Mixerpac Standard wet lubricated mixer seals
According to DIN and special designs
Mixerpac mixer seals
The whole range of seals for mixers, agitators, stirrers, kneaders, dryers, filters

Since the sixties mixer mechanical seals are successfully used in mixer vessels of various construction and fulfill the required sealing tasks in the chemical, pharmaceutical and food industry as well as in the bio process engineering in a predominant number to the most complete satisfaction of the operators. In process plants, diverse systems are employed for agitating, blending, kneading and drying products.

The units require low maintenance operation and safety, both, to protect the environment and the workplace. The mechanical seal design must provide excellent performance in the application, allowing for axial and radial shaft movements and shaft deflections.

We have the right solution to seal your machines safe and economical. And we have a well-trained and motivated staff to support you. Nearby as well as worldwide.

Flowserve FSD is focused specifically to provide the best mixer sealing solutions:
• Liquid lubricated 256x range is a cost-effective sealing solution
• Modular design allows easy part replacement
• Cartridge designs with and without a bearing (2561-2566)
• Top and side mounted
• Accommodation for sanitary gland/debris catcher for applications requiring steam cleaning
• Reverse-pressure capability and emergency sealing solutions
• Cooling flange option
• Designs, engineered to fit major OEM’s
• Designs, engineered according to DIN
• Ability to handle significant radial and axial run-outs
• Materials, selected for corrosion resistance and long seal life
• Split mixer seal designs to allow easy installation
• Sterilizable designs available
• Auxiliary systems, to enhance reliability
• Knowledgeable and experienced mixer seal team support
• Ability, to design to customer specification
### Overview liquid-lubricated mixer seals

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<th>Standard Lubrication</th>
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<th>Bearing</th>
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### Mixer drives

- **Mixer drive**
  - **Overview**: DIN 28 130 part 3
  - **Explanations**: DIN 28 130 part 3
  - **Demands**: DIN 28 161
  - **Mixer vessel with mixer description**: DIN 28 130

### For Flowserve Mixerpac M-series
(wet and dry running) please see separate brochure.

### Mixerpac mixer seals

- **Driver pedestal for mechanical seal**
  - DIN 28 162 part 1
- **Intermediate bearing**
- **Mixer vessel**
  - DIN 28 136 part 1 and part 2
- **Shaft end for mechanical seal**
  - DIN 28 154
- **Mixer type**
  - DIN 28 131
- **Shaft end, enameled**
  - DIN 28 159
- **Strength, appendix 1 to DIN 28 139**

*) currently as draft
Mixerpac 2561-2562
Liquid lubricated, top entry according to DIN

Cost-efficient liquid lubricated mixer mechanical seal, for low duties.
These seals serie 256x is based on the DIN standard. They are equipped with standard parts for liquid lubricated seals. One housing for all varieties. Available as single (2561/62) and as double seal (2563/64), with bearing (2562/64) or without bearing (2561/2563).
The Mixerpac 2564 features a liquid lubricated double seal and a bearing, it is designed for steel vessels. The Mixerpac 2560 is equipped with a glass-lined flange. The Mixerpac 2565, 2566 is designed for easy-to-clean applications.

Operating parameters 2561-2564
Pressure: Vacuum to 16 bar
(in the vessel) • 2563, 2564 shaft size up to 100 mm
Vacuum to 10 bar
• 2563, 2564 shaft size >100 mm
Vacuum to 6 bar
• 2561, 2562 quenched seals

Temperature: Double seals
(in the vessel) • -20 to +200°C
• up to 300°C with cooling flange 810
Single seals
• -20 to +150°C
• up to 250°C with cooling flange 810

Linear face speed: 4 m/s (Double seals)
2 m/s (Single seals)
Shaft sizes (d3): 40 to 220 mm

Materials 2561-2566
Seal faces: Resin-impregnated carbon / Silicon carbide
Silicon carbide / Silicon carbide (optional)

Metal parts: Product-wetted:
1.4571 (~ 316 Ti stainless steel)
Non product wetted:
1.4122 (~AISI 431)

Gaskets: Elastomers, Non-elastomers, PTFE

Supply Connections according to DIN 28 138 part 3
A Barrier liquid inlet
B Barrier liquid outlet
C Leakage control atmospheric side
D Leakage control product side
E Cooling inlet
F Cooling outlet
G Grease

