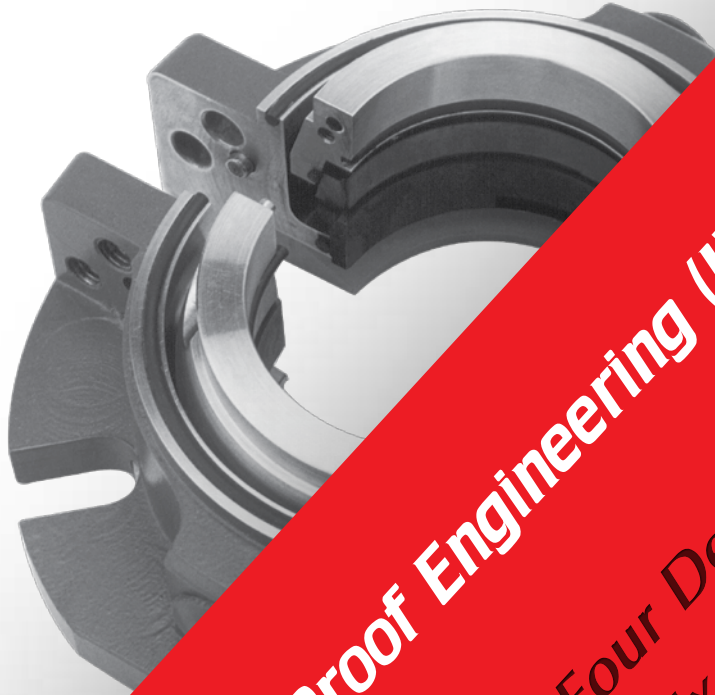




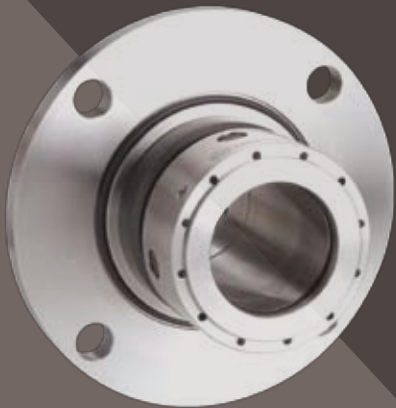
SINCE 1973



**Leak-Proof Engineering (I) Pvt. Ltd**

Over Four Decades of  
Engineering Excellence

EDR GROUP OF INDUSTRIES



Leak-Proof Engineering (I) Pvt. Ltd







SINCE 1973

*40 years to remember ....  
.... and much more to look for*

*Leak Proof the pioneer and leading manufacturer of mechanical seals and sealing systems was established in 1973. With the complete range of standard mechanical seals, API 682 seals, sealing systems and allied products we have an enviable reputation for reliable sealing products. Latest addition to our product range is 180 bar high pressure seal ever developed so far in the world.*

**Products:**

- *API 682 seals*
- *Concrete Volute pump seals*
- *Agitated Nutsche filter seals*
- *Dry Gas seals*
- *Split seals*
- *Metal Bellow seals*
- *Sundyne pump seals*
- *Turbine pump seals*
- *Special high pressure seals*
- *Agitator seals*
- *API sealing systems*
- *Segmented carbon sealing rings*
- *Rotary Joints*
- *Flexible Graphite gaskets and packing*

**Materials:**

**Faces:** *Carbon-R, Carbon-M, Lecrolloy, Ceramic, Tungsten carbide, Silicon carbide, Lecarb.*

**Secondary seals:** *Nitrile, Silicon, EPDM, Viton, Kalrez, PTFE, Flexible graphite.*

**Hardware:** *SS 304, SS 316, Duplex SS, Alloy-20, Hastelloy C, Hastelloy B, Monel, C-42, AM350, Inconel 718.*

**Springs:** *SS 316, Hastelloy C.*

**Applicable range:**

- *Maximum size manufactured till date 512 mm*
- *Maximum pressure up to 180 bar*
- *Maximum temperature +400° C*

## Series LPA 90

(Low Emission, Single and Dual Pressurised)



### Advantages:

These special engineered seals provide the following advantages:

- To extend Life Beyond 25000 Hours of operation
- To Reduce emission levels
- To ensure Plant and personnel safety in hazardous environments
- To standardize the Seals and Sealing Systems

Series LPA90 multi-spring pusher seals are designed and qualification tested according to the stringent testing norms specified by API 682 standard. These dependable, engineered mechanical seals are developed to attain extremely low emissions, typically to less than 150 ppm. These seals are offered in single, dual unpressurised and dual pressurised arrangements for a wide range of petroleum and light hydrocarbon services in refinery and petrochemical industries, encompassing all services in Gas and Oil industry.

### Series LPA 90 S Type A

Arrangement 1 – Single Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20.....110 mm  
Pressure p : Vacuum to 42 bar  
Temperature t : -40° C to 176° C  
Configuration : 1CW-FX

### Series LPA 90 T Type A

Arrangement 2 – Dual Unpressurised Face to Back Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20...110mm  
Pressure p : Vacuum to 42 bar  
Temperature t : -40° C to 176° C  
Configuration : 2CW-CS

### Series LPA 90 B Type A

Arrangement 3 – Dual Pressurized Back to Back Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20...110mm  
Pressure p : Vacuum to 42 bar  
Temperature t : -40° C to 176° C  
Configuration : 3CW-BB

### Series LPA 90 F Type A

Arrangement 3 – Dual Pressurized Face to Face Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20...110mm  
Pressure p : Vacuum to 42 bar  
Temperature t : -40° C to 176° C  
Configuration : 3CW-FF

## Series LPA 45 & LPA 47

(Low Emission, Single and Dual Pressurised)



### Advantages:

These special engineered seals provide the following advantages:

- To extend Life Beyond 25000 Hours of operation
- To Reduce emission levels
- To ensure Plant and personnel safety in hazardous environments
- To standardize the Seals and Sealing Systems

Series LPA45, LPA47 non-pusher metal bellows seals are designed and qualification tested according to the stringent testing norms specified by API 682 standard. These dependable, engineered mechanical seals are developed to attain extremely low emissions. These seals are offered in single, dual unpressurised and dual pressurised arrangements for a wide range of petroleum and light hydrocarbon services in refinery and petrochemical industries, encompassing all services in Gas and Oil industry.

### Series LPA 45 S Type B

Arrangement 1 – Single Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20.....110 mm  
Pressure p : Vacuum to 20 bar  
Temperature t : -40° C to 176° C  
Configuration : 1CW-FX

### Series LPA 45 T Type B

Arrangement 2 – Dual Unpressurized Face to Back Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20...110mm  
Pressure p : Vacuum to 20 bar  
Temperature t : -40° C to 176° C  
Configuration : 2CW-CW

### Series LPA 47 S Type C

Arrangement 1 – Single Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20...110mm  
Pressure p : Vacuum to 20 bar  
Temperature t : -40° C to 400° C  
Configuration : 1CW-FX

### Series LPA 47 F Type C

Arrangement 3 – Dual Pressurized Face to Face Cartridge Seal.

