Antimony Impregnated Carbon, Silicon Carbide, Tungsten Carbide
- **Elastomers:**
  - Buna, Viton®, Neoprene, EPDM,
- **Metallurgy:**
  - 304, 316, Monel,

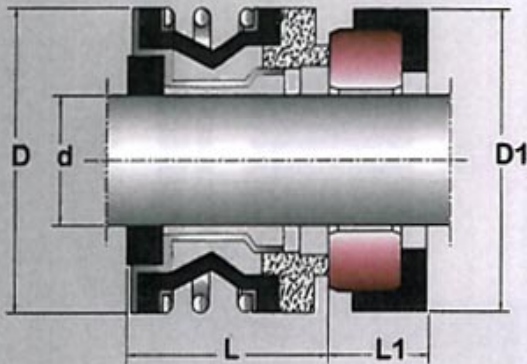
## Operating Limits:

- Pressure: to 225 PSI / 15 BAR
- Temperature: -40°F to +300°F / -40°C to +150°C



# A6

## Single Spring, Elastomer Bellows Seal



COMMON INDUSTRY #	d	D	L	D1	L1
100	.625	1.218	0.718	1.187	0.343
200	.625	1.218	0.718	1.25	0.406
501	.750	1.218	0.811	1.25	0.406
518	.625	1.218	0.718	1.187	0.296
528	.625	1.218	0.718	1.375	0.562
702	.625	1.218	0.718	1.187	0.288



### ▲ Features and Benefits:

- Single spring, elastomer bellows seal
- Compact
- Full convolution bellows gives maximum flexibility
- Pre-assembled for easy installation
- Common to many commercial and domestic pumps

### ▲ Standard Materials of Construction:

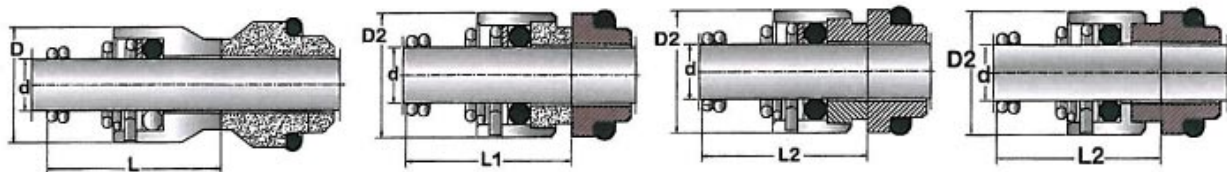
- **Faces:**
  - Carbon Graphite (Resin Impregnated), Phenolic
  - Carbon, Silicon Carbide,
- **Elastomers:**
  - Buna, Viton®, Neoprene, EPDM
- **Metallurgy:**
  - 304, 316

### ▲ Operating Limits:

- Pressure: to 75 PSI , 5.2 Bar
- Temperature: -40°F to +400°F.

All industry standard "PS" numbers are available. Just provide us with the "PS" number required or one used on previous orders

# ES390/320/370/378 Single Coil Tapered Spring Seals



**ES390**

**ES320**

**ES370**

**ES378**



d	D	D2	L	L1	L2
10	19	20	15.5	16.9	16.5
12	21	22	16.0	17.4	16.5
14	23	24	16.5	17.4	16.5
15	24	25	18.0	17.4	16.5
16	26	26	18.0	19.5	16.5
18	29	31	19.5	20.5	18.0
20	31	34	22.0	22.0	19.0
22	33	36	21.5	23.5	20.5
24	35	38	23.5	25.0	22.0
25	36	39	26.5	26.5	23.5
28	40	42	26.5	26.5	24.5
30	43	44	26.5	25.0	24.5
32	46	46	28.5	28.5	28.0
33	47	47	28.5	28.5	28.0
35	49	49	28.5	28.5	28.0
38	53	54	33.5	32.2	31.0
40	56	56	36.0	34.7	34.0
42	59	58	37.5	37.3	35.0
43	59	59	38.5	37.3	36.0
45	61	61	39.5	39.5	36.5
48	64	64	46.0	44.7	42.0
50	66	66	45.0	45.7	43.0
53	69	69	47.0	49.0	43.0
55	71	71	49.0	49.0	47.0
58	76	78	55.0	52.0	50.0
60	78	79	55.0	53.0	51.0
65	84	85	55.0	54.3	52.0
68	88	88	55.0	55.3	52.7
70	90	90	57.0	56.3	54.0