Reverse-pressure capability.
Left: Seal closed by barrier fluid
Right: Seal closed by vessel-side pressure
Mixerpac 2563-2566
For steel vessels, cost efficient design

Mixerpac 2563-2566 for vessels of carbon steel and stainless steel

Features 2560-2566
• Modular construction Mixperpac 2560 to 2566
• Cartridge design
• Reverse pressure capability of the product side seal (Mixerpac 2560 - 2564)
• Pressure-tested unit with integrated self-aligning roller bearing (movable bearing) - Mixerpac 2562, 2564, 2566
• Fully equipped with PTFE gaskets (optional)
• Bi-directional rotation
• Barrier circulation bi-directional by baffle
• Connections according to DIN
• Torque transmission by means of a shrink disc

Features 2565-2566
• Easy-to-clean design
• Modular construction: interchangeable with series 2561 - 2564
• Cartridge design
• Pressure-tested unit with integrated self-aligning roller bearing (movable bearing)
• Fully equipped with PTFE gaskets (optional)
• Bi-directional rotation
• Barrier circulation bi-directional by baffle
• Connections according to DIN
• Torque transmission by means of a shrink disc

Operating parameters 2565-2566
Pressure: Vacuum to 6 bar
(in the vessel)
Temperature: -20 to +150°C
(in the vessel)
Linear face speed: 4 m/s
Shaft sizes (d3): 40 to 220 mm

Dimensional data Mixerpac 2561-2566

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Mixerpac 2560
For glass lined vessels, according to DIN

Features 2560
- Modular construction
- Cartridge design w/o flange
- Can be dis-mounted as cartridge, without glass-lined flange
- Reverse pressure capability
- Fully equipped with PTFE gaskets (optional)
- Pressure-tested unit with integrated self-aligning roller bearing (movable bearing)
- Connections according to DIN
- Torque transmission by means of a shrink disc

Operating parameters 2560
Pressure: Vacuum to 6 bar
(in the vessel)
Temperature: -25 to +200°C
(in the vessel)
Linear face speed: 4 m/s
Shaft sizes (d3): 40 to 160 mm

Materials 2560
Seal faces: Resin-impregnated carbon / Silicon carbide
Metal parts: Product-wetted:
- glass-lined
Non product wetted:
- 1.4122 (~AISI 431)
Gaskets: Elastomers, Non-elastomers, PTFE

Dimensional data Mixerpac 2560

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Measures in mm - 1) Shaft diameter d1 and d2 according to DIN 28 159
2) Flange size according to DIN 28 137 part 2
Mixerpac 580-581
For medium/high pressure applications

Mixerpac 580
Mechanical seals for medium pressure mixer vessels and reactors.
- Top entry
- Bi-directional
- Integrated self aligning spherical roller bearing as movable bearing configuration
- Fully equipped with PTFE gaskets (optional)
- Basic seal FEM (Finite-Element-Method) analysed

Materials 580-581
Seal faces 580: Resin-impregnated carbon / Silicon carbide
Silicon carbide / Silicon carbide (optional)
Seal faces 581: Silicon carbide / Resin-impregnated carbon
Metal parts: 1.4571 (~ 316 Ti stainless steel)
Gaskets: Elastomers, Non-elastomers, PTFE

Features 581
Mechanical seals for high pressure mixer vessels and reactors.
- Hydraulically balanced mating rings
- Deformation resistant faces
- Fully equipped with PTFE gaskets (optional)
- Basic seal FEM (Finite-Element-Method) analysed

Dimensional data Mixerpac 580

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</tbody>
</table>

Adaptative parts for 581 designed to seal chamber and machine dimensions

Operating parameters 580-581

580 581
Pressure: Vacuum to 40 bar Vacuum to 250 bar
(in the vessel)
Temperature: -20 to +200°C -80 to +200°C
(in the vessel)
Linear face speed: 4 m/s
Shaft sizes (d3): 20 to 220 mm; other sizes upon request
Mixerpac 585-588
For top/bottom/side entry

Features 585-586
Mechanical seals for bioreactors and others.
- Bottom entry
- Bi-directional
- Integrated self aligning spherical roller bearing as movable bearing configuration
- Rotating spring-loaded unit, including self-emptying features
- Guiding bushing provides proper barrier liquid circulation also to the product side faces for sufficient heat dissipation
- Construction with few gaps and crevices

