

# MECHANICAL SEALS



**Our products:**  
**PUMP UNITS**  
**PUMPS MODERNIZATION**  
**BEARINGS**  
**MECHANICAL SEALS**  
**VALVES**

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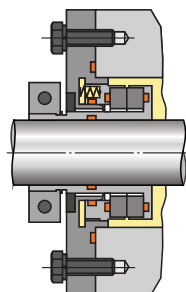
**Nizhniy Novgorod**

## SINGLE MECHANICAL SEALS

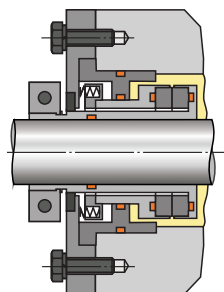
### CODE 3619-001-25579857-2001

Applied in pumps units and equipment for neutral and non-toxic mediums.

The mechanical seals of the second type of construction can be used in the cases when there can be an obstruction of the holes and springs with abrasive particles, sedimentations of working liquids and so on.



**Variant 1. Springs in the medium sealed**

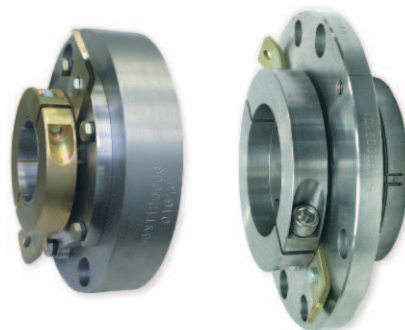


**Variant 2. Springs out of the medium sealed**

#### TECHNICAL PARAMETERS

Shaft diameter, mm	from 18 to 250
Shaft rotation speed, rpm	from 30 to 7500
Temperature of sealed medium, °C	from -60 to 150*
Pressure of sealed medium, MPa	from 0,1 to 10
Maximum leakage, l/h	0,002

\*The maximum temperature of sealed water is 85 °C.



## SINGLE MECHANICAL SEALS WITH PROTECTIVE STEP

### CODE 3619-005-25579857-2003

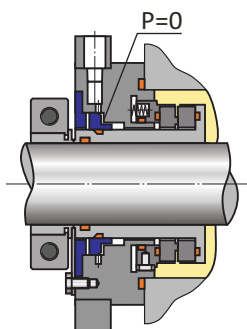
Applied in trunk line pumps where sealed fluid is oil and oil products.

#### FEATURES

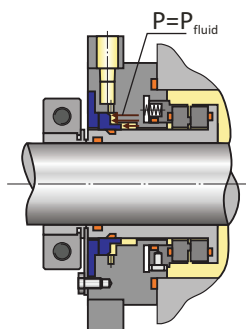
Protective step prevents leakage of pumped fluid into atmosphere and participate in transferring of shut-off signal in case of main sealing disclosure.

#### TECHNICAL PARAMETERS

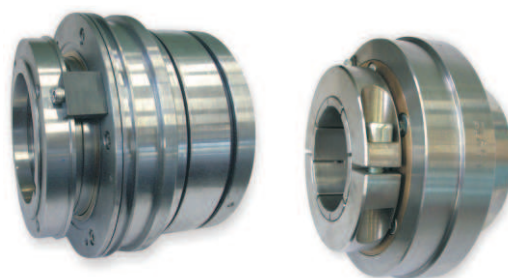
Shaft diameter, mm	from 24 to 140
Shaft rotation speed, rpm	from 30 to 4000
Temperature of sealed medium, °C	from -15 to 50
Pressure of sealed medium, MPa	from 0,1 to 10
Maximum leakage, l/h	0,050



**Subsidiary seal step at normal operation**



**Subsidiary seal step at main friction pair disclosure**



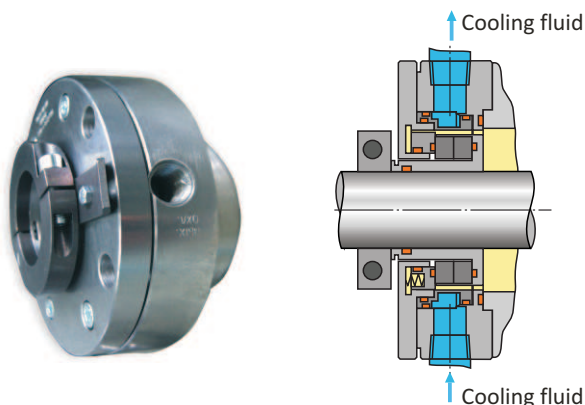


## SINGLE MECHANICAL SEALS WITH COOLING JACKET

CODE 3619-001-25579857-2001

They can be used in pumps and aggregates pumping water at temperature more than 85°C.

The boiling of water is excluded directly in the pair of friction.



### TECHNICAL PARAMETERS

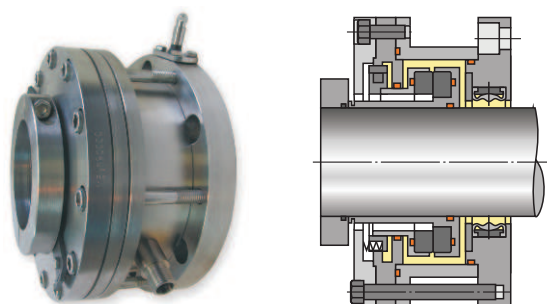
Shaft diameter, mm	from 18 to 250
Shaft rotation speed, rpm	from 30 to 7500
Temperature of sealed medium, °C	from 85 to 130
Pressure of sealed medium, MPa	from 0,1 to 10
Maximum leakage, l/h	0,002
Pumped medium	boiler water, mains water

## SINGLE MECHANICAL SEALS FOR DEADWOOD PROPELLERS SHAFTS

CODE 3619-008-25579857-2014

The mechanical seals can be used in deadwood propellers shafts of the vessel at large radial and angular movements (up to 6 mm) of the shaft at the location of the seal.

It provides the tightness of the shaft while disassembling and repair because of the original construction of the parking seal.



