



# Full Mechanical Seals Catalogue

## Table of Contents

1. Cartridge Mechanical Seals .....	3
1.1. Introduction .....	3
1.2. Applications .....	3
1.3. Common parameters .....	3
1.4. Common sizes / ordering examples .....	4
2. Bellows (PTFE / Elastomer) Mechanical Seals .....	4
2.1. Introduction .....	4
2.2. Applications .....	4
2.3. Common parameters .....	5
2.4. Common sizes / ordering examples .....	5
3. Single-End Mechanical Seals .....	5
3.1. 3.1 Introduction .....	5
3.2. Applications .....	5
3.3. Common parameters .....	6
3.4. Common sizes / ordering examples .....	6
4. Double / Tandem (Dual) Mechanical Seals .....	6
4.1. Introduction .....	6



- 4.2. Applications ..... 6
- 4.3. Common parameters ..... 7
- 4.4. Common sizes / ordering examples .....7
- 5. Balanced vs Unbalanced Seals ..... 7
  - 5.1. Introduction ..... 7
  - 5.2. Applications ..... 7
  - 5.3. Common parameters ..... 8
  - 5.4. Ordering notes .....8
- 6. Stationary Ring (Seal Seat) ..... 8
  - 6.1. Introduction ..... 8
  - 6.2. Applications ..... 8
  - 6.3. Common parameters ..... 9
  - 6.4. Common sizes / ordering examples .....9
- 7. Rotating Ring (Rotor) .....9
  - 7.1. Introduction ..... 9
  - 7.2. Applications .....10
  - 7.3. Common parameters .....10
  - 7.4. Ordering note .....10
- 8. Seal Springs ..... 10



8.1. Introduction .....10

8.2. Applications .....10

8.3. Common parameters .....11

9. Typical Materials and Face Combinations ..... 11

# 1. Cartridge Mechanical Seals

## 1.1. Introduction



Cartridge seals are pre-assembled, unitized mechanical seals (seal faces, springs, gland plate and sometimes sleeve) designed for quick installation and reduced field assembly errors. They are widely used where repeatable installation and reliability are required (critical pumps). Many major suppliers offer standardized cartridge lines for centrifugal pumps.

## 1.2. Applications

- Chemical and petrochemical centrifugal pumps
- Refining and process plants (high uptime requirement)
- Water treatment & utilities (critical pumps)
- Food & beverage, pulp & paper (with appropriate materials)

## 1.3. Common parameters

Parameter	Typical range / example	Notes
Shaft diameter	Typical: 20 mm – 110 mm (0.75" – 4.3") (common cartridge pump range)	API 682 and manufacturer catalogs define standard ranges; OEMs may offer larger sizes.



Parameter	Typical range / example	Notes
<b>Pressure (max working)</b>	Typical: up to ~25 bar (depends on model)	Many cartridge designs are available for higher pressures; check OEM data.
<b>Temperature</b>	Typical: -40°C to +200°C (material dependent)	Elastomer and face selection determine limits.
<b>Surface speed (m/s)</b>	Typical: up to ~12–15 m/s (consult OEM)	Face wear and lubrication determine allowable speed.
<b>Face materials</b>	Carbon, Silicon Carbide (SiC), Tungsten Carbide (TC), Ceramic	Common pairings detailed later.

## 1.4. Common sizes / ordering examples

Standard stocked shaft sizes: 20, 25, 32, 40, 50, 65, 80, 100 mm (model-dependent). Flowserve and other suppliers publish model & dimension tables for cartridge families.

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## 2. Bellows (PTFE / Elastomer) Mechanical Seals

### 2.1. Introduction



Bellows seals have an integral bellows that provides the secondary seal and axial load. They eliminate dynamic O-rings and are beneficial where sliding secondary seals would wear (dirty or viscous fluids). Available in elastomer bellows and PTFE bellows (PTFE suited to highly corrosive services). John Crane and others provide detailed bellows product lines.

### 2.2. Applications

- Corrosive chemical handling (acids, solvents)
- Vacuum or low-pressure services
- Pumps with some axial movement or misalignment
- Small to medium pumps (service & OEM replacements)



## 2.3. Common parameters

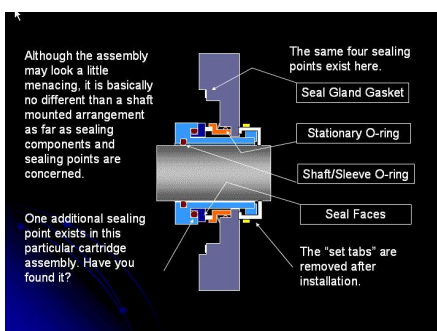
Parameter	Typical range / example	Notes
<b>Shaft diameter</b>	Common: 10 mm – 100+ mm (model dependent)	Many bellows designs favor small/medium shafts; consult model literature.
<b>Pressure</b>	Typical: to ~13 bar for many PTFE bellows designs (varies)	Elastomer bellows often for lower pressures; PTFE bellows extend corrosion resistance.
<b>Temperature</b>	Typical: -45°C to +120°C (PTFE may extend higher)	Refer to bellows material limits; John Crane literature shows PTFE bellows used for corrosive duties.
<b>Speed</b>	Moderate (check OEM limits)	Elastomer bellows limit high surface speeds.

