



# P878 Series

MECHANICAL SEALS

## DESCRIPTION

The P878 series is a dual unpressurized cartridge seal intended to provide an excellent sealing performance for pumps. As one of the member of RST Mechanical Seals, it is designed to operate in a wide range of process fluids. P878 particularly exhibits high performance in the operation of critical process fluids of lubrication fluids, aqueous solutions, chemicals, light hydrocarbons and water services. The improvements in design reliability and robustness are made possible by the utilisation of sophisticated Finite Element Analysis (FEA) Engineering Software. These features are further verified by the usage of ProEight's high-end testing equipment, the patented mechanical seal static tester – AccuTEST<sup>®</sup> and mechanical seal dynamic tester – AccuDYN<sup>®</sup> (Patent Pending).

The adoption of modularity concept has made P878 series even more versatile. Coupled with added interchangeable feature, P878 series seals are able to fit in various conditions, wider range of operating pressures, temperatures and process fluids. This concept ensures that the P878 series seal requires only minimum change-out on its seal face to suit these conditions, eliminating the need to redesign a completely different mechanical seal configuration. To cope with temperature sensitive environment, Low-temperature Inducing Face, ARCAF<sup>®</sup> is designed for this particular need. ARCAF<sup>®</sup> can be interchanged with other RST Standard Face to suit other different operating conditions.



## INDUSTRIAL APPLICATION

- Oil & Gas Production
- Petroleum Refining
- Pipeline
- Pulp & Paper
- Food & Beverage
- Mining & Minerals
- Power Generation
- Water Systems

## SEAL APPLICATION

- Centrifugal Heavy Duty Pumps
- Centrifugal API Process Pumps
- Centrifugal General Purpose Pumps
- Positive Displacement Pumps

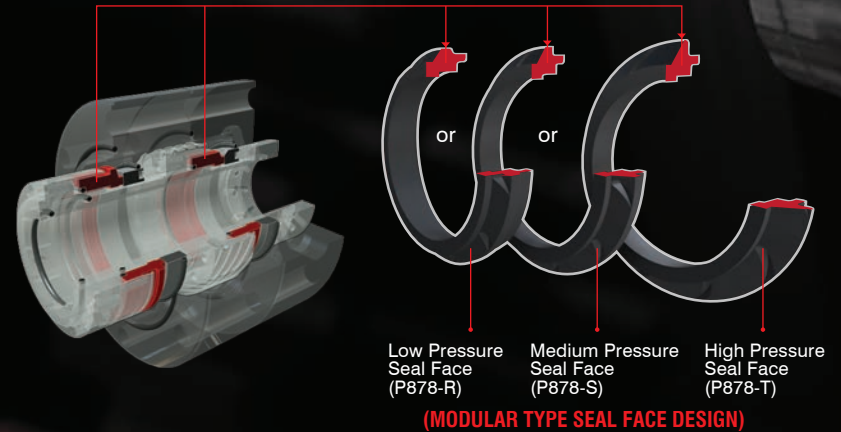
### DESIGN OVERVIEW

- Meet API682 technical design configurations and requirements
- Materials Selection and Design is in accordance with API682 Standard
- RST Design Optimization for seal face design
- Flushing Flow pattern is optimised around seal faces, removing trapped vapour
- High efficiency buffer circulation system

### RST DESIGN PHILOSOPHY

#### Advanced FEA Program for Design Optimization

ProEight in-house FEA programs, SIGMA-FEA and CELC-FEA combined with ANSYS were used extensively to design the RST mechanical seals. Steady state and transient conditions coupled with various possible sealing environment gave a clear overview on the mechanical seal's performance. These software programs analyse combined seal distortion due to pressure, temperature, stress distortion and face loadings.



#### Internal Compression Unit

The main component of the seal is interchangeable to suit wide range of seal application.