## Features and Benefits:

- Rugged simplicity
- Tapered spring "grabs" shaft and drives seal
- Uni-directional – Seal is dependent on rotation of shaft (please specify clockwise or counterclockwise rotation)
- Common European OEM pump seal
- Metal shrouded and protected seal faces
- Spring tabbed into rotary head
- Multiple face and elastomer choices
- Various seats available
- Very cost effective metric alternative

## Standard Materials of Construction:

### • Faces:

- ES320 Carbon Graphite (Resin Impregnated)
- ES370 Tungsten Carbide
- ES378 Silicon Carbide
- ES390 Hardened Stainless

### • Elastomers:

Buna, Viton®, Aflas®, Neoprene, EPDM,

### • Metallurgy:

- 304, 316

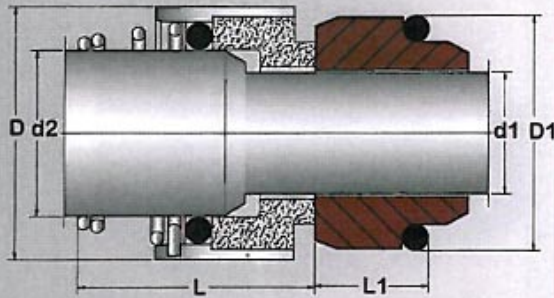
## Operating Limits:

- Pressure: 145 psi / 10 Bar
- Temperature: - 20 to 180°C - 4°F to 350°F



# ES129

## Balanced Single Coil Tapered Spring Seal



d1	d2	D	D1	L	L1
10	14	24	21	25.5	10
12	16	26	23	26.5	10
14	18	31	25	29.5	10
16	20	34	27	31	10
18	22	36	33	32.5	11.5
20	24	38	35	32.5	11.5
22	26	40	37	32.5	11.5
24	28	42	39	32.5	11.5
25	30	44	40	33.5	11.5
28	33	47	43	35.5	11.5
30	35	49	45	35.5	11.5
32	38	54	48	39.5	11.5
33	38	54	48	39.5	11.5
35	40	56	50	43.5	11.5
38	43	59	56	46	14
40	45	61	58	48	14
43	48	64	61	51	14
45	50	66	63	55	14
48	53	69	66	55	14
50	55	71	70	58	15
53	58	78	73	60	15
55	60	79	75	60	15
58	63	83	78	60	15
60	65	85	80	60	15
63	68	88	83	60	15
65	70	90	85	61	15
70	75	98	92	63	18
75	80	105	97	68	18



### ▲ Features and Benefits:

- Balanced face design for higher pressure applications
- Very cost effective metric alternative
- Tapered spring "Grabs and Drives" seal
- Rugged head design
- Shrouded and protected faces
- Dependent on shaft rotation
- Various seats available
- Unidirectional: seal is dependent on rotation of shaft (please specify clockwise or counterclockwise rotation)

### ▲ Standard Materials of Construction:

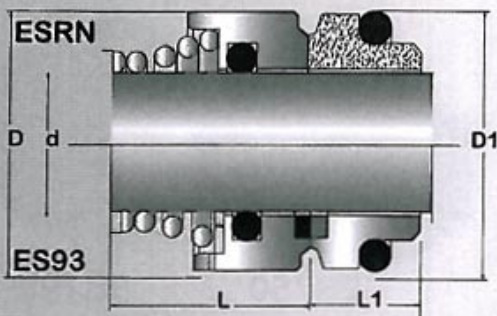
- **Faces:**
  - Carbon Graphite (Resin Impregnated), Antimony Impregnated Carbon, Silicon Carbide
- **Elastomers:**
  - Viton®, Aflas®, EPDM,
- **Metallurgy:**
  - 304, 316