### TECHNICAL PARAMETERS

Shaft diameter, mm	from 50 to 300
Shaft rotation speed, rpm	up to 3000
Temperature of sealed medium, °C	from -4 to 35
Pressure of sealed medium, MPa	0,2
Maximum leakage, l/h	0,7

## DOUBLE MECHANICAL SEALS UTD TYPE

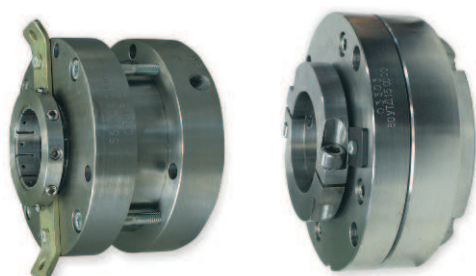
### CODE 3619-002-25579857-2001

Applied in pump units and equipment where sealed fluids are oil products, liquefied hydrocarbon gases, liquids with harmful chemical agents.

The seals of the second variant of construction are more effective at the operation in the environments, prone to crystallization and polymerization, with a high content of abrasive substances as well as in high-viscosity products.

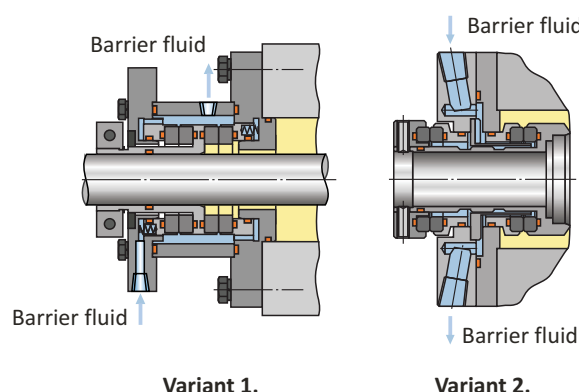
#### TECHNICAL PARAMETERS

Shaft diameter, mm ..... from 22 to 260  
 Shaft rotation speed, rpm ..... from 30 to 4500  
 Temperature of sealed medium, °C ..... from -60 to 200  
 Pressure of sealed medium, MPa ..... up to 10  
 Maximum leakage, l/h ..... 0,002  
 Pressure of sealed medium, MPa ..... not more 1,6  
 (for 2 Variant)



#### FEATURES

- Leakage of sealed fluid into atmosphere is completely excluded.
- First (circuit) friction pair operates at barrier fluid and sealed fluid pressure drop. Second, atmospheric one, - at barrier fluid and air pressure difference.
- Barrier fluid pressure is 0,1 - 0,3 MPa greater than sealed fluid pressure.
- Mechanical seal retains its operability in case barrier fluid pressure is lower than this one of the medium sealed.
- The barrier fluid can be given as from the outer side of the pair of friction (variant 1) as from the inner part (variant 2).
- Pumping is performed according to API682: Plan53 or Plan54.



## TANDEM MECHANICAL SEALS UTT TYPE

### CODE 3619-003-25579857-2001

Applied in pump units and equipment where sealed fluids are oil products, liquefied hydrocarbon gases, liquids with harmful chemical agents.

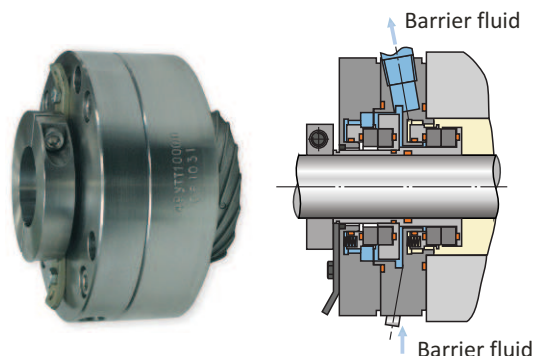
Tandem mechanical seals are mostly effective in cases when barrier fluid penetration into pumped fluid is not permitted.

#### TECHNICAL PARAMETERS

Shaft diameter, mm ..... from 22 to 200  
 Shaft rotation speed, rpm ..... from 30 to 4500  
 Temperature of sealed medium, °C ..... from -60 to 200  
 Pressure of sealed medium, MPa ..... from 0,1 to 10  
 Maximum leakage, l/h ..... 0,002

#### FEATURES

- First (circuit) friction pair operates at barrier fluid and sealed fluid pressure drop. Second, atmospheric one, - at barrier fluid and air pressure difference.
- Pumping is performed according to API682: Plan 52.
- Barrier fluid pressurization by means of gas is not required.



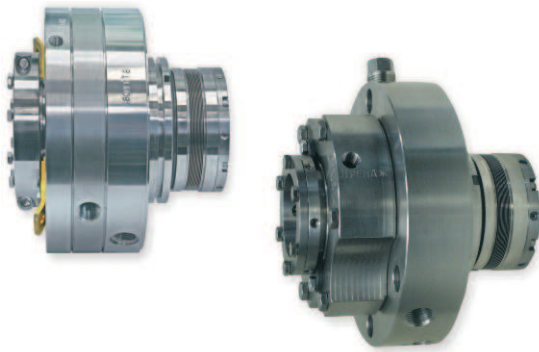
## BELLOWS TANDEM SEALS

Applied in pump units and equipment where sealed fluids are oil products, liquids with harmful chemical agents, including dissolving rubber, at process operating temperatures from -70 up to 400°C.

The use in conditions of high-abrasive and polymerisable environments is not recommended.

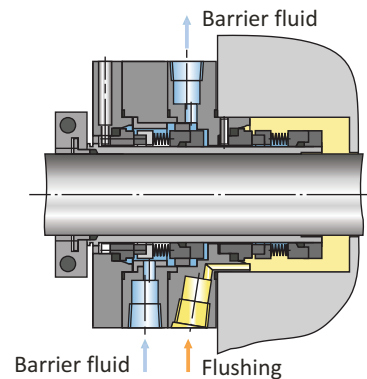
### TECHNICAL PARAMETERS

Shaft diameter, mm ..... from 30 to 100  
Shaft rotation speed, rpm ..... up to 5000  
Temperature of sealed medium, °C ..... from -70 to 400  
Pressure of sealed medium, MPa ..... up to 2,0  
Maximum leakage, l/h ..... 0,002



### FEATURES

- Penetration of barrier fluid into sealed fluid is eliminated.
- First (circuit) friction pair operates at barrier fluid and sealed fluid pressure drop. Second, atmospheric one, - at barrier fluid and air pressure difference.
- The absence of elastomeric O-rings allows the use the mechanical seals in aggressive, active and hot environments (up to 400°C).
- Piping is performed according to API 682: Plan 11/ 52, Plan 11/61/52.