#### Operating Limits:

Shaft diameter d1 : 20...110mm  
Pressure p : Vacuum to 20 bar  
Temperature t : -40° C to 400° C  
Configuration : 3CW-FF

**Series LPH 5149** (Balanced Split Seal)

Series LPH 5149 seals are developed for large shaft size **Concrete volute pumps**.

The split faces are replaceable without disassembling the pump during maintenance shutdowns.

**Operating Limits :**

Shaft Diameter d1: 50 ... 500 mm  
 Pressure p : Vacuum ... 20 bar (max)  
 Temperature t : Amb. ... 50° C (max)  
 Velocity v : 20 m/sec

**Series LPKS 918** (Seal for ANF, Filters & Dryers)

Series LPKS 918 seals are designed for **Agitated nutsche filters (ANF)**. These seals are used for ANF filters & dryers, Rotary vacuum paddle dryers and Horizontal reactors with expanding shafts.

**Operating Limits:**

Shaft Diameter d1 : 50 ... 150 mm  
 Pressure p : full vacuum to 7 bar  
 Temperature t : - 80 ... +200° C  
 Velocity v : 1 m/sec



## **Dry Gas Seal**

Dry Gas seals are part of our manufacturing range which are used on high speed compressors in Gas and Oil Industries. We refurbish dry gas seals of any brand.

### **Operating Limits:**

Shaft Diameter d1: up to 250 mm.

Pressure p : up to 5 bar.

Temperature t : 300° C.

Velocity v : 50 m/sec



## **Series LPH 5050** (Balanced Split Seal)

Series LPH 5050 is a unique design completely split balanced seal with minimum number of components for assembling the seal and allows user to install the seal without disassembling the equipment.

### **Operating Limits :**

Shaft Diameter d1 : 50...350 mm

Pressure p : 14 bar (max)

Temperature t : Amb. ... 140° C

Velocity v : 20 m/sec



### Series 60 L (Metal Bellow Single Acting)

Series 60L is welded metal bellow seal used for high temperature and moderate pressure applications in Petrochemical plants, Petroleum refineries, Edible oil refineries etc.



#### Operating Limits:

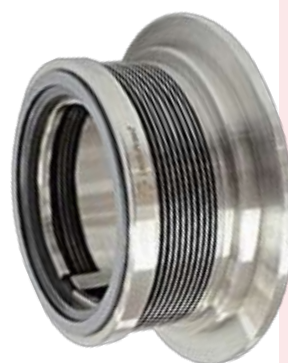
Shaft Diameter d1: 35.... 100 mm  
 Pressure p : 20 bar (max)  
 Temperature t : - 20 + 400° C  
 Velocity v : 20 m/sec



Cartridge version

### Series 65 L (Metal Bellow Single Acting)

Series 65L is welded stationery bellow seal used for high temperature, viscous fluids and moderate pressure applications in Petrochemical plants, Petroleum refineries, Edible oil refineries etc.



#### Operating Limits:

Shaft Diameter d1: 35.... 100 mm  
 Pressure p : 20 bar (max)  
 Temperature t : - 20 + 400° C  
 Velocity v : 20 m/sec



Cartridge version

### Series 40 & 45 (Metal Bellow Single Acting)

Series 40 & 45 are welded metal bellow seals used for moderate temperature, pressure application and for corrosive fluids. The bellow seals eliminate the need for springs and dynamic secondary seal.



#### Operating Limits:

Shaft Diameter d1: 15 ... 100 mm  
 Pressure p : 18 bar (max)  
 Temperature t : -20 ... + 200° C  
 Velocity v : 20 m/sec



Cartridge version

### Series 850B & 855B (Sundyne Pump Seals)

Series 850B & 855B seals are specially developed for **Sundyne and Sunflow pumps**. Single seals are used in most applications for non abrasive or non Hazardous liquids. Double seals are recommended when pumped liquid contains abrasive and leakage could be hazardous or when pump is likely to run dry.



#### Operating Limits:

Shaft Diameter d1 : 1.25", 1.375", 1.5"  
 Pressure p : 20 bar (max)  
 Temperature t : - 45 ... +180° C  
 Velocity v : 50 m/sec

### Series 88B2A/DG

(Reverse Balanced Single Acting)

Series 88B2A/DG is factory assembled dry running seal for stainless steel agitators. This is a multiple spring externally mounted; reverse balanced with elastomer secondary seals.



#### Operating Limits:

Shaft Diameter d1 : 25 ... 350 mm  
 Pressure p : Vacuum ....10 bar (max)  
 Temperature t : Amb. .... 120° C (max)  
 Velocity v : 5 m/sec

### Series LPW 881 (Reverse Balanced Single Acting)

Series LPW 881 is factory assembled dry running seal for stainless steel agitators. This is a wave spring externally mounted; reverse balanced with elastomer secondary seals.



#### Operating Limits:

Shaft Diameter d1 : 25 ... 350 mm  
 Pressure p : Vacuum ....10 bar (max)  
 Temperature t : Amb. .... 120° C (max)  
 Velocity v : 5 m/sec



## Series LPM 850 / LPM 850

(Double Mechanical Seal Double Acting)

Series LPM 850/LPM 850 seals are designed for installation on large size shafts. The seal is configured with double back to back arrangement for operational safety and reliability. Largest size seal (512mm) is in operation on a **Rotary Furnace**.



### Operating Limits:

Shaft Diameter d1: 150 ... 600 mm.  
 Pressure p : up to 10 bar.  
 Temperature t : - 20 to 200° C  
 Velocity v : 5 m/sec.

## Series 800BB/CK

(Double Mechanical Seal Double Acting)

Series 800BB/CK seal is an engineered seal developed for bottom entry shaft vessels. The seal configured with reverse balance feature which will not allow seal faces to open up when barrier medium pressure drops. Successfully installed on Chemineer Reactor for handling polypropylene slurry service.



### Operating Limits:

Shaft Diameter d1: 50 ... 200 mm.  
 Pressure p : 35 bar (max).  
 Temperature t : - 20 ... 200° C.  
 Velocity v : 10 m/sec.

## Series LPH 9010

Series LPH 9010 Turbine Pump Seals are series of segmented carbon rings arranged in one assembly to contain leakage of pumping medium. These seals are used for different types of turbine pumps.



### Operating Limits:

Shaft Diameter d1 : 50 ... 500 mm  
 Pressure p : up to 10 bar  
 Temperature t : amb ... 60° C  
 Velocity v : 25 m/sec

## Series 90B3/800BB/CK

(Triple Mechanical Seal Triple Acting)

Series 90B3/800BB/CK seal is specially engineered for installation on bottom entry shaft vessels. The seal is configured with three balanced seals to handle highly abrasive slurry services and safety. Successfully installed on **Ekato Reactor** for handling PVC slurry service.



### Operating Limits:

Shaft Diameter d1: 50 ... 200 mm.  
 Pressure p : 25 bar (max).  
 Temperature t : - 20 ... 180° C.  
 Velocity v : 10 m/sec.

## Series 95B/95B/BCK & 95B/90B/BCK

(Balanced Double Mechanical Seal Double Acting)

Series 95B/95B/BCK & 95B/90B BCK are factory assembled cartridge seals used on agitators. The seals are designed for handling severe services including products emitting toxic vapours during reaction process.