### ▲ Operating Limits:

- Pressure: 360 psi / 25 Bar
- Temperature: - 50 to 220 °C / - 4°F to 350°F

# ESRN AND ES93

## Tapered Spring Component Seal



d	D	D1	L	L1
8	16	17.1	15	5.5
10	20	21	15	7.0
12	22	23	18	7.0
14	24	25	22	7.0
15	24	26.9	22	7.0
16	26	27	23	7.0
17	26	26.9	23	7.0
18	32	33	24	10.0
19	32	30.9	25	8.0
20	34	35	25	10.0
22	36	37	25	10.0
24	38	39	27	10.0
25	39	40	27	10.0
26	39	38.2	27	8.5
28	42	43	29	10.0
30	44	45	30	10.0
32	46	48	30	10.0
33	47	48	39	10.0
35	49	50	39	10.0
38	54	56	39	13.0
40	56	58	39	13.0
42	57	60.5	39	11.5
43	57	61	39	13.0
45	61	63	41	13.0
48	64	66	41	13.0
50	66	70	45	14.0
53	69	73	45	14.0
55	71	75	47	14.0
58	76	78	47	14.0
60	80	80	49	14.0
63	81	83	49	14.0
65	85	85	51	14.0
68	87	90	51	16.0
70	90	92	51	16.0
75	99	97	57	16.0

### Features and Benefits:

- Tapered spring transmits torque of shaft to seal
- Uni-directional – seal is dependent on rotation of shaft (please specify clockwise or counterclockwise rotation)
- Reliable Oring pusher secondary seal design
- Rugged machined heads
- Unbalanced

### Standard Materials of Construction:

#### • Faces:

- ESRN (machined and lapped rotary face) - Stainless vs Carbon Stationary
- ES93 (Inserted seal faces) - Carbon, Silicon Carbide, Tungsten Carbide

#### • Elastomers:

- Buna, Viton®, Aflas®, Neoprene, EPDM

#### • Metallurgy:

- 304

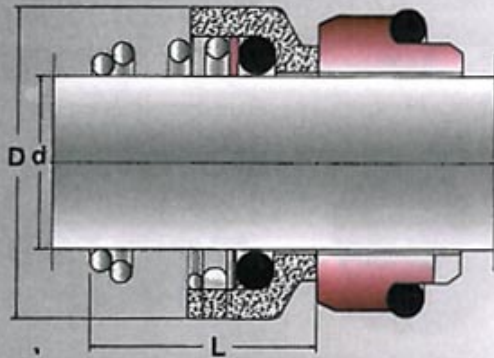
### Operating Limits:

- Pressure: to 145 PSI (10 Bar).
- Temperature: -40°F to +392°F. (- 40 to 200°C)



# ES290

## Single Coil Tapered Spring Seal



d	D	L
10	20	17.5
12	22	17.5
14	25	17.5
15	27	18.0
16	27	19.5
18	30	20.5
20	32	22.0
22	35	23.5
24	38	25.0
25	40	26.5
28	43	26.5

Note: All common metric seat types available



### Features and Benefits:

- Very cost effective metric alternative
- Tapered spring "Grabs and Drives" seal
- Dependent on shaft rotation
- Common European OEM Pump Seal
- Various seats available
- Uni-directional – Seal is dependent on rotation of shaft (please specify clockwise or counterclockwise rotation)

### Standard Materials of Construction:

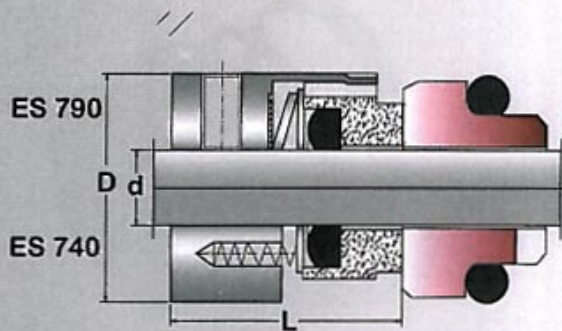
- **Faces:**
  - Carbon Graphite (Resin Impregnated)
- **Elastomers:**
  - Buna, Viton®, Neoprene, EPDM,
- **Metallurgy:**
  - 304, 316

