Split Mechanical Seal MSS
For Piloted and Non-Piloted Models
Installation and Maintenance Instructions for Machinery Parts
1. Drawing, Brief Description, Function

See the annex for the installation drawing.

1.1 Specifications for the operations described herein:

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<td>Product temperature (°C)</td>
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\(^1\) dry  
\(^2\) wet  
\(^3\) statically, \(v = 0\) m/s

The application limits specified are maximum load values and assist in preselection. The application limits must be checked for every application.

A warranty in an individual case is possible only when FLOWSERVE knows the exact application conditions and these have been confirmed in a separate agreement.

1.2 Brief description

The split mechanical seal MSS is delivered as a bidirectional, partially assembled mechanical seal. While it has been designed for rugged industrial applications and ease of installation, it does require careful assembly in a clean environment according to the following installation steps.

The MSS seal is primarily designed to seal agitator shafts and can be run dry up to 350 rpm or wet up to 1750 rpm. Consult your local nearest Flowserve Sales and Service Representative, regarding other applications.

1.3 The spring force and the product pressure push the seal ring against the mating ring. The seal faces are sealed from the shaft sleeve, respectively from the housing, by sealing elements (e.g. O-rings). The faces of the seal ring and the mating ring are designed as sealing faces.

! The installation chamber for the mechanical seal type MSS must be checked against the corresponding drawing and table of dimensions. It must be ensured that all dimensions, surface qualities and tolerances (e.g. concentricity, runout, fits) are observed.
1.4 Function

The faces of the seal ring and the mating ring are designed as sealing faces. The seal faces of the seal rings are contacting and wearing slightly, when the machine shaft rotates. The consumed quantity of product leakage is low and depends on the operating conditions, it enters the atmosphere through the seal gap.

! The product pressure may not exceed the values given under item 1.1.

1.5 Function conditions

The MIXERPAC’s function is obtained only when the following conditions are fulfilled:

- Plane-lapped seal faces.
- Perpendicularity between the seal faces and the shaft centerline.
- Unforced clearance of the rotating parts within the specified tolerances.
- Prevention of sedimentation on the surfaces of the shaft or shaft sleeve by e. g. crystalliation or polymerisation.
- Prevention of the product from adhering in the area at the seal gaps.
- Permanent fluid film in the seal gaps.
- Adherence to the specified operating data as per item 1.1 respectively the data sheet.

If these function conditions are not fulfilled, the leakage rate increases and parts of the product can escape into the atmosphere. Additionally, disregarding of these issues can result in high component temperatures.


2.0 Information on Safety

2.1 DANGER: This symbol means, that failing to observe this information involves the risk of personal injury and / or considerable damage to property.

! IMPORTANT: This symbol draws your particular attention to important information that is possibly not clear even to qualified personnel. This information, however, must be observed to prevent malfunctions that in turn could directly or indirectly give rise to serious injury and / or property damage.

2.2 The customer and / or the operator must ensure that all persons assigned to handle, assemble or run the machine have carefully read these installation and maintenance instructions, before they commence any installation and maintenance work at the MSS or before operate the machine. These personnel must be fully acquainted with the layout and function of the MSS and the respective support system.
2.3 Damage may cause leakage in gaseous form. The hazardous effects correspond to those of the product, and there may be hazard to persons or the environment. The operator’s regulations concerning work safety, accident prevention, and pollution for this plant section must be adhered to without exception.

2.4 Components coming into contact with the leakage must be corrosion-resistant or corrosion-proof.

2.5 Mechanical seals must be decontaminated before they are sent to FLOWSERVE for maintenance or repair.

2.6 When employing elastomers of EP (ethylene-propylene) or butyl rubber, do not use any grease or oil on a mineral basis as a lubricant.

2.7 A loss, a re-establishment or a change of the power supply for the machine and/or the barrier system may not impair the properties of the mechanical seal and/or involves a risk of personal injury and/or considerable damage to property.

2.8 Assigned protection devices from the machine manufacturer must be accordingly arranged and may no cause additional endangerments. They must ensure the necessary range for the accessibility to maintenance work to the mechanical seal.

2.9 The electrical supply of the machine must correspond to the protection targets of the Directive 2006/95/EC. No endangerments for persons and environment may proceed from a non electric power supply.