## SINGLE BELLOWS SEALS

Single cartridge seals with welded metal bellows are designed for sealing of liquids including chemically-aggressive at the ambient temperature from -70 to 400 °C.

### TECHNICAL PARAMETERS

Shaft diameter, mm ..... from 30 to 100  
Shaft rotation speed, rpm ..... from 30 to 4000  
Temperature of sealed medium, °C ..... from -70 to 400  
Pressure of sealed medium, MPa ..... from 0,1 to 2,0  
Maximum leakage, l/h ..... 0,002

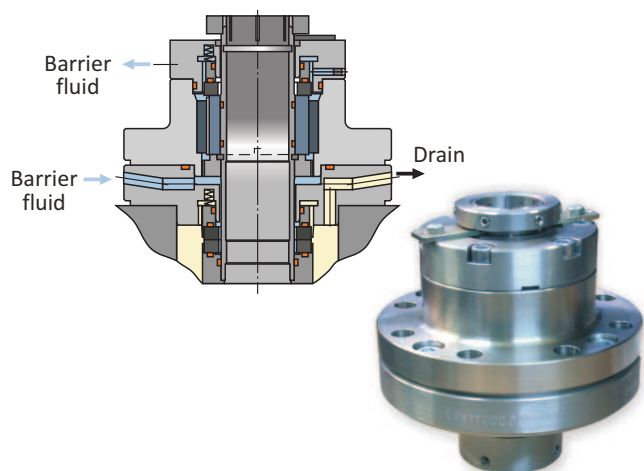


### FEATURES

- There are no rubber secondary seals; all components are made of temperature resistant chrome resistant materials.
- The mechanical seal is equipped with an additional seal in the form of a throttling sleeve and can be used for sealing of combustible and flammable environments.

## DOUBLE MECHANICAL SEALS WITH RADIAL BEARING

Double mechanical seals with radial bearing can be used in console pumps to exclude high vibration.



### TECHNICAL PARAMETERS

Shaft diameter, mm .....from 22 to 200  
 Shaft rotation speed, rpm .....from 30 to 4500  
 Temperature of sealed medium, °C .....from -60 to 200  
 Pressure of sealed medium, MPa .....from 0,1 to 10  
 Maximum leakage, l/h .....0,002

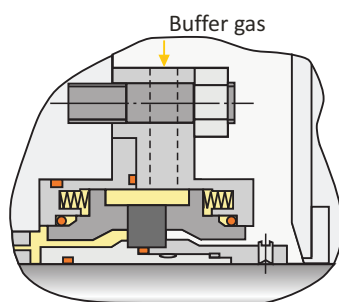
### FEATURES

- The seal is made according to the drawing of the double mechanical seal.
- Radial plain bearing is located between the stages of the seal and operates on the barrier liquid of the mechanical seal.
- The rigidity of the shaft is increased because of the reduced size of the console and increased distance between the shaft supports.

## DRY GAS SEALS FOR PUMPS

The special feature of design is preservation of the tightness of the dry gas seal when the supply of buffer gas. Depending on the composition of sealing environment and buffer gas, the system of dry gas seals can be equipped with the end labyrinth and an internal screw seal.

Materials used in the nodes of dry gas seals are selected from the condition of resistance to corrosion of the sealing environment.



The scheme of dry gas seal for the pump

### TECHNICAL PARAMETERS

Shaft diameter, mm ..... up to 200  
 Shaft rotation speed, rpm ..... up to 80  
 Temperature of sealed medium, °C ..... up to 250  
 Pressure of sealed medium, MPa ..... up to 2,0

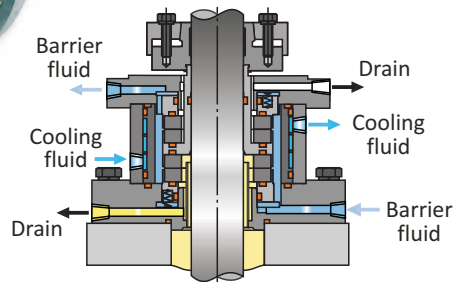
### ADVANTAGES

- 100% sealing of pumping liquid.
- Absence of contamination of pumped environment with the buffer liquid.
- Reducing energy losses to overcome friction in the mechanical seal.
- The increasing of life of mechanical seal, saving on the repair and replacing of spare parts.
- The reduction of the cost on barrier system of buffer environment.
- Keeping the tightness at back pressure when the pump stops.
- It is possible to install the seals at reversible (bidirectional rotation) version of the nodes of mechanical seals.

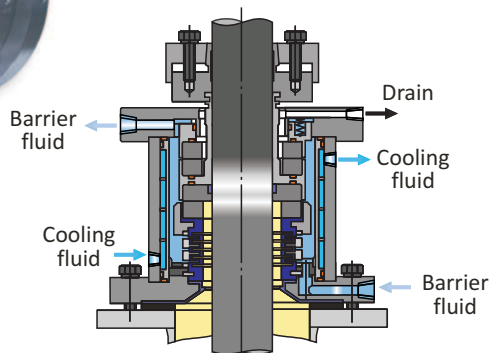
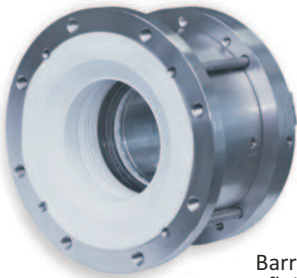
## MECHANICAL SEALS FOR REACTORS AND MIXERS

CODE 3619-002-25579857-2001

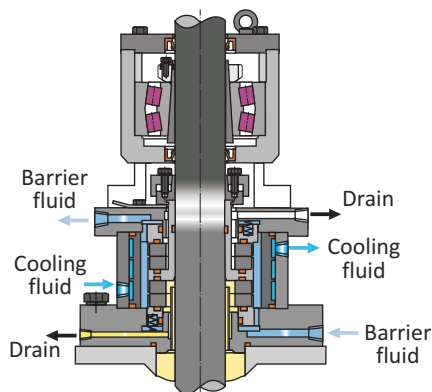
The sealing module can be composed of mechanical seals of different types, joined with one or several blocks, mentioned above.