Features 587-588
- Side entry, top entry
- Mechanical seals for high viscous or pulverized products
- Guiding bushing provides proper barrier liquid circulation also to the product side faces for sufficient heat dissipation
- Construction with few gaps and crevices

Operating parameters 585-588
Pressure:
- Vacuum to 6 bar (585, 586)
- Vacuum to 10 bar (587, 588)
- Higher pressures upon request
Temperature:
- -20 to +180°C (585, 586)
- -20 to +200°C (587, 588)
Linear face speed: 4 m/s (585, 586), 10 m/s (587, 588)
Shaft sizes (d3):
- 40 to 220 mm (585, 586); other sizes 40 to 200 mm (587, 588); upon request

Materials 585-588
Seal faces:
- Silicon carbide / Resin or antimony impregnated carbon
- Silicon carbide / Silicon carbide
- Tungsten carbide / Tungsten carbide (587, 588)
Metal parts:
- 1.4571 (~ 316 Ti stainless steel)
Gaskets:
- Elastomers, Non-elastomers, PTFE

Dimensional data Mixerpac 585-588

| d₁ | d₂ | d₃ | d₄ | d₅ | d₆ | d₇ | k | n | l₁ | l₂ | l₃ | l₄ | l₅ | l₆ | A,B | C |
|----|----|----|----|----|----|----|---|---|----|----|----|----|----|----|----|----|---|
| 40 | 80 | 130 | 150 | 190 | 11 | 85 | 100 | 170 | 8 | 42 | 170 | 210 | 22 | 158 | 200 | G3/8 | G1/8 |
| 50 | 100 | 150 | 170 | 225 | 11 | 105 | 120 | 195 | 8 | 42 | 180 | 240 | 55 | 168 | 228 | G3/8 | G1/8 |
| 60 | 120 | 160 | 190 | 245 | 11 | 125 | 140 | 205 | 8 | 45 | 190 | 250 | 60 | 175 | 235 | G3/8 | G1/8 |
| 80 | 150 | 220 | 240 | 300 | 14 | 160 | 180 | 250 | 8 | 48 | 210 | 270 | 65 | 195 | 225 | G1/2 | G1/4 |
| 100 | 170 | 240 | 260 | 320 | 14 | 180 | 200 | 270 | 8 | 48 | 230 | 300 | 65 | 215 | 285 | G1/2 | G1/4 |
| 110 | 190 | 250 | 270 | 330 | 14 | 200 | 220 | 280 | 8 | 52 | 240 | 320 | 70 | 225 | 300 | G1/2 | G1/4 |
| 125 | 205 | 265 | 295 | 365 | 18 | 215 | 235 | 330 | 8 | 52 | 250 | 330 | 70 | 232 | 310 | 91/2 | G1/4 |
| 140 | 230 | 290 | 310 | 400 | 18 | 240 | 260 | 345 | 8 | 55 | 255 | 350 | 75 | 235 | 330 | 91/2 | G1/4 |
| 160 | 245 | 300 | 320 | 410 | 18 | 260 | 280 | 355 | 8 | 60 | 260 | 360 | 80 | 240 | 340 | 91/2 | G1/4 |
| 180 | 255 | 320 | 345 | 430 | 18 | 270 | 300 | 375 | 12 | 60 | 270 | 370 | 80 | 250 | 350 | 91/2 | G1/4 |
| 200 | 270 | 350 | 360 | 440 | 18 | 285 | 320 | 395 | 12 | 65 | 290 | 410 | 90 | 265 | 385 | 91/2 | G1/4 |

Adaptive parts designed to seal chamber and machine dimensions
Cleaning-Sterilization

- **Methods**:
  - **CIP**: Cleaning in Place, i.e. the installed mechanical seals are cleaned with a washing solution of 2% nitric acid and flushed with a 5% caustic soda lye (up to pH = 14). This is done at a temperature of t = 60°C to 80°C over a period of approx. 15 minutes.
  - **SIP**: Sterilization in Place, i.e. the installed mechanical seals are sterilized at stationary shaft with steam at about 135°C and a pressure of p = 3,5 to 4 bar for a period of approx. 30 minutes.