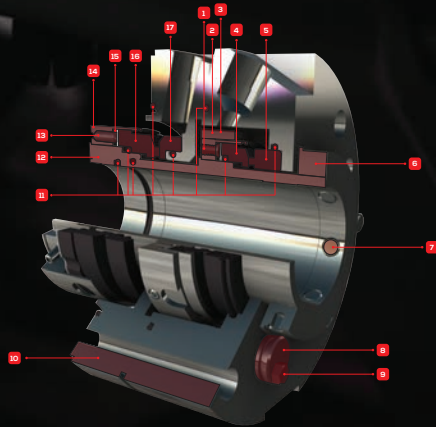
#### PERFORMANCE CAPABILITIES

**Temperature** : -40°C to 260 °C / -40 °F to + 500°F

**Pressures** : Up to 95 bar g /1368 psig

**Speeds** : Up to 25 m/s / 5000 fpm

SEAL PARTS



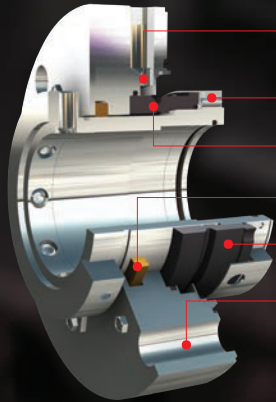
- 1** Spring
- 2** Spring Retainer
- 3** Pumping Ring
- 4** Seal Face (Outboard)
- 5** Seat (Outboard)
- 6** Drive Collar
- 7** Set Screw
- 8** Setting Plate
- 9** Hexagon Screw
- 10** Flange
- 11** O-Ring
- 12** Shaft Sleeve
- 13** Spring
- 14** Spring Retainer
- 15** Thrust Ring
- 16** Seal Face (Inboard)
- 17** Seat (Inboard)

MATERIAL SPECIFICATION

SEAL COMPONENTS		MATERIALS	
Description		Standard	Custom
Seal Face (Inboard & Outboard)		Resin Impregnated Carbon	Tungsten Carbide (WC) Alpha Sintered Silicon Carbide ( $\alpha$ -SiC) Antimony Impregnated Carbon Reaction Bonded Silicon Carbide (RbSiC)
Seat (Inboard & Outboard)		Reaction Bonded Silicon Carbide (RbSiC)	Alpha Sintered Silicon Carbide ( $\alpha$ -SiC)
Spring Collar	Setting Plate	Stainless Steel 316L (UNS S31603) Stainless Steel 304L (UNS S30403)	Duplex (UNS S31803) Hastelloy® C-276 (UNS N10276) Bronze Titanium Alloy (UNS R56401)
Drive Collar	Hexagon Screw		
Thrust Ring	Flange		
Set Screw	Bushing Retainer		
Shaft Sleeve	Pumping Ring		
Spring		Stainless Steel 316L (UNS S31603)	Hastelloy® C-276 (UNS N10276) Stainless Steel 304L (UNS S30403)
O-Ring		Fluoroelastomers - Viton® (FKM)	Amine-Resistant Perfluoroelastomer (FFKM) Low Temp Nitrile Butyl Rubber (NBR) Teflon Encapsulated Viton (VMQ) Ethylene Propylene Diene Monomer (EPDM)

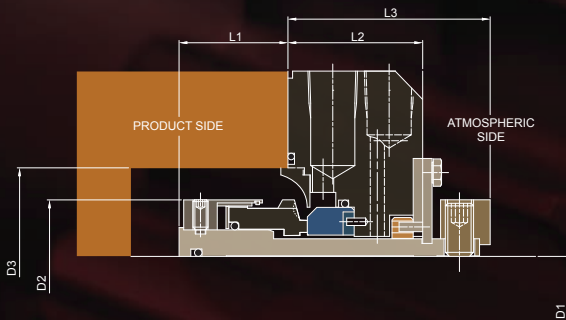


## DESIGN FEATURES



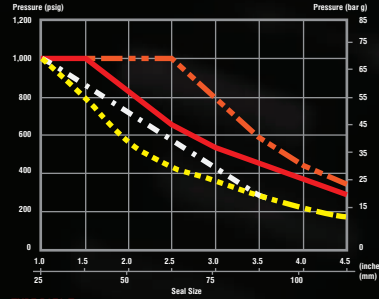
- High flow pattern and distributed flush system
- Uniform-load Multi-spring compression unit
- RST Optimized Seal Face Design
- Emission Restrictive Throttle Bushing
- Low-temperature including face (ARCAF<sup>®</sup>) (subject to design requirements & compatibility)
- Bolted Auxiliary Gland