### Operating Limits:

Shaft Diameter d1: 25 .... 350mm  
 Pressure p : Vacuum .... 35 bar (max)  
 Temperature t : Amb. ... 200° C (max)  
 Velocity v : 10 m/sec

## Series LPKS 903 & LPKS 925

(Balanced Double Mechanical Seal Double Acting)

Series LPKS 903 & LPKS 925 are factory assembled cartridge seals used on agitators. The seals are designed for handling severe services including products emitting toxic vapours during reaction process.



### Operating Limits:

Shaft Diameter d1: 25 .... 350mm  
 Pressure p : Vacuum .... 35 bar (max)  
 Temperature t : Amb. ... 200° C (max)  
 Velocity v : 10 m/sec

### **Series 95U/95U/BCG & 95U/90U/BCG** (Unbalanced Double Mechanical Seal Double Acting)

Series 95U/95U/BCG & 95U/90U/BCG are factory assembled cartridge seals used on agitators. The seals are designed for handling severe services including products emitting toxic vapours during reaction process.



#### **Operating Limits:**

Shaft Diameter d1: 15 ... 350 mm  
 Pressure p : Vacuum ....10 bar (max)  
 Temperature t : Amb. .... 120° C (max)  
 Velocity v : 10 m/sec

### **Series LPKS 901 & LPKS 913** (Unbalanced Double Mechanical Seal Double Acting)

Series LPKS 901 & LPKS 913 are factory assembled cartridge seals used on agitators. The seals are designed for handling severe services including products emitting toxic vapours during reaction process.



#### **Operating Limits:**

Shaft Diameter d1: 15 ... 350 mm  
 Pressure p : Vacuum ....10 bar (max)  
 Temperature t : Amb. .... 120° C (max)  
 Velocity v : 10 m/sec

### **Series 88B2A/WCG** (Wet Running Single Acting)

Series 88B2A/WCG is factory assembled cartridge seal units for stainless steel agitators. Lubrication of faces aids reduction of heat generation and heat removal from faces.



#### **Operating Limits:**

Shaft Diameter d1: 25 ... 350 mm  
 Pressure p : Vacuum ....10 bar (max)  
 Temperature t : Amb. .... 180° C (max)  
 Velocity v : 10 m/sec

### **Series LPKS 924** (Wet Running Single Acting)

Series LPKS 924 is factory assembled cartridge seal units for stainless steel agitators. Lubrication of faces aids reduction of heat generation and heat removal from faces.



#### **Operating Limits:**

Shaft Diameter d1: 25 ... 350 mm  
 Pressure p : Vacuum ....10 bar (max)  
 Temperature t : Amb. .... 180° C (max)  
 Velocity v : 10 m/sec

### **Series 88B2A/BWCGJ** (Reverse Balanced Single Acting)

Series 88B2A/BWCGJ is factory assembled cartridge seals for stainless steel agitators. These seals are used as wet seals with clean lubricating medium to lubricate seal faces.



#### **Operating Limits:**

Shaft Diameter d1: 25 ... 350mm  
 Pressure p : Vacuum ... 10 bar (max)  
 Temperature t : Amb. .... 180° C (max)  
 Velocity v : 10 m/sec

### **Series LPKS 921** (Reverse Balanced Single Acting)

Series LPKS 921 is factory assembled cartridge seals for stainless steel agitators. These seals are used as wet seals with clean lubricating medium to lubricate seal faces.



#### **Operating Limits:**

Shaft Diameter d1: 25 ... 350mm  
 Pressure p : Vacuum ... 10 bar (max)  
 Temperature t : Amb. .... 180° C (max)  
 Velocity v : 10 m/sec

### Series 800 HB2/CG (Balanced Single Acting)

This is a unique seal developed to meet stringent requirements of **Boiler feed water pumps** involving high speeds. Thermo hydrodynamic grooves inscribed on the rotating face enhance cooling of faces.



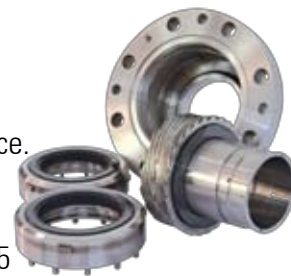
#### Operating Limits:

Shaft Diameter d1: 65 ... 150 mm  
 Pressure p : 50...140 bar (max)  
 Temperature t : - 20 + 250° C (API plan 23)  
 Velocity v : < 50 m/sec

### Series F900B/900B/CK

(Balanced Double Mechanical Seal Double Acting)

Series F900B/900B/CK is top of the line Balanced Double high pressure seal developed **first time in the world** for **180 bar** pressure at 350° C water service. This seal is developed on the lines of already proven series 90B/CG seals working for 126.5 bar pressure for over 20 years.



#### Operating Limits:

Shaft Diameter d1: 20 ... 150 mm.  
 Pressure p : 50 ... 180 bar.  
 Temperature t : amb ... 350° C  
 Velocity v : 25 m/sec.



Cartridge version

### Series 900B/CG

(Balanced High Pressure, Heavy Duty Cartridge Single Acting)

Series 900B/CG is a cartridge design seal for high pressure services, like **Pipe line pumps**, BFP etc. Sturdy design and drive arrangement makes the seal suitable for high pressure services.



#### Operating Limits:

Shaft Diameter d1: 25 ... 150 mm  
 Pressure p : 25...150 bar  
 Temperature t : - 40 + 180° C  
 Velocity v : 20 m/sec

### Labyrinth Seal

Labyrinth seal comprises of segmented carbon rings assembled together in one split housing assembly to prevent leakage of lubricating oil circulated to bearings using forced circulation system. These seals are used on large equipment like electric motors where the rotor is supported at either ends by antifriction bearings.



#### Operating Limits:

Shaft Diameter d1: up to 600 mm.  
 Pressure p : up to 5 bar.  
 Temperature t : 100° C.  
 Velocity v : 15 m/sec

### Carbon Bush Bearings & Segmented Carbon Rings

Bush bearings in different grades of carbon (resin or antimony impregnated) with or without housing in different sizes are offered depending on the requirement. Segmented carbon rings with SS garter spring for any size are available with different joint configurations.



#### Features:

Bush bearings with straight or helical grooves for circulation of lubricating medium.  
 Segmented carbon ring size : From 50 ... 1000 mm.  
 Temperature : - 40 ... 250° C

### Bearing Isolator LPBI 101

Series LPBI 101 Bearing Isolators enhance bearing life on pumps and other rotating equipment by reducing bearing lubrication contamination and loss.

Bearing failure is a leading cause of downtime in pumps. Proper bearing protection is critical to improve rotating equipment reliability and preventing downtime and production loss.



#### Operating Limits:

Shaft diameter : 16 .....100 mm

### Series LPM 935/CG

(Balanced Compact Cartridge Single Acting)

Series LPM 935/CG is a cartridge construction multiple spring balanced seal specially developed for equipment handling clean media as well as **slurries**, sludges, syrups and other fluids that solidify with the change in temperature. The springs are isolated from the fluid being sealed by dynamic O-ring.