### Operating Limits:

- Pressure: 145 psi / 10 Bar
- Temperature: - 20 to 180°C - 4°F to 350°F

# ES790 / ES740

Single Unbalanced Component Seal  
 ES 790 Continuous Wave Spring  
 ES 740 Multiple Spring



d	D	L
14	25	25.0
16	27	25.0
18	33	26.0
20	35	26.0
22	37	26.0
24	39	28.5
25	40	28.5
28	43	31.0
30	45	31.0
32	47	31.0
33	48	31.0
35	50	31.0
38	55	31.0
40	57	31.0
43	60	31.0
45	62	31.0
48	65	31.0
50	67	32.5
53	70	32.5
55	72	32.5
58	79	37.5
60	81	37.5
63	84	37.5
65	86	37.5
68	89	34.5
70	91	42.0
75	99	42.0
80	104	41.8

## Features and Benefits:

- Cost effective single component seal
- Bi – Directional
- Easy to repair and clean
- Face materials can be easily changed
- Single unwelded wave spring or multiple springs
- Built to DIN 24960
- Retainer with pumping screw available

## Standard Materials of Construction:

- **Faces:**
  - Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide, Stainless Steel
- **Elastomers:**
  - Buna, Viton®, Aflas®, Neoprene, EPDM
- **Metallurgy:**
  - 304, 316,

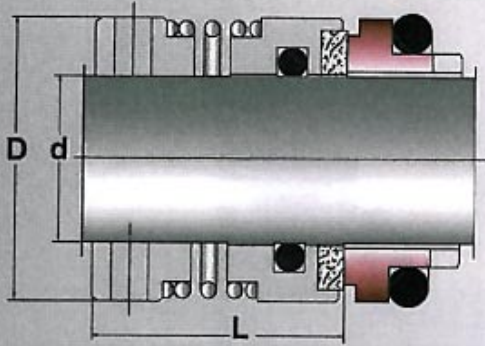
## Operating Limits:

- Pressure: to 150 PSI (10 Bar).
- Temperature: -40°F to +400°F. (- 40 to 205°C)



# A157

## Single Spring "O" Ring Style



Note: For Imperial seats refer to page 47.  
For Metric seats refer to page 49

d (mm)	d (in)	D (mm)	D (in)	L (mm)	L (inch)
16	0.625	29.0	1.142	32.5	1.280
18	0.750	32.5	1.280	32.5	1.280
20	-	34.5	*	35.5	*
22	0.875	35.0	1.378	35.5	1.398
25	1.000	38.1	1.500	39.0	1.535
28	1.125	42.9	1.689	41.0	1.614
30	-	45.5	*	41.0	*
32	1.250	47.0	1.850	44.0	1.732
33	-	49.0	*	44.0	*
35	1.375	50.0	1.969	47.0	1.850
38	1.500	53.0	2.087	47.0	1.850
40	-	55.0	*	47.0	*
42	1.625	55.5	2.185	47.0	1.850
43	-	55.5	*	47.0	*
45	1.750	60.0	2.362	47.0	1.850
48	1.875	62.0	2.441	55.0	2.165
50	-	66.0	*	58.5	*
-	2.000	66.7	2.626	58.5	2.303
55	2.125	71.0	2.795	60.0	2.362
58	2.250	73.0	2.874	60.0	2.362
60	2.375	77.0	3.031	63.0	2.480
63	2.500	79.4	3.126	63.0	2.480
65	-	82.0	*	66.0	*
68	2.625	82.6	3.252	66.0	2.598
70	2.750	87.0	3.425	66.0	2.598
73	2.875	90.0	3.543	71.0	2.795
75	-	91.5	*	71.0	*
-	3.000	95.3	3.752	77.5	3.051



### Features and Benefits:

- Machined head is standard to withstand more rigorous conditions
- Uni-directional (dependent on shaft rotation)
- Rugged single spring minimizes clogging in stuffing box
- 316 SS Standard Material to withstand wider variety of aggressive fluids
- Inserted protected faces
- Multiple face and elastomer choices
- Set screw lock collar improves setting and drive reliability