Double mechanical seal UTD100 type



Double mechanical seal with fluoroplastic bellows



Double mechanical seal with bearing unit

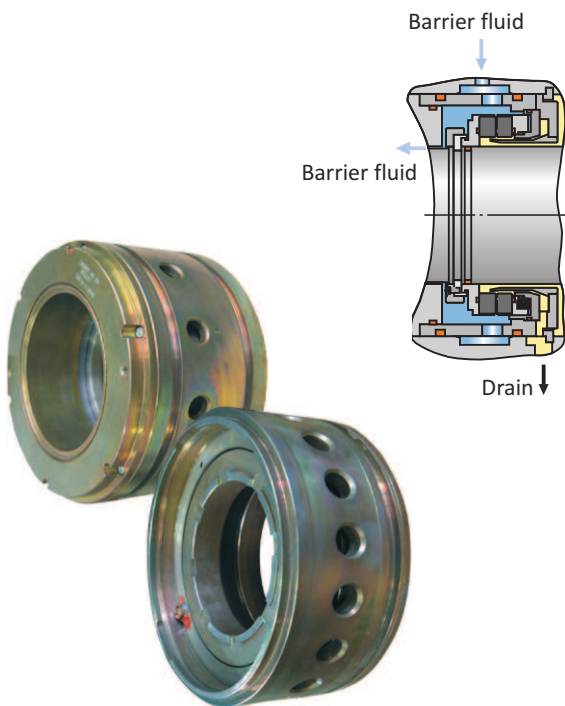
### TECHNICAL PARAMETERS

Shaft diameter, mm ..... from 25 to 300  
 Shaft rotation speed, rpm ..... from 10 to 1500  
 Temperature of sealed medium, °C ..... from -60 to 400  
 Pressure of sealed medium, MPa ..... up to 10,0

- Leakage of sealed fluid into atmosphere is completely excluded.
- Parts, contacting medium sealed are made of corrosion-resistant materials.
- Friction pair materials used are siliconized graphite, silicon carbide.
- The following elastomeric materials are used: materials on the base of fluorine rubber, ethylene-propylene rubber and perfluorinated rubber.
- Mechanical seal can be removed without depressurization of equipment.
- Mechanical seal parts protected against corrosive and aggressive working mediums.
- Mechanical seal design provides for operational reliability at high temperature and pressure.
- Cartridge seal design makes it easy to install.
- All seal types for same shaft diameter have completely replaceable components: friction pairs, ring holders, O-rings, springs, force averting devices, drive collars, intake and withdrawal connecting pipes for buffer and cooling fluids.
- **Bearing block**, rigidly connected with the seal, receives significant radial and partly axial loads of the shaft, that allows to apply them on long, flexible, single-shaft machine shafts.
- **The refrigeration block** allows to apply the seal at the temperature of operation environment up to +400°C, providing the necessary temperature at the location of the sealing.
- **The block of protection** from the influence of adhesion and crystallization properties is filled with the liquid compatible with the operation environment neutralizing its adhesion and crystallization properties.
- **Parking seal block** prevents the operation environment from escaping into the atmosphere in case of malfunction of the seal. It allows to replace the mechanical seal without the depressurization of the equipment. The block of protection has an autonomous fastening to the boss of the device and functions at the stopped shaft not depending from the mechanical seal.
- **Fluoroplastic bellows** of original design protects metal components of the seal, that interact with the operation environment.



## SINGLE MECHANICAL SEALS FOR CENTRIFUGAL COMPRESSORS AND REPLACEMENT FLOW PARTS

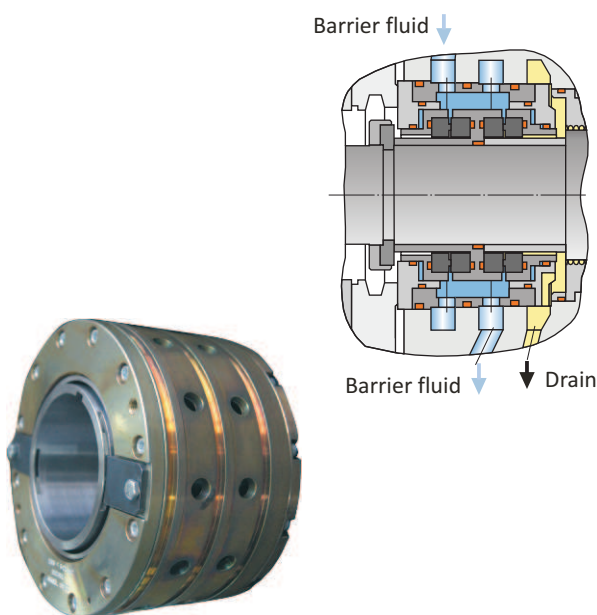


- Specific oil leakage to the supercharger is less than 0,2 kg/h.
- Mechanical seals of cartridge type in the state of installation readiness and have been tested at the factory conditions.
- Silicon carbide rings with increased wear resistance are used as friction pairs.
- Increased overhaul life.

### TECHNICAL PARAMETERS

*Shaft diameter, mm* ..... from 80 to 150  
*Shaft rotation speed, rpm* ..... from 4800 to 11000  
*Temperature of sealed medium, °C* ..... from 10 to 80  
*Pressure of sealed medium, MPa* ..... from 1,0 to 6,0

## DOUBLE MECHANICAL SEALS FOR COMPRESSORS AND SUPERCHARGERS



- It completely avoids gas leakage through the seal at stopped supercharger so that you don't need to drop gas from the circuit during shutdowns.
- Specific losses of oil to the compressor 0,022...0,1 kg/h.
- Easy to install.
- Increased reliability.