#### Operating Limits:

Shaft diameter d1: 20 ... 75 mm  
 Pressure p : 18 bar (max)  
 Temperature t : -20 ... +180° C  
 Velocity v : 20 m/sec

### Series 90B35/CG

(Balanced Compact Cartridge Single Acting)

Series 90B35/CG is a cartridge construction multiple springs balanced seal developed for equipment handling **slurries**, sludge, syrups, bitumen, fatty acids etc. The springs are isolated from the fluid by dynamic O-ring.



#### Operating Limits:

Shaft Diameter d1: 20 ... 75 mm  
 Pressure p : 18 bar (max)  
 Temperature t : -20 ... +180° C  
 Velocity v : 20 m/sec

### Series LPM 900/CG

(Balanced Heavy Duty Cartridge Single Acting)

Series LPM 900/CG is a cartridge construction multiple springs heavy duty balanced seal for handling **slurries**, sludge, syrups, bitumen, fatty acids etc. The springs are isolated from the fluid by dynamic O-ring.



#### Operating Limits:

Shaft Diameter d1: 20 ... 100 mm  
 Pressure p : 25 bar (max)  
 Temperature t : -20 ... +180° C  
 Velocity v : 20 m/sec

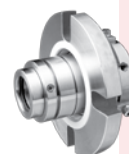
### Series LPS 900 (Balanced Single Acting)

Series LPS 900 seals are developed for **high pressure** applications in food processing industries for **Votator, Crystalliser** etc. Seal faces are TC/TC, Elastomers in Silicon/Viton.



#### Operating Limits :

Shaft Diameter d1: 25 ... 150mm  
 Pressure p : Vacuum ... 120 bar (max)  
 Temperature t : Amb. .... 200° C (max)  
 Velocity v : 20 m/sec



Cartridge version

### Series LPM 939

Series LPM 939 is a cartridge construction double seal 90B35/ 88B2 specially developed for equipment handling clean media as well as slurries and other fluids that polymerize or solidify with the change in temperature. The springs are isolated from the process fluid being sealed by dynamic O-ring which enhances seal life.



#### Operating Limits:

Shaft diameter d1 : 25 mm --- 75 mm.  
 Pressure p : 25 bar ( max).  
 Temperature t : -20 --- +180° C.  
 Velocity v : 20 m/sec

### Series LPM 906

Series LPM 906 is a cartridge construction multiple spring inside mounted balanced seal specially developed for Boiler Feed Water. Compact design seal fits in most of pumps. No external cooling required this eliminates cooling water, Heat Exchanger etc. Multiple flush option distributes API PLAN 11 flow around the seal faces.



#### Operating Limits:

Shaft Diameter d1 : 50 ... 500 mm  
 Pressure p : up to 10 bar  
 Temperature t : amb ... 60° C  
 Velocity v : 25 m/sec

### Series LPMF 101/LPDF 201 (Rotary Joints)

Series LPMF 101 (mono flow) and LPDF 201 (dual flow) design rotary joints are used on equipment for cooling, drying, humidification etc.

Self supporting on two precision Ball Bearings enough to reduce vibration & wobbling.



#### Operating Limits :

Size Range d1: 3/8" to 2.0"  
 Pressure p : 10 bar  
 Temperature t : 120°C

### Series MFP-02 (Hand Pump)

FeedPumpseriesMFP-02isspecially designedforThermosyphonVessels. This is normally recommended for API plans 53A, 53B and 53C. The function of the Feed Pump is to recharge the Thermosyphon Vessel to make up for the lost barrier fluid.



#### Operating Limits:

Capacity : 2.0 Litres  
 Design Pressure : 30 bar  
 Hydraulic Test Pressure : 25 bar  
 Working Temperature : 110°C (max)  
 Displaced Volume : 15 cm<sup>3</sup> / Stroke

### API Plan 52

#### Series LPTS 07 (Thermosyphon Vessel)

Series LPTS07 is used as a storage & unpressurising unit. Used for double mechanical seals in tandem seal arrangement. This is equipped with cooling coil inside the shell to bring down the temperature of buffer fluid coming from seal to Thermosyphon Vessel. Higher capacity upto 20 ltr. can also be offered.



#### Operating Limits:

Capacity : 7.0 ltrs  
 Design Pressure : 35 bar  
 Hydraulic Test pressure : 53 bar  
 Working temperature (max) : 150°C  
 Heat Transfer area of cooling coil : 0.2 m<sup>2</sup>  
 Cooling water flow rate recommended : 5 ltrs/min

### Series HE-4 & HE-8 (Heat Exchanger)

Series HE-4 & HE-8 are used for bringing down the temperature of flushing fluid before it enters in the seal chamber. When the mechanical seals are used with API plan 21, 23 and 41, Heat Exchangers are used. Special feature of this heat exchanger is that its cooling coil can be removed for cleaning purpose.



#### Operating Limits :

	HE-4	HE-8
Capacity	7.5 ltr	10 ltr
Heat Transfer area	0.4 m <sup>2</sup>	0.8 m <sup>2</sup>
Design Pressure	45 bar	80 bar
Working Pressure	40 bar	70 bar
Design Pressure of Shell	30 bar	30 bar
Working Pressure of Shell	20 bar	20 bar

### Series LPCS03 (Cyclone Separator)

Series LPCS03 is designed to supply clear flushing fluid for lubrication to mechanical seal in seal chamber. This is fitted in between pump discharge and seal flush port line to separate abrasive particles which can cause damage to mechanical seal.



#### Operating Limits:

Solid Contents : 10% by weight (max)  
 Liquid Viscosity : 20 Centistokes (max)  
 Differential Pressure : 2 to 8.5 bar (max)

### API Plan 53A

#### Series LPATS 20 (Thermosyphon Vessel)

Series LPATS 20 is used as a storage & pressurising unit. Used for double mechanical seals in back-to-back arrangement. Instrumentation on storage unit and capacity as per API 682 Standard can be adapted to suit application and customer requirement



#### Operating Limits:

Capacity : 20.0 ltrs  
 Design Pressure : 35 bar  
 Hydraulic Test pressure : 53 bar  
 Working temperature (max) : 150°C  
 Heat Transfer area of cooling coil : 0.4 m<sup>2</sup>  
 Cooling water flow rate recommended : 10 ltrs/min

## API Plan 53B (Closed Loop Circulation System)

A closed loop API Plan 53B (with Bladder Accumulator) allows stand-alone operation of a double mechanical seals. It contains Air Finned Cooler, Pressure Transmitter, Pressure Gauge, Hand Pump, Valves, Fittings etc.

53B System provide lubrication to seal faces, dissipate heat and maintains the desired pressure gradient across the seal faces for back to back & tandem double seals.