3.0 General

3.1 All illustrations and details in these instructions are subject to technical alterations that are necessary in improving the mechanical seal.

3.2 The copyright on these installation and maintenance instructions is the property of FLOWSERVE. These installation and maintenance instructions are intended for the assembly, operating, and supervisory personnel and contain regulations and drawings of a technical character that may not, in full or in part, be copied, distributed, used without authorization for competitive purposes, or given to others.

3.3 We point out that we accept no liability for any instances of damage or malfunctions of the machine incurred through nonadherence to these installation and maintenance instructions.
4.0 Transport, Storage

4.1 The mechanical seal must be transported and stored in the unopened original packaging. The storage site must be dry and free of dust. Influences through temperature or irradiation must be avoided.

4.2 Parts or complete mechanical seals that have been dropped or otherwise subjected to heavy impacts during transport must not be installed. An inspection by FLOWSERVE becomes necessary.

4.3 After a storage period of three years the mechanical seal must be inspected for properties as new. This applies in particular to the secondary seals and seal faces. We recommend an inspection by FLOWSERVE.

4.4 If the machine is to be preserved with integrated mechanical seal the preserving medium must not impair the function of the mechanical seal by e. g. fouling or hardening or swelling the secondary seals.

4.5 The mechanical seal must be transported with adequate tools, e. g. by using industrial trucks or lifting devices.

5.0 Preparing for Installation

5.1 The mechanical seal may be installed when there are no visible signs of damage to the mechanical seal. This applies in particular to the static faces of the flange, centring and the static sealing elements.

Before installing, consult the specifications on the accompanying documents to verify that the correct mechanical seal has been installed correctly and is suitable for the specified application. Do not exceed the design data.

Requisite for all assembly work are the installation drawing and parts list and the tools and aids required for the assembly.

Vibrations must not be allowed to reach the installed mechanical seal when the machine is operating or in particular when it is shut down. Vibrations can be stopped e.g. by structural measures on the machine.

Installation of this seal requires the use of an adhesive to bond the O-ring secondary seals together. Do not allow the adhesive to come in contact with the skin.

The installation chamber for the mechanical seal must be checked against the corresponding drawing and table of dimensions. It must be ensured that all dimensions, surface qualities and tolerances (e. g. concentricity, runout, fits) are observed.
Ensure the highest degree of cleanness. Force must not be used to install the seal. Use only suitable tools and devices.

The seal faces of the mechanical seal are important functional sections and may not be damaged.

All functional and assembly areas for the secondary seals (e.g. O-rings) must be dimensionally accurate, free of scratches and burrs, flash-free and rounded.

The fitting surfaces of the mechanical seal and the installation chamber must be undamaged and dry. Ensure the highest degree of cleanness.

A thin coat of product-compatible grease (e.g. Molykote M55) is to be applied to the sealing elements. Excess grease is to be avoided.

Depending on the installation direction, a lubricant, (e.g. Molykote D321R) or PTFE spray without solvent, must be applied to the shaft or shaft sleeve.

The areas for the clamp-connections must remain free of grease, otherwise the adhesive force will become inadequate for correct functioning.

5.2 Equipment Check

5.2.1 Follow plant safety regulations prior to equipment disassembly:
- lock out motor and valves.
- wear designated personal safety equipment.
- relieve any pressure in the system.
- consult plant MSDS files for hazardous material regulations.

5.2.2 Dismantle the machine in accordance with the instructions from the machine manufacturer to reach the installation chamber for the mechanical seal.

5.2.3 Remove existing mechanical seal and gland or packing gland (follower flange) and the first few rings of compression packing down to the lantern ring.

5.2.4 Make sure the shaft or sleeve in the seal shaft packing (P) area and the seal housing bore (B) and face are clean and free of burrs, cuts, dents or corrosion that might cause leakage past the rotating face gasket or stationary face mounting O-rings.

5.2.5 Check equipment dimensions to ensure that they are within the dimensions shown in Figures 1 and 2 or 3. Critical dimensions include shaft or sleeve OD (A), seal housing bore (B), and the distance to the first obstruction (J).