## 2.4. Common sizes / ordering examples

Typical small-bore sizes: 12, 16, 20, 25, 32, 40 mm. See John Crane Type 1 / Type 10 product pages for model match.

# 3. Single-End Mechanical Seals

## 3.1. 3.1 Introduction



Single seals (single-end) are the simplest mechanical seal type: a single face pair (rotating + stationary). They are the industry standard for general purpose pumps where leakage control to atmospheric levels is acceptable.

## 3.2. Applications

- Water supply, HVAC, wastewater
- Light chemical duties
- General industrial centrifugal pumps



### 3.3. Common parameters

Parameter	Typical range	Notes
Shaft diameter	From ~6–10 mm to >200 mm (depends on product)	Wide range across OEM catalogs.
Pressure	Typically low to moderate; many single seals rated up to 20–30 bar	High-pressure services usually require dual seals.
Temperature	Material dependent; many standard single seals: -40°C to +200°C	High-temperature materials extend range.

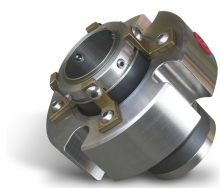
### 3.4. Common sizes / ordering examples

Typical stocked shaft sizes: 12, 16, 20, 25, 30, 40, 50, 65, 80, 100 mm (check OEM tables).

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## 4. Double / Tandem (Dual) Mechanical Seals

### 4.1. Introduction



Dual seals use two independent seal face sets with an intermediate barrier or buffer fluid — used where leakage must be minimized, the pumped fluid is hazardous, or higher reliability is required (API piping plans often apply).

### 4.2. Applications

- Toxic or flammable chemical services (emissions control)
- Refining and petrochemical plants with environmental controls
- Services requiring redundancy or pressurized barrier systems



### 4.3. Common parameters

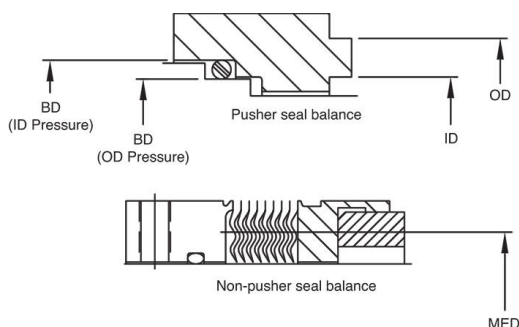
Parameter	Typical / notes	Notes
<b>Configurations</b>	Tandem (series / chamber between faces) or Back-to-Back (opposed)	Selection guided by piping plan and safety needs.
<b>Barrier fluid</b>	Clean compatible liquid or gas (pressurized)	Must be compatible and maintained by a seal support system.
<b>Pressure</b>	Suitable for higher-pressure services (with correct support)	Requires seal support system design per API 682.

### 4.4. Common sizes / ordering examples

Dual seals are ordered with full OEM kits and piping-plan instructions; common shaft ranges align with single-end and cartridge ranges.

## 5. Balanced vs Unbalanced Seals

### 5.1. Introduction



Balanced seals incorporate face geometry that reduces the net hydrostatic closing load on the faces, producing lower leakage and better performance at higher pressures. Unbalanced seals are simpler and acceptable for lower pressure services.

### 5.2. Applications

- Balanced: high pressure, aggressive process fluids, critical pumps
- Unbalanced: general service, lower pressure water pumps



## 5.3. Common parameters

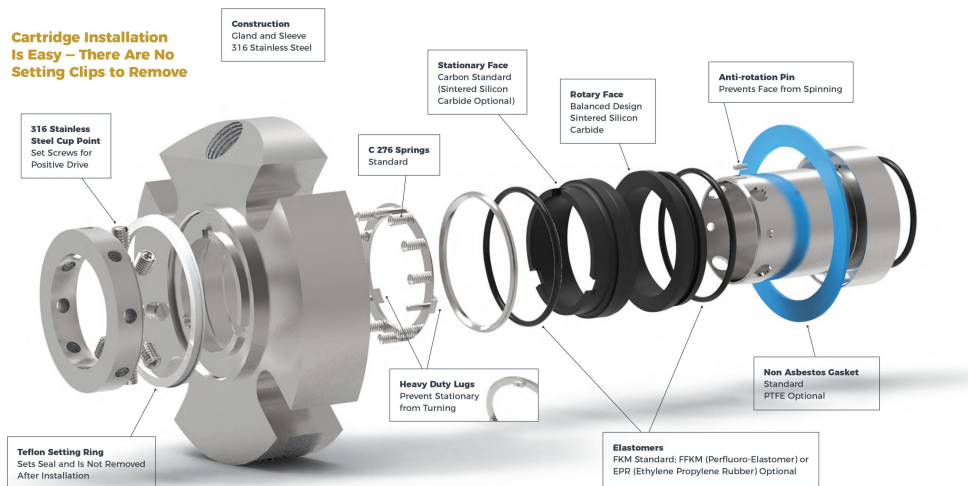
Parameter	Balanced	Unbalanced
Net face closing load	Reduced	Higher
Typical use	> ~10–15 bar or when reduced leakage required	Low-pressure, general-service pumps