### Standard Materials of Construction:

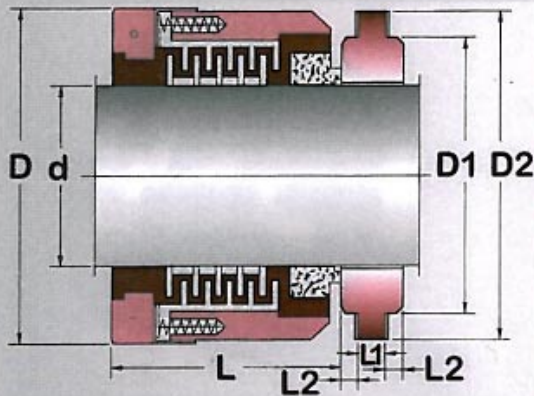
- **Faces:**
  - Carbon Graphite (Resin Impregnated), Antimony-Impregnated Carbon, Silicon Carbide, Tungsten Carbide
- **Elastomers:**
  - Buna, Viton®, Aflas®, Neoprene, EPDM
- **Metallurgy:**
  - 304, 316, Monel

### Operating Limits:

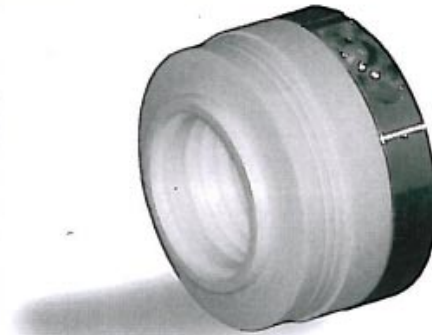
- Pressure: to 200 PSI
- Temperature: -40°F to +400°F.

# TB

## Single Outside PTFE Bellows Component Seal



d(IN)	dMM	D	L	D1	D2	L1	L2
	25mm	61.0	33.0	42.7	53.0	8.0	4.8
1.000		2.402	1.299	1.681	2.087	0.315	0.189
	28mm	67.0	36.0	50.7	63.0	11.0	8.0
1.125		2.638	1.417	1.996	2.480	0.433	0.315
	30mm	70.0	37.0	53.9	66.0	11.0	8.0
1.375		2.874	1.496	2.244	2.717	0.433	0.315
	33mm	73.0	38.0	57.0	69.0	11.0	8.0
	35mm	73.0	38.0	57.0	69.0	11.0	8.0
	38mm	76.0	38.0	63.4	76.0	11.0	8.0
1.500		2.992	1.496	2.496	2.992	0.433	0.315
	40mm	80.0	40.0	66.5	79.0	11.0	8.0
1.625		3.150	1.575	2.618	3.110	0.433	0.315
	43mm	83.0	40.0	69.7	82.0	11.0	8.0
1.750		3.268	1.575	2.744	3.228	0.433	0.315
	45mm	83.0	40.0	69.7	82.0	11.0	8.0
1.875		3.504	1.693	3.122	3.740	0.563	0.374
	48mm	89.0	43.0	79.3	95.0	14.3	9.5
	50mm	89.0	43.0	79.3	95.0	14.3	9.5
2.000		3.504	1.693	3.122	3.740	0.563	0.374
	53mm	103.0	53.0	82.4	98.0	14.3	9.5
2.125		4.055	2.087	3.244	3.858	0.563	0.374
	55mm	107.0	53.0	85.6	101.0	14.3	9.5
	60mm	110.0	53.0	88.8	106.0	14.3	9.5
2.375		4.331	2.087	3.496	4.173	0.563	0.374
	63mm	113.0	53.0	91.9	108.0	14.3	9.5
2.500		4.449	2.087	3.618	4.252	0.563	0.374
	65mm	116.0	53.0	95.1	111.0	14.3	9.5
2.625		4.567	2.087	3.744	4.370	0.563	0.374



### Features and Benefits:

- Outside design for highly corrosive media
- No metallic parts contact fluid
- Bellows design helps compensate for face wear
- Clamp to shaft design eliminates need for direct set screw drive on shaft
- No vapor corrosion
- Multiple Springs out of the product but enhance face loading
- Eliminates Orings
- Easy Installation
- Replaces John Crane® Type 20

### Standard Materials of Construction:

- **Faces:**
  - Carbon Graphite (Resin Impregnated), Silicon Carbide, PTFE, Ceramic
- **Seal Body:**
  - PTFE (Teflon)
- **Clamp Metallurgy (Non Contacting):**
  - 316, Monel, Hastelloy-C, Alloy 20

### Operating Limits:

- Pressure: 120 psi / 8.3 Bar
- Temperature: -40°F to +248°F / -40°C to +120°C.