5.2.6 Check gland bolting to ensure that bolt size (D) and bolt circle (F) conform to the dimensions shown in Figures 2 or 3.
**Seal chamber requirements**

Figure 1

- Bearings must be in good condition.
- Maximum axial movement of shaft (end play) = 0.010 inch (0.25 mm) FIM.
- Maximum combined shaft eccentricity and shaft deflection at face of housing total = 0.150 inch (3.8 mm) FIM.

**Tools needed for installation:**
- A 5/32" T-handle or right angle Allen wrench.
- An open end wrench for the gland bolts.
- Two (2) 1/8" Allen wrenches.

Cleanliness during installation is crucial to the satisfactory operation of the MSS seal.

Installation of this seal requires the use of an adhesive to bond the O-ring secondary seals together. Do not allow the adhesive to come in contact with the skin.

**There are two basic models of the MSS seal, piloted,** see Figure 2, page 9, and **NON-Piloted,** see Figure 3, page 13.
6.0 Installation

6.1 The mechanical seal type MSS is installed in the mixer in accordance with the instructions from the machine manufacturer and with consideration to the following recommendations.

⚠️ The machine to take the mechanical seal type MSS must be earthed in accordance with the applicable regulations for electrical installations (e.g. VDE rules) to conduct away any electrostatic build-up and so prevent spark formation.

⚠️ Parts of the mechanical seal, which needs to be entered during assembly works, needs to be secured against slipping, stumbling or falling (e.g. by holding devices).

⚠️ Installation of the mechanical seal type MSS on the machine may take place during machine breakdown only.

⚠️ The areas for the clamp-connections must remain free of grease, otherwise the adhesive force will become inadequate for correct functioning.

❗️ There are two basic models of the MSS seal, piloted, see Figure 2, page 9, and NON-Piloted, see Figure 3, page 13.

6.2 Installation of Piloted MSS (see Figure 2).

6.3 Spray one end of one of the split stationary face seat gasket O-rings with the adhesive accelerator provided. Apply one drop of the adhesive provided to the other end. Position the split O-ring around the shaft and bond the joint ends together. Hold for one minute to assure a suitable bond. Lubricate the O-ring with the silicone lubricant provided. Place the bonded O-ring on the seal chamber (stuffing box) face.
## Dimensional Data for MSS with Piloted Insert

### Reference Figure 2

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**Note:** Dimension J reflects minimum distance required for the assembled seal plus additional axial space required for seal assembly.

![Diagram of MSS with Piloted Insert](image-url)
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Be careful not to let O-ring fall in to the bore.

6.4 **Install the stationary face halves** around the shaft with the lapped face outward (non-lapped face is identified with a groove or part marking) away from the seal chamber face. Hold the stationary face up and place the bonded O-ring over the stationary face shoulder closest to the seal chamber face. **Pilot** the inner stationary face shoulder into the seal chamber bore.

6.5 **Bond and lubricate the second stationary face seat gasket O-ring** around the shaft and place it over the outer stationary face shoulder.

6.6 **Position the gland ring halves** around the shaft with the counterbore facing the stationary face. **Place** the gland halves around the stationary face and fasten them together using the shoulder screws provided.

Be sure the **gland ring joints are in line with the stationary face joints** and the **two bolt holes are in line with the bolt holes or studs in the seal chamber face**.

It is imperative that the centering of the mechanical seal type MSS components in the mixer vessel’s assembly flange without force. Under no circumstances may the given fit tolerances be exceeded.

6.7 **Carefully fasten the gland to the seal chamber** by tightening the nuts or bolts to a 30 lb-in (3.4 Nm) maximum torque while feeling for sealing face mismatch at the stationary face joints. If any mismatch exists, loosen the nuts or bolts and shift the stationary face halves until no mismatch is felt. Retighten the nuts or bolts.

**Do not overtighten the gland nuts or bolts** as overtightening on some equipment may cause the stationary face to distort which may result in leakage at the sealing faces. It is not necessary for the gland to have metal-to-metal contact with

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**Do not overtighten the gland nuts or bolts** as overtightening on some equipment may cause the stationary face to distort which may result in leakage at the sealing faces. It is not necessary for the gland to have metal-to-metal contact with
the seal chamber face for the inner stationary face O-ring to form a seal. The gland face must, however, be square with the axis of the shaft to within 0.020“ FIM.

Components provided by the customer for installing the mechanical seal type MSS, e.g. fastening screws, must prove adequate both in the choice of material and the dimensions. It must not be possible to overstress these components, e.g. the max permitted tightening torque must not be exceeded.