### Operating Parameters:

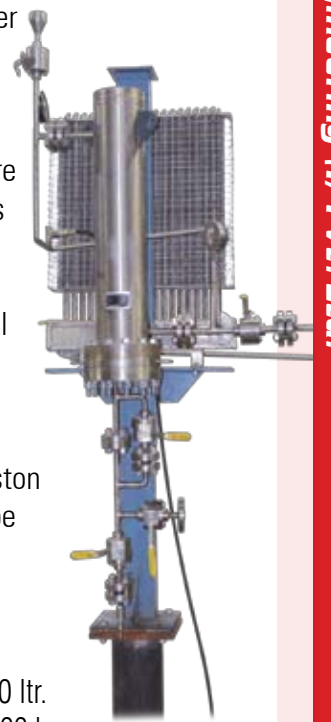
Capacity : 20 & 50 ltr.  
 Pressure : up to 120 bar  
 Flow rate : 3 ... 20 lpm\*

\*depends on the seal circulation device

## API Plan 53C

(Constant Pressure Barrier Fluid Sealing System)

The constant pressure barrier fluid system comprises of a vessel and formed bellow assembly. This maintains constant differential pressure across seal faces regardless of fluctuations in suction or discharge pressure of the pump. It requires no external supply of nitrogen or power source to pressurize the system. The advantage with this system is there is no piston drag compared to piston type constant pressure system.



### Operating Parameters:

Capacity : 10 & 80 ltr.  
 Pressure : up to 200 bar  
 Flow rate : 3 ... 30 lpm\*

\*depends on the seal circulation device

## API Plan 54 (Forced Circulation System)

Forced Circulation System is used to circulate the barrier medium to double mechanical seals of any configuration.



### Features:

- Independent Pressurized fluid supply system.
- Compact and easy to operate.
- Automatic pressure hold.

### Operating Parameters:

Capacity : 40 ... 120 ltr.  
 Pressure : 40 ... 120 bar  
 Flow Rate : 3 ... 30 lpm

## AIR FINNED COOLERS (for Mechanical Seals)

High efficiency Air Finned Coolers are used to remove heat generated by mechanical seals. Different models are available to meet required differential temperature ( $\Delta t$  as high as 200<sup>o</sup> C).

### Advantages of Air Finned Coolers:

- No Water Needed.
- No forced Air Draft.
- No topping the Systems.
- No De-scaling Required.
- Could be used for API Plan 21, 22 & 23
- Minimal Maintenance.
- No Spill- No Contamination on the production or factory Floor.
- Environment Friendly.
- No consumption of Energy.
- Ever Lasting.

### Operating Parameters:

Temperature from : 40<sup>o</sup> C to 425<sup>o</sup> C (800<sup>o</sup> F)  
 Pressure : 80 bar (1200 psi)



### Series 20M

(PTFE Bellow Single Acting)

Series 20M is used for extremely corrosive services. In this seal series Glass filled PTFE face is composite moulded with highly flexible PTFE bellow.



#### Operating Limits:

Shaft Diameter d1: 18 ... 100 mm  
 Pressure p : 6 bar (max)  
 Temperature t : -45 ... + 120° C  
 Velocity v : 20 m/sec

### Series LPT20R

(PTFE Bellow Single Acting)

Series LPT20R is used for extremely corrosive services. The lugs impart smooth drive to the face. Replacement of face is done easily.



#### Operating Limits:

Shaft Diameter d1: 18 ... 100 mm  
 Pressure p : 6 bar (max)  
 Temperature t : -45 ... + 120° C  
 Velocity v : 20 m/sec

### Series 110U & 115U (Unbalanced Single Acting)

Series 110U & 115U are single wave spring seals suitable for most general applications including those with suspended particles. Compact in design, easily fits into shallow stuffing boxes.



#### Operating Limits:

Shaft Diameter d1: 16 ... 100 mm  
 Pressure p : 10 bar (max)  
 Temperature t : - 45... + 180° C  
 Velocity v : 20 m/sec



Cartridge version

### Series LPM 902 (Balanced Single Acting)

Series LPM 902 is multiple spring seal specially designed for higher axial float of the shaft. High axial float is inherent in some between bearings pump designs and other equipment. This seal has advantage over standard seals and can work successfully where axial float of shaft is up to ± 3.0 mm.



#### Operating Limits:

Shaft diameter d1: 25 ... 150mm  
 Pressure p : Vacuum ... 25 bar (max)  
 Temperature t : Amb. .... 200° C (max)  
 Velocity v : 20 m/sec



Cartridge version

### Series LPM 938

Series LPM 938 is a cartridge construction double seal 90B35/ 90B35 specially developed for equipment handling clean media as well as slurries and other fluids that polymerize or solidify with the change in temperature. The springs are isolated from the process fluid being sealed by dynamic O-ring which enhances seal life.



#### Operating Limits:

Shaft diameter d1 : 25 mm --- 75 mm.  
 Pressure p : 25 bar ( max).  
 Temperature t : -20 --- +180° C.  
 Velocity v : 20 m/sec

### Series 82 & 82/CG (Balanced Single Acting)

Series 82 is a multiple springs balanced seal used for slurry media. The springs are protected from media by dynamic O-ring. This balanced seal can be mounted on plain shaft / shaft sleeve. Series 82/CG is a cartridge seal.



#### Operating Limits:

Shaft Diameter d1: 20 ... 100 mm  
 Pressure p : 25 bar (max)  
 Temperature t : - 20... + 180° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series 90U & 95U** (Unbalanced Single Acting)

Series 90U & 95U are multiple spring units developed for universal applications. These seals have heavy cross section, thus used on pumps with large stuffing box bores and agitators.



#### **Operating Limits:**

Shaft diameter d1: 16 ... 150 mm  
 Pressure p : 10 bar (max)  
 Temperature t : - 60 ... +200° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series LPW 901 & LPW 951**

(Unbalanced Single Acting)

Series LPW 901 & LPW951 are wave spring units developed for universal applications. These seals have heavy cross section, thus used on pumps with large stuffing box bores and agitators.



#### **Operating Limits:**

Shaft diameter d1: 16 ... 150 mm  
 Pressure p : 10 bar (max)  
 Temperature t : - 60 ... +200° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series 90B & 95B** (Balanced Single Acting)

Series 90B & 95B are multiple spring units developed for universal high pressure applications. These seals have heavy cross section, thus used on pumps with large stuffing box bores and agitators.



#### **Operating Limits:**

Shaft Diameter d1: 16 ...150 mm  
 Pressure p : 35 bar (max)  
 Temperature t : - 60 ... +200° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series LPW 902 & LPW 952**

(Balanced Single Acting)

Series LPW 902 & LPW952 are wave spring units developed for universal high pressure applications. These seals have heavy cross section, thus used on pumps with large stuffing box bores and agitators.



#### **Operating Limits:**

Shaft Diameter d1: 16 ...150 mm  
 Pressure p : 35 bar (max)  
 Temperature t : - 60 ... +200° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series 70U & 75U** (Unbalanced Single Acting)

Series 70U & 75U are single helical coil spring seals developed for dirty media and clogging type applications. All components are held together by a snap ring which helps in easier installation.



#### **Operating Limits:**

Shaft Diameter d1: 12 ... 100 mm  
 Pressure p : 10 bar (max)  
 Temperature t : - 60 ... + 200° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series 70B & 75B** (Balanced Single Acting)

Series 70B & 75B are single helical coil spring seals developed for dirty media and clogging type applications. All components are held together by a snap ring which helps in easier installation.