### TECHNICAL PARAMETERS

*Shaft diameter, mm* ..... from 80 to 150  
*Shaft rotation speed, rpm* ..... from 4800 to 11000  
*Temperature of sealed medium, °C* ..... from 10 to 80  
*Pressure of sealed medium, MPa* ..... from 1,0 to 9,0



## COMBINED MECHANICAL SEALS FOR CENTRIFUGAL COMPRESSORS AND SUPERCHARGERS

### FEATURES

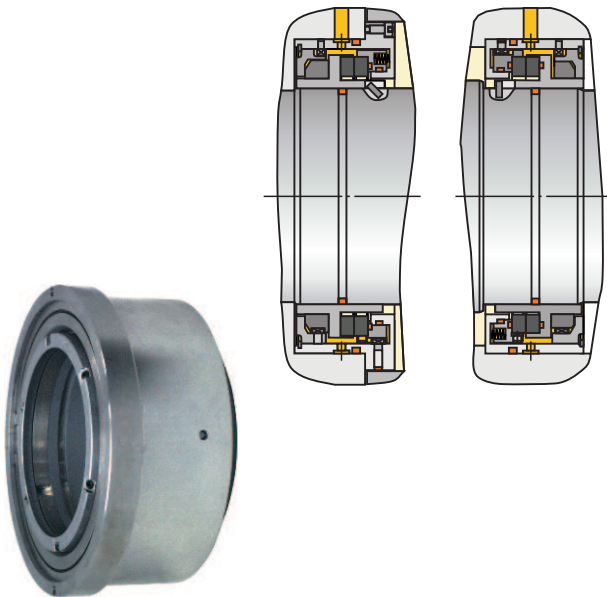
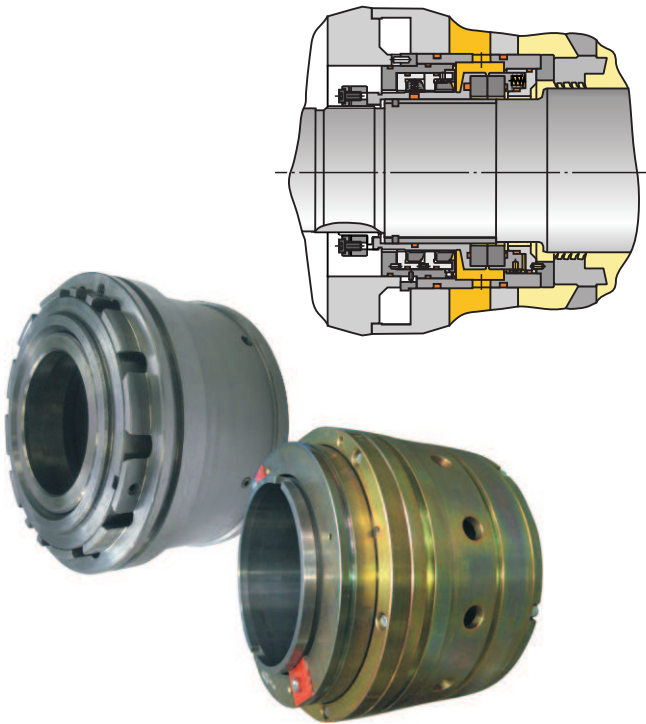
- The design of mechanical seals is interchangeable with standard seal slot and is adapted to standard oil supply systems.
- It doesn't need to modify the supercharger bodies and rotors.
- The reduction of oil losses is in 2-5 times in comparison with slot seals due to power and thermal uploading of sealing elements.
- The increase of life of the seal is from 3000 to 15000 hours.
- Minimize gas contamination of the oil.
- Not mixing of gas and oil in the sealing zone.
- Stabilization of gas-oil differential system.
- The absence of contact of the rotor necks with floating rings eliminates the wear of rotor necks.
- The wear and necessity of replacing of collonoid bushings is eliminated.
- The improving of conditions of operation of the supercharger during start-ups at low ambience temperature.
- Oil consumption during start-ups and stops is eliminated.

### TECHNICAL PARAMETERS

Shaft diameter, mm ..... from 70 to 190  
Shaft rotation speed, rpm ..... from 4600 to 13400  
Temperature of sealed medium, °C ..... from 10 to 80  
Pressure of sealed medium, MPa ..... from 1,0 to 6,0

## COMBINED MECHANICAL SEALS FOR SCREW COMPRESSORS

- All the seals are tested in factory conditions.
- They are supplied in the state of installation readiness.
- The customers are the following:
  - RAO «Gazprom»,
  - OJSC NK «Bashneft»,
  - OJSC NK «Tatneft»,
  - OJSC «Podzemneftegas»,
  - «Pavlodarsky NPZ».



## DRY GAS SEALS

In 2015 RPC ANOD Ltd started the production of dry gas seals for centrifugal compressors. The work in this direction is connected with the realization of the program of import substitution. Due to this, first there worked out the questions to design the parts for dry gas seals in Russian factories. By this way, all the parts produced by Anod (Russian production).

To conduct the works of production and service of systems of dry gas seals ANOD organized the sector for assembling and repair of mechanical seals, test benches, the sector of production of control panels for dry gas seals.



The enterprise has 2 test benches for dry gas seals:

- pressure up to 22 MPa, at speed up to 18000 rot/min, with the size of shaft up to 300 mm.

The bench is designed to test the seals in pairs.

- for high speed seals of compressors with the speed up to 45 000 rot/min.

Currently ANOD has skilled staff with long time experience of work with mechanical seals of world famous brands of dry gas seals producers — «John Crane», «EagleBurgmann», «Flowserve», «Grace». The employees of the department are certified by foreign companies for conducting all kinds of works in systems of gas dynamic mechanical seals.

The knowledge, gained in leading world companies producers of dry gas seals, allows to provide service and repair works of high quality for dry gas seals of gas pumping and oil refining industry companies.

## CONTROL AND MEASURING PANEL FOR DRY GAS SEALS

### FUNCTIONS

- Cleaning of buffer gas supplied in the seal.
- Control of pressure after the first stage of the node of the mechanical seal.
- Control of the differential between the pressure of buffer gas and the pressure in the compressor equalization line.
- Monitoring of differential of pressure on the filter of cleaning of buffer and barrier gas.
- Control of flow of buffer gas.
- Control of leakage through the first stage.
- Cleaning of barrier gas.
- Regulation and control of the pressure of barrier gas.
- Transmission of signals from the instrumentation on the central panel of control.

### EASY CONTROL AND SERVICE

Control instruments and regulation valves are displayed on the front panel. It provides the convenience of visual control and regulation of parameters of exploitation.

The special features of the construction:

- The application of optimal in size pipelines, filters and other devices;
- Ergonomic design;
- Providing the access to any element for repair and maintenance;
- High reliability and safety in operation.