## 5.4. Ordering notes

Manufacturers typically offer the same mechanical seal family in both balanced and unbalanced variants; part codes specify balance type.

# 6. Stationary Ring (Seal Seat)

## 6.1. Introduction



The stationary ring (seat) provides one half of the sealing face pair. Precision finish, flatness and material selection are critical. Typical materials: SiC, tungsten carbide (TC), ceramic, carbon.

## 6.2. Applications

- Replacement components across all mechanical-seal types



## 6.3. Common parameters

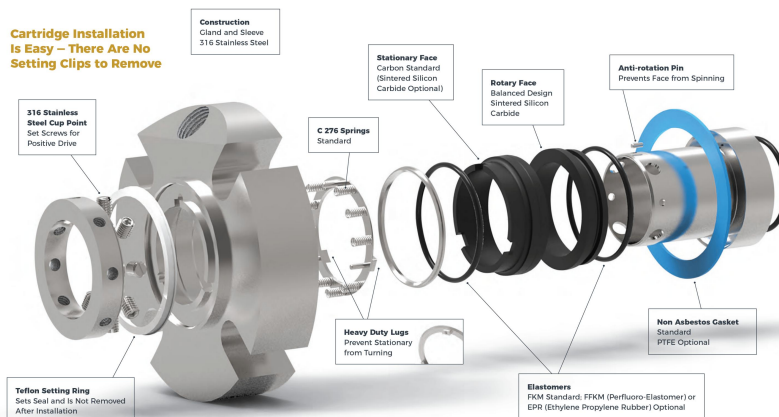
Parameter	Typical	Notes
<b>Materials</b>	SiC, TC, Ceramic, Carbon	Selection based on abrasion and chemical compatibility.
<b>Tolerances</b>	High precision ( $\mu\text{m}$ / sub-0.01 mm flatness & concentricity)	OEM tolerances are required for interchangeability.

## 6.4. Common sizes / ordering examples

Seats are ordered by face OD / ID and part code matching the rotary ring and seal frame.

# 7. Rotating Ring (Rotor)

## 7.1. Introduction



The rotating ring mounts to the shaft or sleeve and rotates with the shaft. Commonly softer carbon (rotor) is paired with hard SiC/TC stationary faces for abrasion tolerance.



## 7.2. Applications

- Spare parts and custom face combinations for abrasive or corrosive fluids

## 7.3. Common parameters

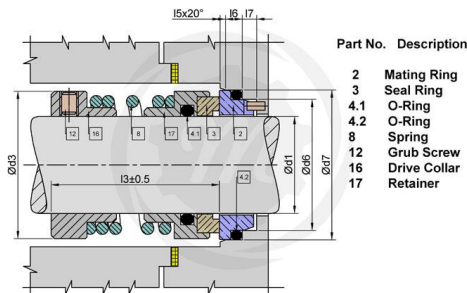
Parameter	Typical	Notes
Materials	Carbon (graphite), SiC, TC, Ceramic	Soft vs hard face pairing strategy.
Balance features	May include balance steps or grooves	Used in balanced seals to reduce closing load.

## 7.4. Ordering note

Match rotating ring dimensions (ID/OD/thickness) to OEM seat/shaft size.

## 8. Seal Springs

### 8.1. Introduction



Seal springs supply axial preload that keeps seal faces in contact. Designs include single coil, multiple coil, wave springs and elastomer/metal bellows (which remove dynamic O-ring sliding). Spring material selection (316L, Hastelloy, Alloy C, etc.) is based on corrosion resistance.

### 8.2. Applications

- All dynamic mechanical seals (spring is primary load element)



### 8.3. Common parameters

Parameter	Typical	Notes
Types	Single coil, multi-coil, wave springs, bellows	Bellows eliminate dynamic secondary seals.
Materials	316/316L SS, Hastelloy, special alloys	Select per process fluid compatibility.

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### 9. Typical Materials and Face Combinations

Face pair examples (industry practice):

Carbon (rotary) vs Silicon Carbide (stationary) — common general solution

Carbon vs Tungsten Carbide — abrasion/erosion resistant option

SiC vs SiC — long-life, abrasive services

Ceramic faces — specific corrosive duties

Elastomers: FKM (Viton), EPDM, NBR, PTFE — choose based on chemical compatibility and temperature.