- **Frequently used terms related to sterilization**:
  - **FDA**: Food and Drug Administration, Division of the US Department of Health, Education and Welfare. Supervises food, drug and cosmetics to the protection of the population.
  - **GMP**: Good Manufacturing Practices. Basic principles for the production and quality control of drugs published for the first time in 1968 by the World Health Organization.
  - **QHD**: Qualified Hygienic Design. Guidelines for sterilization from VDMA.

Requirements on mixer mechanical seals

- Construction with few gaps and crevices
- Good possibility to clean/sterilize
- Non-abrasive materials for faces and gaskets
- Smooth, rounded surface contour on the product side
- High surface quality of the product touched parts (Ra < 0.8 µm)
- Good resistance against steam, hot water, disinfectant also with CIP
- Non-poisonous materials, being non-ageing and non-corroding, colorless and tasteless, light and ozone resistant.
Demands on barrier liquids
Barrier liquids must be clean, free from solid particles, of low viscosity, be product compatible, temperature resistant and must not attack materials in use. Water and oils are most frequently used as barrier liquid. The following must be adhered to:

Water: On account of its good heat conductivity water is very suitable as a barrier. The high solubility of salts and gases in water however, proves detrimental. Frequently the deposition of salts and other solid particles at hot surfaces e.g. in sealing gaps, is the result. In order to avoid this a prepared, softened or distilled water or condensate is preferred. An antifreeze without additives like e.g. glycols may be added if freezing risk is given.

Oil: Useful is mineral oil or synthetic oil with a viscosity of 15 to max. 50 mm²/s (cSt) at working temperature. In addition the oil must be resistant to aging and, even in contact with the product, not tend to paste or coke.

Stand-still seals
- Stand-still seal
- Emergency seal
  - Shaft in rotation
  - Shaft is stopped

Possibility to change the seal with the vessel loaded
Not activated during shaft rotation; activated during stand-still

Installation
Tolerance check before fitting the Mixerpac seal

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<th>d (mm)</th>
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<th>50</th>
<th>60</th>
<th>80</th>
<th>100</th>
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</table>

d acc. to DIN 28 144, DIN 28 154 and DIN 28 159
Piping schematic, unpressurized system, optional with heat exchanger

1. Vessel (pressureless)
2. Cooling coil
3. Drain
4. Level indicator
5. Level switch
6. Thermometer
7. Orifice to the vent
8. Filling connection

Piping schematic, pressurized system, with heat exchanger, optional with forced circulation

1. Vessel
2. Cooling coil
3. Drain
4. Level indicator
5. Level switch
6. Thermometer
7. Vent
8. N2-connection
9. Pressure gauge
10. Filling pump
11. Refill vessel

Sealant systems for sterile applications

1. Vessel
2. Pressure indicator
3. Level gauge
4. Temperature indicator
5. Valve
6. Vent valve
7. Heat exchanger
8. Steam exhaust
9. valve
10. 9 Valve
11. Steam supply valve
12. Condensate valve
13. Condensate separator

Quench fluid tank

Capacity: 3l
Pressure: 0 bar
Temperature: up to 200°C

Thermosyphon pressure vessel

Capacity: 6l
Pressure: standard 32 bar
Optional: 40, 64 bar
Temperature: up to 200°C

Pressure transmitter

Capacity: 3l
Pressure: standard 40 bar
Optional: 64 bar
Temperature: up to 150°C

Pressurizer with gear pump and self-acting pressure resistance, when motor fails

Pump capacity: 6l/min
Sealant pressure: 10 to 50 bar
Oil viscosity: 12mm²/s
Tank capacity: 40l
Dimensions:
- Height: 780mm
- Width: 700mm
- Depth: 440mm
The Flowserve FSD Dortmund facility is specialized in sophisticated mechanical seals for mixers, compressors and pumps. At this location sealing solutions have been made since 1919 on a very high level.

The advantage of cooperation with Flowserve lies on the one hand in technically efficient, high quality, and long service life products, and on the other hand in the technical competence and commitment to advice and customer service.

The product range contains standard seals as well as custom engineered solutions. Whether liquid lubricated or lift-off technology - we deliver always the state of the art.

Flowserve FSD supports you by local sales engineers and by our special mixer support group in Dortmund. For your special requirements we have engineering capacity especially for mixer applications.

Our service for you includes service and repair centers all over the world (12 in Europe) and training and education of your personnel.

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