### INSTALLATION OF MORDEN DEVICES

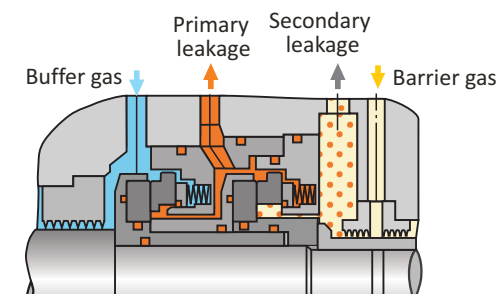
- The devices of the best producers are used to provide the highest reliability of exploitation in control and measuring panels there.
- All devices can transmit signals to the computer of the central panel of control of the unit.



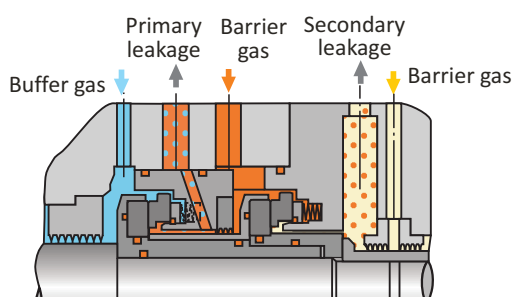
## DRY GAS SEALS

### TECHNICAL PARAMETERS

Shaft diameter, mm ..... from 28 to 300  
 Shaft rotation speed, rpm ..... up to 160  
 Temperature of sealed medium, °C ..... up to 250  
 Pressure of sealed medium, MPa ..... up to 25,0



The scheme of "tandem" dry gas seal with intermediate double end labyrinth



The scheme of "tandem" dry gas seal with barrier sealing



### APPLICATION

- In centrifugal compressors.
- In the superchargers of natural gas.
- In turboexpanders.
- In centrifugal pumps, stream turbines, mixing devices for all industries.

### TYPES

- Tandem mechanical seals with double end labyrinth, which is used with oil and magnetic bearings.
- Tandem mechanical seals with single labyrinth and ejector. It's used with magnetic bearings.
- Tandem mechanical seals with barrier sealing is used with oil and magnetic bearings.

### ADVANTAGES

- The increasing of reliability and safety of compressor operation.
- The minimization of losses of pumping gas.
- The complete elimination of contamination of oil in the pumping gas.
- The increasing of resource of the nodes in several times.
- The reduction of energy consumption due to the lack of pumping systems for oil circulation.
- Short payback period.

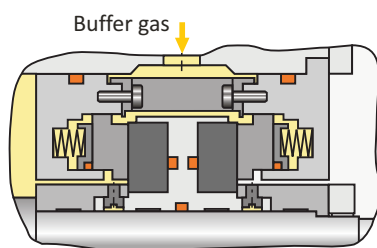
### FEATURES

- The mechanical seal is designed in such a way that when the pressure is supplied to it and at start-ups and stops of compressors there is no contact between the parts of the sealing pair.
- Due to the independent centering of the rotor bushings:
  - dynamic characteristics of the mechanical seal is improved,
  - the mutual influence of sealing stages in operation is reduced,
  - the accuracy of the centering of rotor parts on the shaft is increased,
  - the process of installation of the node becomes easier and takes less time in 3-5 times.

## DRY GAS SEALS FOR MIXERS

### TECHNICAL PARAMETERS

Shaft diameter, mm ..... up to 200  
 Shaft rotation speed, rpm ..... from 0,5  
 Temperature of sealed medium, °C ..... up to 250  
 Pressure of sealed medium, MPa ..... up to 4,0



The scheme of dry gas seal for mixer-reactor

Depending on the composition of the sealed medium and the buffer gas, the Dry Gas Seal system can be equipped with an end labyrinth and an internal screw seal. For mixer-reactors with a low speed of the rotor specially seals designed.

Parts of the seal that interact with the sealing medium are made of corrosion-resistant materials.

### ADVANTAGES

- 100% sealing of the mixed medium.
- Reducing energy losses to overcome friction in the mechanical seal.
- The increasing of life of mechanical seal, saving on the repair and replacing of spare parts.
- The reduction of the cost on barrier system of buffer environment.
- It is possible to install the seals at reversible (bidirectional rotation) version of the nodes of mechanical seals.

## MECHANICAL SEAL SUPPORT SYSTEM

- They are designed for cooling buffer/barrier liquid, for providing technological control over the operation of the mechanical seal, the formation of protection signals in case of failure of the seal.
- They are provide the operability of any double mechanical seals of the tandem type and the double ones, operating inside and outside, installed in 'hot' pumps (with the temperature of the pumping environment up to + 400 °C).
- The used materials, design and manufacturing technology allow the system to perform at the necessary operating pressure without requiring the installation of safety valve.
- The vessel of the mechanical seal (VTMS), being the part of the system, can be made as whole-welded or detachable, with a built-in coil or straight-tube heat exchanger.
- In order to reduce the welding works at the customer's area (welding nuts, nipples, adaptors) they use plug-in connectors.
- The system of instrumentation allows to monitor the operation of mechanical seals as visually as at distance, providing an automatic protection mode.
- Depending on the nature of deviations of the technological parameters of the system, light and sound alarms are provided with the operator's intervention in the control of the process and automatic control with the transition to the standby pump and the shutdown of the emergency pump.
- For the safe exploitation of the pumping aggregate there has been designed and implemented system of automatic control of technical parameters (SCTP-1) of the pumping aggregate.

### THE CHOICE OF BUFFER/BARRIER LIQUID FOR OPERATION OF MECHANICAL SEALS

**The correct choice of the buffer/barrier liquid is one of the most important factors, having impact on durability reliability of the operation of mechanical seals.**

You need to take in consideration the following factors:

- Compatibility of buffer/barrier liquid with the pumping product;
- Compatibility of buffer/barrier liquid with the materials of the construction of the mechanical seal, the tank, the pipeline and the pump;
- Compatibility of buffer/barrier liquid with the gas in case when the circulation of the buffer/barrier liquid is performed under the gas pressure;
- Buffer/barrier liquid should be not toxic and have a minimum impact on the environment and humans;
- Viscosity of the buffer/barrier liquid in dependence on the conditions of exploitation and the climate;
- The boiling temperature of buffer/barrier liquid is recommended to be 10°C higher than working temperature;
- In the presence of oxygen the temperature of flashpoint have to be higher than buffer liquid temperature;
- It is inadmissible to form deposits, gels, emulsions, polymerization, crystallization or coking.