6.8 Mount the rotating seal face halves 8 around the shaft and fasten them together using the cap screws 9 provided, tighten to a 30 lb-in (3.4 Nm) torque maximum. Check for seal face joint mismatch. If any mismatch exists, loosen the cap screws and shift the rotating seal face halves until no mismatch is felt. Retighten the cap screws.

Note: There are threads on both halves of the rotating seal face. Align halves carefully so as to not allow a gap between halves during tightening.

The shaft sleeve can be displaced in radially or axially direction, if the seal drive connection is not accomplished according the requirements.

6.9 Clean the rubbing faces of the stationary face and rotating face ring with alcohol and place the rotating face so that its rubbing face is against the stationary face rubbing face.

6.10 Position the split rotating face gasket O-ring P around the shaft, bond and lubricate as in Step 6.3, and push the O-ring into the rotating face bore.

6.11 Install the white split backing ring P1 into the rotating face bore next to the O-ring. Install the two black elastomer backing rings P2. Be sure to stagger the backing ring joints by 120°.

! Do not bond the backing ring joints together or with each other.

6.12 Mount the seal drive halves 5 around the shaft and loosely fasten them together with the shoulder screws K1 provided. Line up the pins in the seal drive with the holes in the rotating face and slide the seal drive towards the rotating face until a
0.12" (3 mm) spring gap is achieved using the two 1/8" Allen wrenches as spacers. **Tighten the shoulder screws completely and lock seal drive to shaft.**

⚠ **Designs that incorporate set screws** in the seal drive, after tightening shoulder screws **K1**, tighten the set screws **57** to lock the seal drive to the shaft.

The seal is now ready for operation. See paragraph 8.0, „Starting up the Machine“, before start-up.

⚠ Once more check the running precision as per paragraph 5.2.6 and the installation dimensions according the assembly drawing.

⚠ The installation dimensions of the mechanical seal type MSS must apply to the dimensions shown on the assembly drawing. Non-compliance of the information shown on the assembly drawing may cause in damages.

⚠ For special problems encountered during installation, contact your nearest Flowserve Sales and Service Representative or Authorized Distributor.

6.13 **Installation of Non-Piloted MSS (see Figure 3).**

6.14 **Spray one end of the split gland gasket O-ring** with the adhesive accelerator provided. **Apply** one drop of the adhesive provided to the other end. **Position** the split O-ring around the shaft and bond the joint ends together. **Hold** for one minute to assure a suitable bond. **Lubricate** the O-ring with the silicone lubricant provided. **Place** the bonded O-ring on the seal chamber (stuffing box) face.

6.15 **Remove the retainer halves** from the face of the gland halves and save the retainer halves and cap screws **K3** for Step 6.20.

6.16 **Position the gland ring halves** around the shaft and fasten them loosely together using the shoulder screws **K2** provided.

6.17 Use some silicone lubricant provided to hold the gland gasket O-ring in its groove and **position the gland** on the seal chamber face by loosely tightening the nuts or. (See paragraph 6.7).

6.18 **Bond one of the split stationary face seal gasket O-rings** and lubricate as in Step 6.14. Place the bonded O-ring in the gland counterbore.
MSS with Non-Piloted Insert

Dimensional Data for MSS with Non-Piloted Insert (Reference Figure 3)

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- D φ Studs equally spaced on F, bolt circle
6.19 **Install the stationary face halves** around the shaft with the lapped face outward (non-lapped face is identified with a groove or part marking) away from the seal chamber face. **Insert** the stationary face into the gland bore and nest it in the O-ring while making sure there is no sealing face mismatch at joints. If mismatch is present, gently remove it.

! Be sure the stationary face joints are in line with the gland ring joints.

6.20 **Bond and lubricate the second stationary face mounting O-ring** around the shaft as in Step 6.14 and **place** it over the stationary face outer shoulder.

6.21 **Securely attach the retainer halves** to the face of the gland using cap screws while positioning the retainer over the outer stationary face mounting O-ring.

6.22 **Tighten the shoulder screws** in the gland ring halves while feeling for sealing face mismatch at the stationary face joints. If any mismatch occurs, loosen the shoulder screws and shift the stationary face halves to remove the mismatch then continue with tightening the shoulder screws.