#### **Operating Limits:**

Shaft Diameter d1: 12... 100 mm  
 Pressure p : 35 bar (max)  
 Temperature t : - 60 + 200° C  
 Velocity v : 20 m/sec



Cartridge version



### **Series 88B2** (Reverse Balanced Single Acting)

Series 88B2 is multiple springs reverse balanced seal with O-ring secondary seal. Reverse balancing feature helps for installation as internally mounted as well as externally mounted seal.



#### **Operating Limits:**

Shaft Diameter d1: 16 ... 150 mm  
 Pressure p : 25 bar (max)  
 Temperature t : - 45 ... + 180° C  
 Velocity v : 20 m/sec

### **Series LPW 821** (Reverse Balanced Single Acting)

Series LPW 821 is wave spring reverse balanced seal with O-ring secondary seal. Reverse balancing feature helps for installation as internally mounted as well as externally mounted seal.



#### **Operating Limits:**

Shaft Diameter d1: 16 ... 150 mm  
 Pressure p : 25 bar (max)  
 Temperature t : - 45 ... + 180° C  
 Velocity v : 20 m/sec

### **Series 80U & 85U** (Unbalanced Single Acting)

Series 80U & 85U are multiple spring seals developed for universal application. Compact design permits their use in all types of centrifugal pumps. All components are held together by a snap ring which helps in easier installation.



#### **Operating Limits:**

Shaft Diameter d1: 12 ... 100 mm  
 Pressure p : 10 bar (max)  
 Temperature t : - 60 + 200° C  
 Velocity v : 20 m/sec

Cartridge version



### **Series LPW 801 & LPW851**

(Unbalanced Single Acting)

Series LPW 801 & LPW 851 are wave spring seals developed for universal application. Compact design permits their use in all types of centrifugal pumps. All components are held together by a snap ring which helps in easier installation.



#### **Operating Limits:**

Shaft Diameter d1: 12 ... 100 mm  
 Pressure p : 10 bar (max)  
 Temperature t : - 60 + 200° C  
 Velocity v : 20 m/sec

Cartridge version



### **Series 80B & 85B** (Balanced Single Acting)

Series 80B & 85B are multiple spring seals developed for universal high pressure applications. The compact design permits installation on all types of centrifugal pumps. All components are held together by a snap ring for easier installation.



#### **Operating Limits:**

Shaft Diameter d1: 12 ... 100 mm  
 Pressure p : 35 bar (max)  
 Temperature t : - 60 + 200° C  
 Velocity v : 20 m/sec

Cartridge version



### **Series LPW 802 & LPW852**

(Balanced Single Acting)

Series LPW802 & LPW852 are wave spring seals developed for universal high pressure applications. The compact design permits installation on all types of centrifugal pumps. All components are held together by a snap ring for easier installation.



#### **Operating Limits:**

Shaft Diameter d1: 12 ... 100 mm  
 Pressure p : 35 bar (max)  
 Temperature t : - 60 + 200° C  
 Velocity v : 20 m/sec

Cartridge version



### **Series 2U** (Unbalanced Single Acting)

Series 2U is a single conical helical spring unbalanced seal with O-ring secondary seal. Variety of seal face materials and elastomers can be offered for wide service applications involving suspended solids.



#### **Operating Limits:**

Shaft Diameter d1: 12 ... 90 mm  
 Pressure p : 10 bar (max)  
 Temperature t : - 20 + 120° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series LPS 150 & 155** (Unbalanced Single Acting)

Series LPS 150 & LPS 155 seals are single coil spring design developed for dirty media and clogging type applications. Torque transmission is effected by sturdy drive lugs.



#### **Operating Limits:**

Shaft Diameter d1: 20 ... 90 mm  
 Pressure p : 14 bar (max)  
 Temperature t : -23... +200° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series 73 & 73L** (Unbalanced Single Acting)

Series 73 & 73L are single coil spring seals with elastomeric bellow for water, Oil and light duties. These seals have self aligning feature which compensates higher shaft run out and end play.



#### **Operating Limits:**

Shaft Diameter d1: 12 ... 100 mm  
 Pressure p : 12 bar (max)  
 Temperature t : - 20.... +180° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series LPR 200 & LPR 205** (Unbalanced Single Acting)

Series LPR 200 & LPR 205 are single coil spring rubber bellow seals used for water, oil and light duties. Seals have self aligning feature which compensates higher shaft run out and end play.



#### **Operating Limits:**

Shaft Diameter d1: 16 ... 75 mm  
 Pressure p : 18 bar (max)  
 Temperature t : - 20 ... + 180° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series LPR 100** (Unbalanced Single Acting)

Series LPR 100 is single coil spring rubber bellow seal used for clean as well as dirty services with suspended particulates, like waste water or sewage. Elastomeric bellow protects shaft/ sleeve from fretting.



#### **Operating Limits:**

Shaft Diameter d1: 10 ... 100 mm  
 Pressure p : 12 bar (max)  
 Temperature t : - 20 ... + 180° C  
 Velocity v : 20 m/sec



Cartridge version

### **Series LPR 500** (Unbalanced Single Acting)

Series LPR-500 is a compact elastomeric bellow general purpose seal developed to accommodate in limited space inside stuffing box. Self-aligning feature compensates for excessive shaft run out and axial play. Non-clogging due to single coil spring construction.



#### **Operating Limits:**

Shaft Diameter d1: 25 ... 100 mm  
 Pressure p : 40 bar (max)  
 Temperature t : -20... + 180° C  
 Velocity v : 13 m/sec



Cartridge version

## GRAFOIL Products



GRAFOIL is pure graphite. No fillers or no binders, nothing to leach out or harden. It is free from corrosion, embrittlement and aging. The gaskets and packing made from Grafoil can perform successfully even under extreme conditions.

\* They can withstand from  $-200^{\circ}\text{C}$  to  $1850^{\circ}\text{C}$  or as high as  $3000^{\circ}\text{C}$  in the absence of oxygen.

\* They are resistant to all aggressive media such as highly concentrated acids, solvents and hot oils.

\* They are resilient across entire temperature range of any length of time.

\* They are not susceptible to cold or hot flow at the highest permitted surface pressure.

\* They are unaffected by radiation and are recommended for use in nuclear plants.

\* They are permitted to use in conjunction with oxygen.

\* They are physiologically inert.

\* Flange distortions are compensated.

### Operating Parameters:

Temperature :  $-270^{\circ}$  to  $3000^{\circ}\text{C}$

Pressure : up to  $685\text{ Kg/cm}^2$ .

pH Value : 0 to 14.

Vacuum : 710 mm of Hg.



## GRAFOIL Products

### Advantages:

Grafoil is available in a variety of forms for versatile maintenance and OEM applications.

- As endless or split gland packing rings and self sealing rings.
- As cut gaskets to suit specific requirement of pipe flange gaskets, bonnet gaskets, sight gage glass gaskets etc
- As self adhesive gasket tape for flanges, pressure vessels, heat exchangers etc.
- As pipe thread sealants

### Benefits :

Maximum Sealability.

Absolute Reliability.

No Fluid Losses.

Negligible Downtime

Extended Equipment Life.

Enhanced Plant Safety.