## COMMON NORTH AMERICAN SEAT STYLES



CUP



O - RING



BLOCK



T - SEAT



L - SEAT

### ▲ Features and Benefits:

- All styles and materials of construction
- Special sizes and designs readily available
- Repair and lapping of all materials
- Available with all standard elastomers
- Notches, pin holes, flush holes are easily added
- Retained faces in metal shrouds

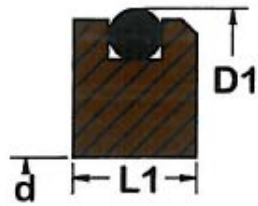
### ▲ Standard Materials of Construction:

#### Faces:

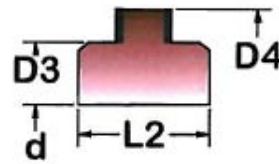
- Alumina Ceramic
- Carbon
- Phenolic
- Tungsten Carbide
- Reaction Bonded Silicon Carbide
- Sintered Alpha Silicon Carbide
- Graphitized Silicon Carbide
- NiResist
- 17-4 PH
- Glass Filled PTFE

### ▲ Elastomers:

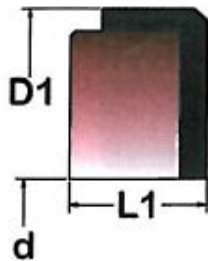
Buna, Viton®, Aflas®, Neoprene, EPDM, Kalrez®, Chemraz®