6.23 **Insert the plastic centering device** between the insert ID and the shaft.

6.24 Tighten the gland fastening nuts or bolts holding the gland to the seal chamber to 30 lb-in (3.4 Nm) maximum torque while feeling for seal face mismatch at stationary face joints. If any mismatch exists, loosen gland fastening nuts or bolts and shoulder and retighten the nuts or bolts.

! **Do not overtighten the gland fastening nuts or bolts** as overtightening on some equipment may cause the stationary face to distort which may result in leakage at the sealing faces. It is not necessary for the gland to have metal-to-metal contact with the seal chamber face for the inner stationary face mounting O-ring to form a seal. The gland face must, however, be square with the axis of the shaft to within 0.020" FIIM (0,5 mm).

6.25 **Remove the centering device**. Retain it for use with the spare parts kit.

6.26 **Mount the rotating seal face halves** around the shaft and fasten them together using the cap screw provided, tighten to a 30 lb-in (3.4 Nm) torque maximum. Check for seal face joint mismatch. If any mismatch exists, loosen the cap screws and shift the rotating face halves until no mismatch is felt. Retighten the cap.

6.27 **Clean the rubbing faces** of the rotating and stationary face with alcohol and **place** the rotating face so that its rubbing face is against the stationary rubbing face. See Step 6.9.

6.28 **Position the split shaft packing O-ring** around the shaft and bond the joint ends together as in Step 6.14. **Lubricate** the O-ring with the silicone lubricant provided and push the O-ring into the seal ring bore. See Step 6.10.
6.29 **Install the white split backing ring** P1 into the seal ring bore next to the O-ring. **Install the two black elastomer backing rings** P2. Be sure to stagger the backing ring joints by 120°.

⚠️ Do not bond the backing ring joints together.

6.30 **Mount the seal drive halves** 5 around the shaft and loosely fasten them together with the shoulder screws K1 provided. Line up the pins in the seal drive with the holes in the rotating face and slide the seal drive towards the rotating face until a 0.12" (3 mm) spring gap is achieved using the two 1/8" Allen wrenches as spacers.

**Tighten the shoulder screws completely** and lock seal drive to shaft.

⚠️ **Designs that incorporate set screws** 57 in the seal drive, after tightening shoulder screws K1, tighten the set screws 57 to lock the seal drive to the shaft.

The seal is now ready for operation.

⚠️ For special problems encountered during installation, contact your nearest Flowservice Sales and Service Representative or Authorized Distributor.

### 7.0 Connecting the Seal Support System

7.1 The mechanical seal type MSS is pressurized from the product pressure, see paragraph 3.1, due to this the connection of a seal support system is inapplicable.

7.2 A check can now be conducted on the mixer’s sense of rotation (without pressurized product chamber).

### 8.0 Starting up the Machine

⚠️ The MSS seal is designed to run dry at speeds of up to 350 rpm. If operated dry, no special environmental controls are necessary. For wet operation of up to 1750 rpm, make sure that the seal water flush, Plan 32, is adequate to remove seal generated heat and that the flush is on before start-up of the equipment.

Contact your nearest Flowservice Sales and Service Representative or Authorized Distributor, for seal flush requirements.

⚠️ Parts of the mechanical seal type MSS, which rotate during operation of the machine, must be secured against contacts, in accordance with the specifications from the machine manufacturer.

8.1 The mechanical seal type MSS is ready for operation of the machine after it has been installed.

8.2 The installed mechanical seal type MSS is bidirectional.
8.3 For the static pressure test on the product vessel the vessel pressure may not exceed the values given under item 1.1.

⚠ Temperatures at the component surfaces of the mechanical seal type MSS correspond to the operating temperatures of the product. Suitable precautions against contacts are necessary.

⚠ The mechanical seal type MSS will be damaged when the conditions given under item 1.5 are not maintained.

⚠ Follow the instructions both for start up and re-commissioning of the machine after a machine breakdown, see items 8.0 to 8.3.

⚠ Escaping leakage must not form an explosive mixture.

8.4 Possible malfunctions:

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| Dramatic increase of the leakage rate | - Shaft rotates eccentric.  
                             | - Damage to the mechanical seal  
                             |   (product enters the atmosphere). |

8.5 The mixer shaft may be stopped at any time.

⚠ The mechanical seal type MSS cannot function during all assembly and maintenance work.