Long Service Life.

Minimum maintenance.

### Applications:

- Petrochemicals
- Refineries
- Nuclear Power Plants
- Thermal Power Stations
- Fertilizers





## EDR GROUP OF INDUSTRIES



AN ISO 9001 : 2008 COMPANY



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*E m i s s i o n*

*H a z a r d o u s g a s e s*

*D e a d l y c h e m i c a l s*

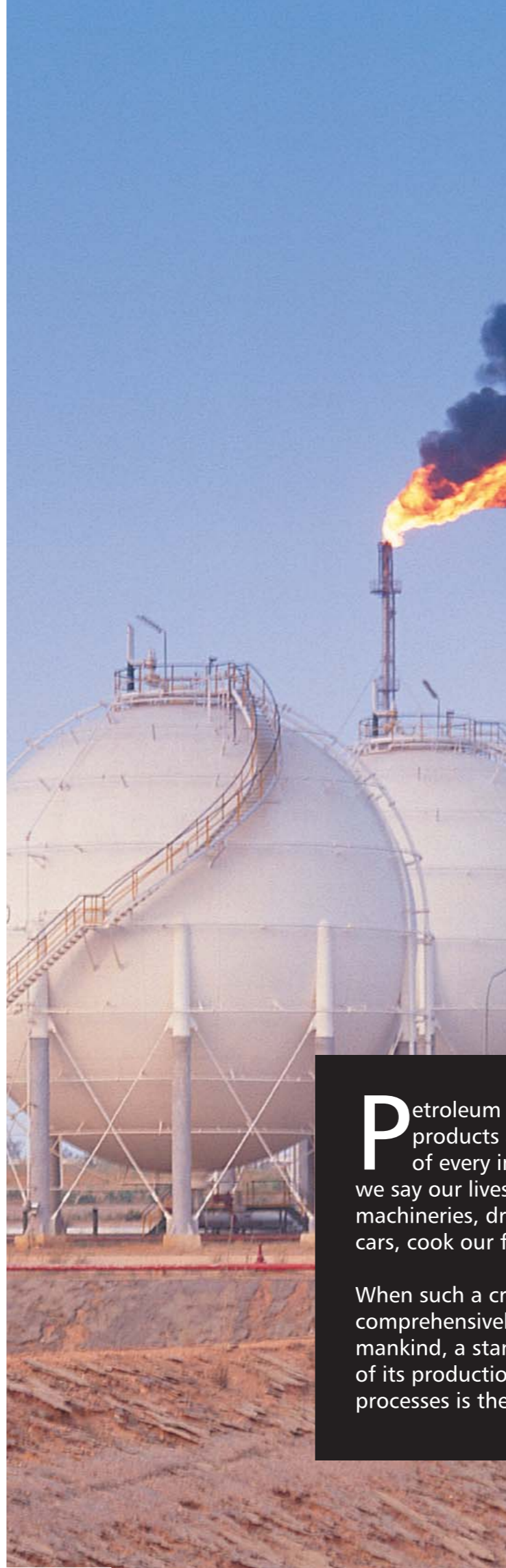
*whatever be the force **we seal it***



API 682

Benchmarked in the USA  
Now, manufactured in India ●●●

***Leak-Proof Engineering (I) Pvt. Ltd.***  
*The force of India. The pride of India*



The American Petroleum Institute (API) is the premier international authority that establishes and certifies industry standards. The API sets technical standards for the petroleum industry to help improve processes, increase efficiencies, achieve cost-effectiveness in operations and increases Mean Time between Failures (MTBF).

The API 682 is the standard developed for mechanical seals that impacts production, refinement and distribution of petroleum products. The API 682 prescribes stringent and precise configuration and also ensures safety, safeguards health and protects the environment.

Like everywhere in the world, Indian petroleum industry also follows the API benchmarks ardently and adheres to its standards. These API 682 mechanical seals, which have been, till now, imported from leading international manufacturers, are now being manufactured in India for the first time.

Leak-Proof Engineering India Private Limited, has mastered the API standards and now take pride in presenting indigenously developed range of API 682 seals.

**P**etroleum and petroleum products are integral elements of every industry...or, should we say our lives. They lubricate machineries, drive engines, fuel our cars, cook our food and so on.

When such a critical substance comprehensively influences mankind, a standardized regulation of its production and related processes is the utmost need.

Manufacturing Unit  
North Gujarat (Chhapi)



Leak-Proof Engineering established in the year 1973, pioneer in the field of engineered Mechanical Seals, is one of the largest indigenous seal manufacturers in India. Today, with state of art manufacturing facility, the company is catering to Chemical process, Petrochemical, Fertilizer, Refinery, Oil & Gas, Steel, Solvent Extraction, Edible oil, Food Processing, Refrigeration and other industries situated all over India. Leak-Proof is a name to reckon with and has more satisfied clientele in the country and overseas, both in terms of quality and service.

We have successfully concluded qualification testing of special seal series LPA90S, LPA47S, sizes: 3.00" and 4.00", confirming to API 682 (3rd edition) specification for water, caustic, mineral oil and propane liquefied gas.

We are approved by Engineer's India Limited (EIL) for API 682 seals. We are the only company to install facility for testing seals using propane/LPG in India, apart from independent facilities for water, caustic and mineral oil mediums.



**API 682 Mechanical Seals  
Series LPA90S Multi-Spring Pusher Seals**

**DESCRIPTION :**

Series LPA90S multi-spring pusher seals are designed and qualification tested according to the stringent testing norms specified by API 682 standard. These dependable, engineered mechanical seals are developed to attain extremely low emissions, typically to less than 150 ppm. These seals are offered in single, dual unpressurized and dual pressurized arrangements for a wide range of petroleum and light hydrocarbon services in refinery and petrochemical industries.

**These special engineered seals provide the following advantages:**

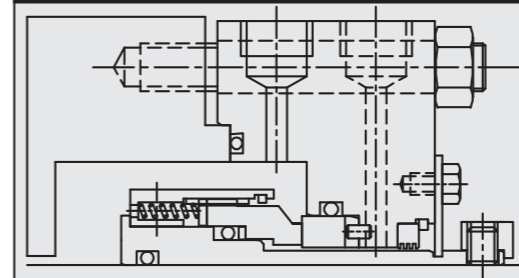
- To extend seal life beyond 25000 hours of operation.
- To reduce emission levels.
- To ensure plant and personal safety in hazardous environments.
- To standardise the seals and sealing systems.