## DESIGN DRAWING

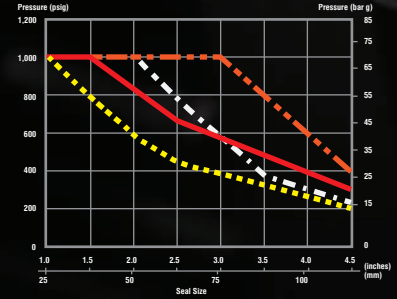


## PERFORMANCE CURVE

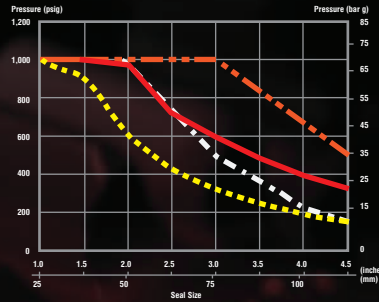
TYPE P878-R



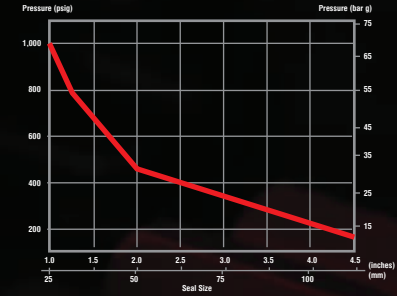
TYPE P878-S



TYPE P878-T



TYPE P878-OUTBOARD



- 1800 rpm Lubricating Fluid
- 3600 rpm Lubricating Fluid
- 1800 rpm Light Hydrocarbon
- 3600 rpm Light Hydrocarbon

**DIMENSIONAL DATA**

Seal Size *	D1	D2	D3	L1	L2	L3
0476	35.3	66.7	76.2	47.0	79.9	98.0
0508	38.5	69.9	79.4	47.0	79.9	98.0
0539	41.6	76.2	85.7	47.0	79.9	98.0
0571	44.8	79.4	88.9	47.0	79.9	98.0
0603	48.0	82.6	92.1	47.0	79.9	98.0
0635	51.2	85.7	95.3	47.0	79.9	98.0
0666	54.3	88.9	98.4	50.2	79.9	98.0
0698	57.5	92.1	101.6	50.2	79.9	98.0
0730	60.7	95.3	104.8	50.2	79.9	98.0
0762	63.8	96.8	106.3	47.6	88.9	107.0
0793	67.0	100.0	109.5	47.6	88.9	107.0
0825	70.2	104.8	114.3	47.6	88.9	107.0
0857	73.4	108.0	117.5	53.1	88.9	107.0
0889	76.6	111.1	120.7	53.1	88.9	107.0
0920	79.7	114.3	123.8	53.1	88.9	107.0
0952	82.9	117.5	127.0	53.1	88.9	107.0
0984	86.1	120.7	130.2	53.1	88.9	107.0
1016	89.3	123.8	133.4	53.1	88.9	107.0
1047	92.4	130.2	139.7	53.1	88.9	107.0
1079	95.6	133.4	142.9	53.1	88.9	107.0
1111	98.8	136.5	146.1	53.1	88.9	110.0
1143	102.0	139.7	149.2	53.1	88.9	110.0
1174	105.1	142.9	152.4	49.3	95.9	117.0
1206	108.3	146.1	155.6	49.3	95.9	117.0
1238	111.5	149.2	158.6	49.3	95.9	117.0
1270	114.7	152.4	161.9	49.3	95.9	117.0
1333	117.8	165.1	174.6	49.3	95.9	117.0
1365	121.0	162.0	181.5	53.2	95.9	117.0
1460	124.2	181.0	190.5	53.2	95.9	117.0

\* All dimensions are in mm

D1 assumes a standard ISO tolerance for shaft (ISO286-2)

Fluid Type	Temperature Range		Weightage
	Min (°C)	Max (°C)	
Lubricating Fluid Light Hydrocarbon	60	80	0.98
	81	100	0.93
	101	120	0.85
	121	160	0.83
	161	180	0.78
	181	200	0.73
	201	220	0.68
	221	260	0.63
	Aqueous Solution	40	100

For further information, please consult our Technical Support Engineer.

**NOTES:**

1. The pressure weightages only confirm to seals with carbon primary rings. Hard face vs hard face combination seals are not applicable.
2. The listed temperatures are referred to single seal's product temperatures. For dual seals, the listed temperature are referred to the product fluids & buffer/barrier fluid's average temperature.

**EXAMPLE FOR DETERMINING PRESSURE RATING LIMITS:**

Seal : 88.9mm/3.5" diameter Type P878-R  
 Product : Lube Oil  
 Temperature : 82 C/180 F  
 Speed : 4000 rpm

Using P878-R performance curve, the pressure limit is 47 bar g/676.8psig. From the table above, apply the weightage value, in this case 0.93. For this service condition, the maximum operating pressure is: 47 bar g/666.98psig x 0.93 = 43.71 bar g/620.291 psig

All specifications are based on extensive tests and our many years of experience. The diversity of possible applications means, however, can only served as guide values. We must be notified of the exact conditions of application before we can provide any guarantee for a specific case. Subject prior to change.