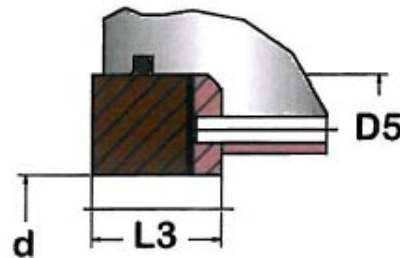
**O-RING SEAT**



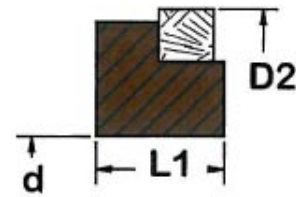
**T - SEAT**



**CUP SEAT**



**BLOCK SEAT**



**L - SHAPE  
(WITH GRAFOIL OR O-RING)**

d(in)	CS / OS		BS		TS			LS	
	Cup /Oring Groove		Block		"T" Seat			"L" Seat	
	D1	L1	D5 (Bore)	L3	D3	D4	L2	D2	L1
0.375	1.000	0.312	*	*	*	*	*	1.000	0.312
0.500	1.000	0.312	1.008	0.312	*	*	*	1.000	0.312
0.625	1.250	0.408	1.258	0.406	*	*	*	1.250	0.408
0.750	1.375	0.406	1.383	0.406	1.370	1.750	0.880	1.375	0.406
0.812	1.375	0.406	1.383	0.406	*	*	*	1.375	0.406
0.875	1.500	0.406	1.508	0.406	1.494	1.875	0.880	1.500	0.406
1.000	1.625	0.437	1.633	0.437	1.620	2.090	0.880	1.625	0.437
1.125	1.750	0.437	1.758	0.437	1.745	2.220	0.880	1.750	0.437
1.250	1.875	0.437	1.883	0.437	1.870	2.340	0.880	1.875	0.437
1.375	2.000	0.437	2.008	0.437	1.995	2.410	0.880	2.000	0.437
1.437	2.125	0.437	2.133	0.437	2.166	2.560	0.880	2.125	0.437
1.500	2.125	0.437	2.133	0.437	2.245	2.720	0.880	2.125	0.437
1.625	2.375	0.500	2.388	0.500	2.370	2.840	0.880	2.375	0.500
1.750	2.500	0.500	2.508	0.500	2.495	3.090	0.880	2.500	0.500
1.875	2.625	0.500	2.633	0.500	2.620	3.220	0.880	2.625	0.500
2.000	2.750	0.500	2.758	0.500	2.745	3.470	0.880	2.750	0.500
2.125	3.000	0.562	3.008	0.562	2.870	3.720	0.880	3.000	0.562
2.250	3.125	0.562	3.133	0.562	2.995	3.840	0.880	3.125	0.562
2.375	3.250	0.562	2.258	0.562	3.057	3.880	0.880	3.250	0.562
2.500	3.375	0.562	3.383	0.562	3.245	4.090	0.880	3.375	0.562
2.625	3.375	0.625	3.385	0.625	3.370	4.220	0.880	3.375	0.625
2.750	3.500	0.625	3.510	0.625	3.615	4.250	1.000	3.500	0.625
2.875	3.750	0.625	3.760	0.625	3.740	4.375	1.000	3.750	0.625
3.000	3.875	0.625	3.885	0.625	3.865	4.500	1.000	3.875	0.625
3.125	4.000	0.781	4.010	0.781	3.990	4.625	1.000	4.000	0.781
3.250	4.125	0.781	4.135	0.781	4.115	4.750	1.000	4.125	0.781
3.375	4.250	0.781	4.260	0.781	4.240	4.875	1.000	4.250	0.781
3.500	4.375	0.781	4.383	0.781	4.365	5.000	1.000	4.375	0.781
3.625	4.500	0.781	4.508	0.781	4.490	5.125	1.000	4.500	0.781
3.750	4.625	0.781	4.633	0.781	4.615	5.250	1.000	4.625	0.781
3.875	4.750	0.781	4.758	0.781	4.740	5.375	1.000	4.750	0.781
4.000	4.875	0.781	4.883	0.781	4.865	5.500	1.000	4.875	0.781



## COMMON METRIC SEAT STYLES



MS44



MS50



MS13



MS66



MS60



MS99



MS92

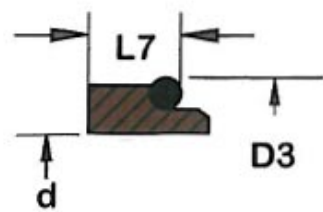
### ▲ Standard Materials of Construction:

#### Faces:

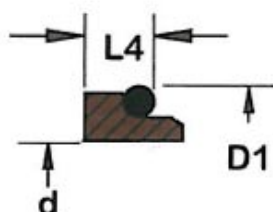
- Alumina Ceramic
- Carbon
- Phenolic
- Tungsten Carbide
- Reaction Bonded Silicon Carbide
- Sintered Alpha Silicon Carbide
- Graphitized Silicon Carbide
- NiResist
- 17-4 PH
- Glass Filled PTFE

### ▲ Elastomers:

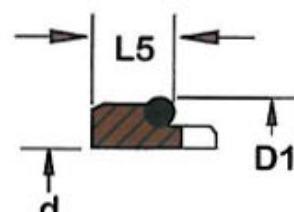
Buna, Viton®, Aflas®, Neoprene, EPDM, Kalrez®, Chemraz®