**Materials of Construction - LPA90S**

SEAL COMPONENTS	MATERIALS	
DESCRIPTION	STANDARD	OPTIONS
Seal Ring	Resin Impregnated Carbon	Antimony Impregnated Carbon Reaction Bonded Silicon Carbide Self Sintered Silicon Carbide Nickel Bonded Tungsten Carbide
Mating Ring	Reaction Bonded Silicon Carbide	Self Sintered Silicon Carbide Nickel Bonded Tungsten Carbide
Retainer Snap Ring Thrust Ring Grub Screws Sleeve Gland Drive Collar Auxiliary Gland Location Plate	Stainless Steel 316	Alloy 20 Hastelloy - C Titanium
Spring	Hastelloy C-276	- - -
Secondary Sealing Elements	Fluoroelastomer	Perfluoroelastomer

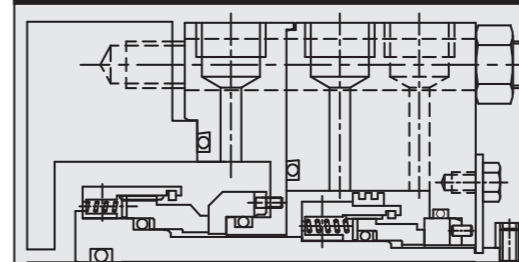
**MECHANICAL SEAL NOMENCLATURE**

**SEAL ARRANGEMENTS:  
Series LPA90S**



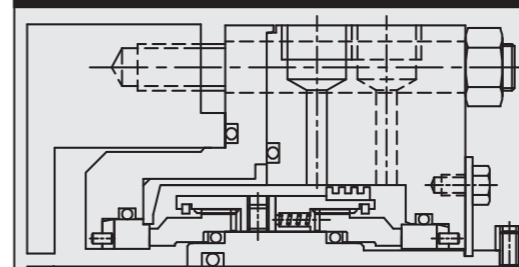
Shaft Dia.: d=20...110mm  
Pressure : p=Vacuum to 42 bar  
Temp. : t= -40°C to 176°C  
Config. : 1CW-FX

**SEAL ARRANGEMENTS:  
Series LPA90T**



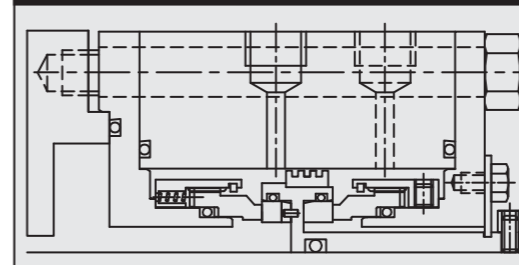
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Pressure : p=Vacuum to 42 bar  
Temp. : t= -40°C to 176°C  
Config. : 2CW-CS

**SEAL ARRANGEMENTS:  
Series LPA90B**



Shaft Dia.: d=20...110mm  
Pressure : p=Vacuum to 42 bar  
Temp. : t= -40°C to 176°C  
Config. : 3CW-BB

**SEAL ARRANGEMENTS:  
Series LPA90F**



Shaft Dia.: d=20...110mm  
Pressure : p=Vacuum to 42 bar  
Temp. : t= -40°C to 176°C  
Config. : 3CW-FF

**API 682 Mechanical Seals  
Series LPA45S, LPA47S Metal Bellows**

**DESCRIPTION :**

Series LPA45S, LPA47S non-pusher metal bellows seals are designed and qualification tested according to the stringent testing norms specified by API 682 standard. These dependable, engineered mechanical seals are developed to attain extremely low emissions, These seals are offered in single, dual unpressurized and dual pressurized arrangements for a wide range of petroleum and light hydrocarbon services in refinery and petrochemical industries.

**These special engineered seals provide the following advantages:**

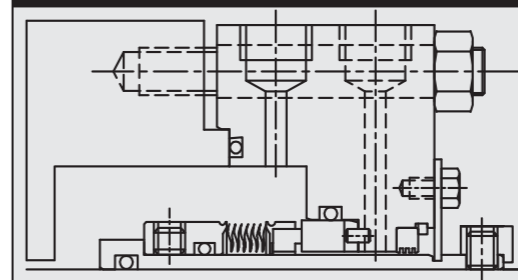
- To extend seal life beyond 25000 hours of operation.
- To reduce emission levels.
- To ensure plant and personal safety in hazardous environments.
- To standardise the seals and sealing systems.

**Materials of Construction - LPA47S**

SEAL COMPONENTS	MATERIALS	
DESCRIPTION	STANDARD	OPTIONS
Seal Ring	Resin Impregnated Carbon	Antimony Impregnated Carbon Reaction Bonded Silicon Carbide Self Sintered Silicon Carbide Nickel Bonded Tungsten Carbide
Mating Ring	Reaction Bonded Silicon Carbide	Self Sintered Silicon Carbide Nickel Bonded Tungsten Carbide
Sleeve Gland Grub screws Rear collar Auxiliary Gland Location Plate	Stainless Steel 316	----
Seal Ring Housing	Stainless Steel 316 Carpenter 42	----
Secondary Sealing Elements	Fluoroelastomer (up to 176°C) Flexible Graphite up to 400°C	Perfluoroelastomer Low Temperature Buna-N
Metal Bellows	Hastelloy C-276 (up to 176°C) Inconel Alloy 718 up to 400°C	----

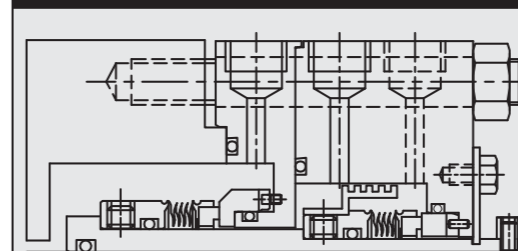
**MECHANICAL SEAL NOMENCLATURE**

**SEAL ARRANGEMENTS:  
Series LPA45S**



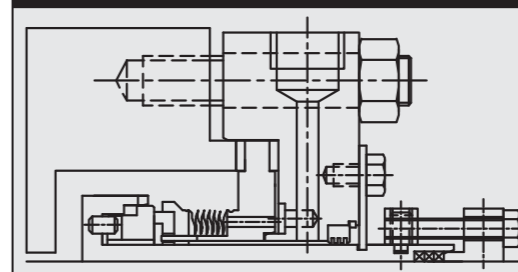
Shaft Dia.: d=20...110mm  
Pressure : p=Vacuum to 20 bar  
Temp. : t= -40°C to 176°C  
Config. : 1CW-FX

**SEAL ARRANGEMENTS:  
Series LPA45T**



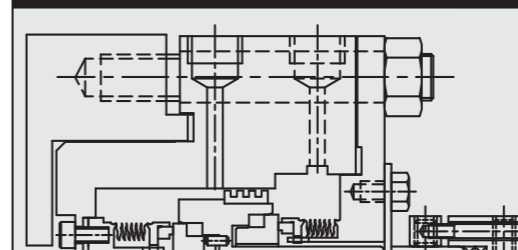
Shaft Dia.: d=20...110mm  
Pressure : p=Vacuum to 20 bar  
Temp. : t= -40°C to 176°C  
Config. : 2CW-CW

**SEAL ARRANGEMENTS:  
Series LPA47S**



Shaft Dia.: d=20...110mm  
Pressure : p=Vacuum to 20 bar  
Temp. : t= -40°C to 400°C  
Config. : 1CW-FX

**SEAL ARRANGEMENTS:  
Series LPA47F**



Shaft Dia.: d=20...110mm  
Pressure : p=Vacuum to 20 bar  
Temp. : t= -40°C to 400°C  
Config. : 3CW-FF

## API 682 Testing Facility



## Design and Development Office



## API Seals Approval From - EIL





*... together we achieve*



SINCE 1973

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