### LOCKING OF AUXILIARY SYSTEMS

- For mechanical seals of type 'tandem' (configuration 2): at reaching the pressure in the tank for buffer liquid  $P_{max} = 0,5 \dots 0,75 P_{suct.}$  – warning sound and light alarm.
- For double mechanical seals (configuration 3): at reducing the pressure in the tank for barrier liquid less  $P_{min} = P_{suct.} + 0,05 \text{ MPa}$  – warning light and sound alarm.
- At reducing the level of buffer/barrier liquid less than minimum there is warning light and sound alarm. You need to turn the unit off during 3 minutes (go reserve).
- At increasing the temperature of buffer/barrier liquid at the outlet of the mechanical seal more than 100 °C – warning light and sound alarm.
- The conditions of the alarms and interlocks can be changed in each specific case depending on:
  - the pressure at the pump suction,
  - the temperature of pumping environment,
  - the temperature of cooling environment.

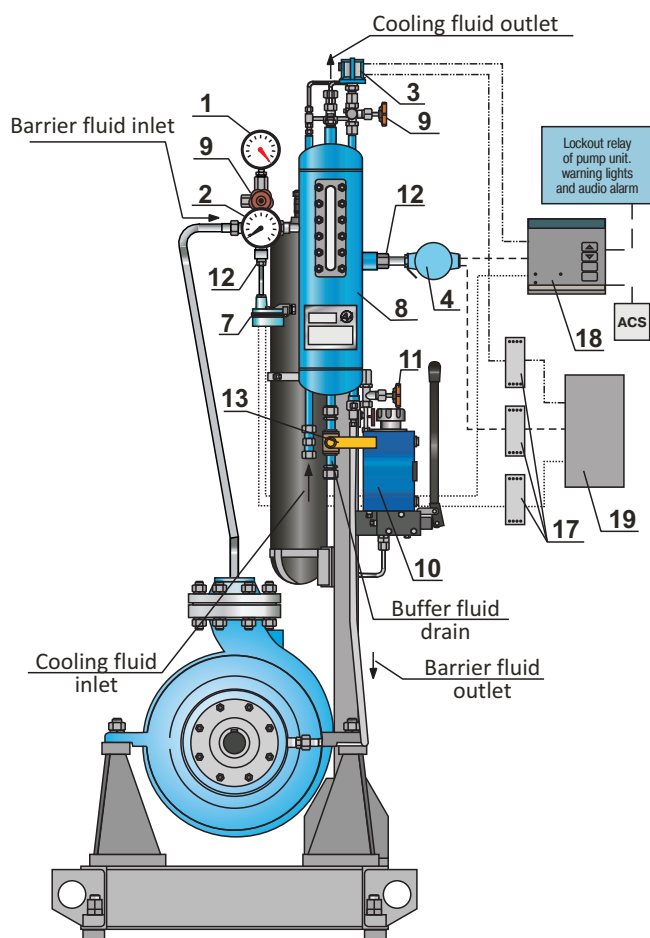
### INSTALLATION RECOMMENDATIONS

1. After fitting and welding the pipes, it's necessary to clean their inner surface. The ingress of foreign objects and dirt is contraindicated for normal operation of the mechanical seal.
2. During the preparation of the system for supplying buffer/barrier liquid it's necessary to follow the rule, that the number of bends of the supply and discharge pipes must be minimal and not exceed 270 degrees. A large number of bends complicates the slows the circulation of the barrier liquid.
3. At fulfilling the mechanical seal with buffer/barrier liquid recommended feed rate of barrier liquid into the vessel is not much than 1-2 l/min that provides the removal of air from the cavity of mechanical seals.
4. At reaching the level of 30...100 mm lower than the branch pipe of the exit of the barrier liquid in the vessel, scroll the pump shaft manually 2-3 turns, that allows completely eliminate air from the cavities of the seal.
5. After filling the tank the initial level of barrier liquid should reach normal level mark to will insure the continuous circulation of barrier liquid through the tank.
6. For double mechanical seals UTD type gas pressure in the tank should be set not lower than of 0,1 MPa bigger, than the pressure in the stuffing box of the pump. If necessary carry out the correction of pressure till 0,3 MPa after starting the pump and heating the seal to the operation temperatures.
7. The speed of gas dissipation in the tank is not regulated, however, in order to increase the safety of the operation it is recommended not to exceed speed  $2...3 \text{ kg/cm}^2$  per second.

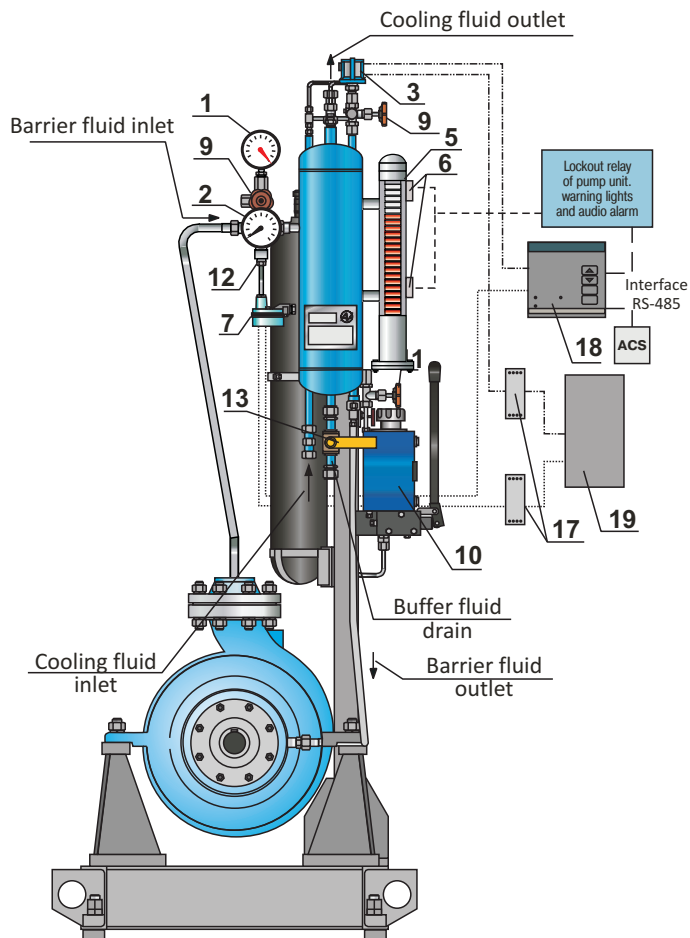
**The reliable operation of mechanical seals depends on the correct choice of the type of mechanical seal, sealing materials, schemes of piping and qualifications and skills of the service staff.**