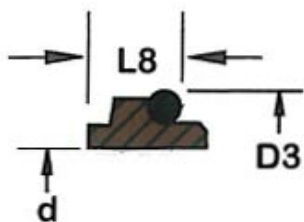
MS44



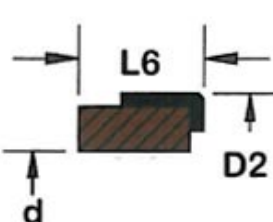
MS66



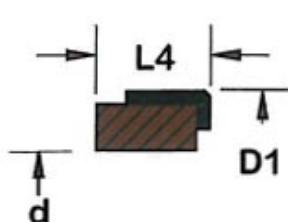
MS99



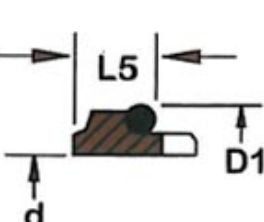
MS13



MS50



MS60



MS92

d	D1	D2	D3	L4	L5	L6	L7	L8
10	21	24.60	19.2	6.6	10.0	9.0	6.6	7.1
12	23	27.80	21.6	6.6	10.0	9.0	5.6	7.6
14	25	30.95	24.6	6.6	10.0	10.5	5.6	7.6
15	27	30.95	24.6	6.6	10.0	10.5	6.6	9.0
16	27	30.95	28.0	6.6	10.0	10.5	7.5	9.0
18	33	34.15	30.0	7.5	11.5	10.5	8.0	10.0
20	35	35.70	35.0	7.5	11.5	10.5	7.5	9.5
22	37	37.30	35.0	7.5	11.5	10.5	7.5	9.5
24	39	40.50	38.0	7.5	11.5	10.5	7.5	9.5
25	40	40.50	38.0	7.5	11.5	10.5	7.5	11.0
28	43	47.65	42.0	7.5	11.5	12.0	9.0	11.0
30	45	50.80	45.0	7.5	11.5	12.0	10.5	11.0
32	48	50.80	48.0	7.5	11.5	12.0	10.5	11.0
33	48	54.00	50.0	7.5	11.5	12.0	11.0	11.5
35	50	54.00	52.0	7.5	11.5	12.0	11.0	11.5
38	56	57.15	55.0	9.0	14.0	12.0	10.3	11.5
40	58	60.35	58.0	9.0	14.0	12.0	10.8	11.5
42	61	63.50	60.0	9.0	14.0	12.0	12.0	14.3
43	61	63.50	62.0	9.0	14.0	12.0	12.0	14.3
45	63	63.50	64.0	9.0	14.0	12.0	11.6	14.3
48	66	66.70	68.4	9.0	14.0	12.0	11.6	14.3
50	70	69.85	69.3	9.5	15.0	13.5	11.6	14.3
53	73	73.05	72.3	11.0	15.0	13.5	12.3	14.3
55	75	76.20	75.4	11.0	15.0	13.5	13.3	15.3
58	78	79.40	78.4	11.0	15.0	13.5	13.3	15.3
60	80	79.40	80.4	11.0	15.0	13.5	13.3	15.3
65	85	92.10	85.4	11.0	15.0	16.0	13.0	15.3
68	90	95.25	91.5	11.3	18.0	16.0	13.7	16.0
70	92	95.25	92.0	11.3	18.0	16.0	13.0	15.3
75	97	101.60	99.0	11.3	18.0	16.0	14.0	15.3
80	105	114.30	104.0	12.0	18.2	20.0	15.0	16.3
85	110	117.50	109.0	14.0	18.2	20.0	14.8	16.3
90	115	123.85	114.0	14.0	18.2	20.0	14.8	16.3
95	120	127.00	120.3	14.0	17.2	20.0	15.8	17.3
100	125	133.35	123.3	14.0	17.2	20.0	15.8	17.3

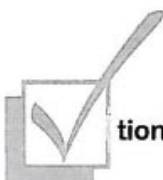




Repair of all seal styles regardless of manufacturer



Detailed breakdown and failure analysis



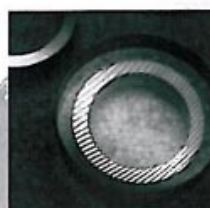
Diverse domestic and international sourcing network minimizes costs and shortens lead times



Ultra-sonic cleaning



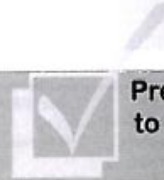
Precise attention to detail, and years of technical seal repair experience



Precision seal surface lapping to 2-3 lightbands



Reassembly to original OEM specifications



Pressure tests to assure field success



Seals returned to customers in "like new" operating condition

**Pay only the wholesale costs for replaced parts and labor**

We do not "guesstimate" what the customers can bear or what the OEM might charge. Just a fair cost to get the job done correctly. Consistently, we offer the industry's most aggressive price structures.



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