9.0 Shutting Down the Machine and MSS Removal

9.1 The machine can be shut down at any time under normal conditions.

9.2 Before the mechanical seal type MSS can be removed the machine must first be shut down and the mixer vessel depressurized.

9.3 The shaft may be shut down under pressurized conditions.

9.4 Remove the mechanical seal type MSS by the instructions for installation in reverse order.

⚠ Der Removing the mechanical seal type MSS from the machine may take place during machine breakdown only.

⚠ Temperatures at the component surfaces of the mechanical seal type MSS correspond to the operating temperatures of the product. Suitable precautions against contacts are necessary.

⚠ Removing the seal may release product! All information and regulations regarding safety measures and protective clothing with respect to this plant section must be observed and strictly adhered to. The operator must ensure the proper
disposal of the media collected when the machine is vented or drained.

9.5 Carefully replace the removed mechanical seal type MSS in the original packaging (e.g. wooden crate) and store or send this to FLOWSERVE for inspection.

9.6 Follow the instructions for recommissioning of the machine, after a machine breakdown, see items 8.0 to 8.3.

9.7 When seals are returned to Flowserve for repair, decontaminate the seal assembly and include an order marked „Repair or Replace.“ A signed certificate of decontamination must be attached. A Material Safety Data Sheet (MSDS) must be enclosed for any product that came in contact with the seal. The seal assembly will be inspected and, if repairable, it will be rebuilt, tested, and returned.

10.0 System Check

System check of the MSS may take place during machine breakdown only.

Ensure accessibility for the necessary range to operate the machine or for main-tenance work at the MSS.

10.1 System checks of the MSS extend to the monitoring of the set values for pressure, temperature and barrier or quench fluid consumption.

10.2 Removing the MSS for an inspection becomes necessary when:

- The specified leakage values are exceeded and, after enquiries at FLOWSERVE, no other written agreement ensues.
  - Examination of the leakage rates should take place at least once during 24 operating hours!
- After an installation period of more than three years.
- An inspection of the mixer is due, and a similarly long operating period is expected thereafter..

11.0 Maintenance, Replacement Parts; Aftersales Service

11.1 Repairs must be conducted by FLOWSERVE within the guarantee period. In special cases (emergencies) competent personnel may replace individual parts in situ after consultation with FLOWSERVE.

- Decontaminate the MIXERPAC and return it to a FLOWSERVE authorized repair facility with an order marked „Repair“ or „Replace“.

A signed certificate of decontamination must be attached. A Material Safety Data Sheet (MSDS) must be enclosed for any product that came in contact with the
MIXERPAC. The MIXERPAC will be inspected and if repairable, a quotation will be made for restoring it to its original condition. Upon acceptance of the quotation, the MIXERPAC will be rebuilt, tested and returned to sender.

11.2 Replacement parts are to be ordered with the ID numbers given in the annexed parts list.

11.3 A warranty is given only for the original replacement parts delivered by FLOWSERVE. All parts of the MIXERPAC meet with high-precision dimensional tolerances and are matched to one another. Only a part replacement as given in the FLOWSERVE quality assurance documentation ensures smooth operation.

11.4 We expressly point out that original replacement parts and accessories not delivered by FLOWSERVE are not tested or released by FLOWSERVE. Under certain circumstances therefore, using and/or installing such products may impair the properties given in the MIXERPAC design and hence undermine the active and/or passive safety. All incidents of damage incurred through the use of nonoriginal replacement parts or appurtenances render all liabilities and warranties on the part of FLOWSERVE void.

Please note that special manufacturing and delivery specifications exist for all parts of our products manufactured or procured by ourselves, and the replacement parts are always offered in accordance with the latest technology and with the most current regulations and laws.

11.5 This product is a precision sealing device. The design and dimension tolerances are critical to seal performance. Only parts supplied by Flowserve should be used to repair a seal. To order replacement parts, refer to the part code and B/M number. A spare backup seal should be stocked to reduce re-pair time:

- Insert
- Shaft Packing
- Gaskets
- O-ring
- Screws
- Set Screws
- Springs
- Seal Ring
- Back up Rings

12.0 Annex

12.1 Assembly drawing, parts list.

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Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, running, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

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