## SUPPORT SYSTEM OF THE VESSEL WITH THE GLASS INDEX LEVEL INDICATOR



## SUPPORT SYSTEM OF THE VESSEL WITH THE BYPASS LEVEL INDICATOR



Piping for tandem mechanical seals is performed according to **API 682: Plan 52**.  
For double mechanical seals a gas pressure system is additionally installed.

Diagram of pressurization  
by means of gas  
(only for double mechanical seals)

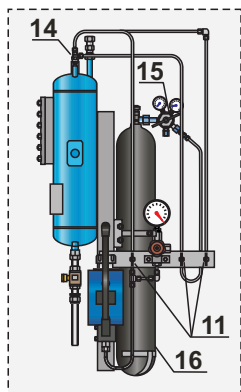
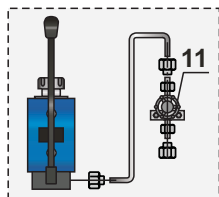


Diagram of buffer fluid  
injection system



№ POS.	NAME	The glass index level indicator		Bypass level indicator	
		Tandem	Double	Tandem	Double
	Control and measuring devices				
1	Deformation manometer with sleeve	+	+	+	+
2	Bimetallic thermometer	+	+	+	+
3	Pressure gauge	+	+	+	+
4	Level switch	+	+	-	-
5	Bypass level indicator	-	-	+	+
6	Magnetic switch	-	-	+	+
7	Temperature gauge	+	+	+	+
	Accessory kit				
8	Reservoir	+	+	+	+
9	Globe valve	+	+	+	+
10	Hand plunger pump	+	+	+	+
11	Globe valve	+	+	+	+
12	Adapter	+	+	+	+
13	Ball valve	+	+	+	+
14	T-joint	-	+	-	+
15	Pressure reduction unit	-	+	-	+
16	Nitrogen cylinder	-	+	-	+
17	Intrinsic safety barrier	+	+	+	+
18	Microprocessor regulator	+	+	+	+
19	Sensor power supply	+	+	+	+

Research & Production Centre "ANOD", Ltd reserves the right to change the construction of the vessel of the mechanical seal as well as the change in the equipment configuration.

## VESSEL SBTU2 FOR MECHANICAL SEALS

The coil nonseparable vessel of mechanical seals with a glass visual level indicator is designed for use with mechanical seals of plan API 52 and 53A.

The most popular model of the vessel is with the cheapest cost. The first vessel SBTU2 were produced by ANOD Ltd in 2003, have good recommendations and are required and continue to be successfully used.

### TECHNICAL PARAMETERS

Material, steel	09Г2С, 12Х18Н10Т
Working pressure, MPa	up to 4,0
Test pressure, MPa	6,0
Rated temperature, °C	from -60 to +200
Volume at normal level, l	7,0
Efficient cooling capacity, kVt	8,0
Coolant flow rate, m <sup>3</sup> /h	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup>	8,0



## VESSEL SBTU4 FOR MECHANICAL SEALS

The coil nonseparable vessel of mechanical seals with a bypass level indicator is designed for use with mechanical seals of plan API 52 and 53A.

The construction of the vessel is similar with SBTU2, is different by the indicator of the level. SBTU4 has been also produced since 2003.

### TECHNICAL PARAMETERS

Material, steel	09Г2С, 12Х18Н10Т
Working pressure, MPa	4,0
Test pressure, MPa	6,0
Rated temperature, °C	from -60 to +200
Volume at normal level, l	7,0
Efficient cooling capacity, kVt	8,0
Coolant flow rate, m <sup>3</sup> /h	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup>	8,0



## VESSEL SBTU3 FOR MECHANICAL SEALS

The coil nonseparable vessel of mechanical seals of the volume 15 liters is designed for the use with mechanical seals of plans API21 and API23. It is used for cooling of boiler water.

Water is used as cooling liquid.

### TECHNICAL PARAMETERS

Material, steel	12Х18Н10Т
Working pressure, MPa	4,0
Test pressure, MPa	6,0
Rated temperature, °C	from 0 to +100
Volume at normal level, l	15,0
Efficient cooling capacity, kVt	15,0
Coolant flow rate, m <sup>3</sup> /h	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup>	8,0



## VESSEL SBTU5.21 FOR MECHANICAL SEALS

The coil nonseparable vessel of mechanical seals of extended volume (19 l) with a glass indicator of level is designed for use with mechanical seals of plans API 52 and 53A.

It is used without the supply of coolant liquid at the aggregates with the temperature lower than + 60°C.

### TECHNICAL PARAMETERS

Material, steel .....	09Г2С, 12Х18Н10Т
Working pressure, MPa .....	4,0
Test pressure, Mpa .....	5,8
Rated temperature, °C .....	from -60 to +200
Volume at normal level, l .....	19,0



## VESSEL SBTU8 FOR MECHANICAL SEALS

The coil separable vessel of mechanical seals with a glass visual level indicator is designed for the use with mechanical seals of plans API 52 и 53A.

Water is used as cooling liquid.

### TECHNICAL PARAMETERS

Material, steel .....	09Г2С, 12Х18Н10Т
Working pressure, MPa .....	up to 2,5
Test pressure, MPa .....	3,5
Rated temperature, °C .....	from -60 to +200
Volume at normal level, l .....	9,0
Efficient cooling capacity, kVt .....	12
Coolant flow rate, m <sup>3</sup> /h .....	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup> .....	8



## VESSEL SBTU9 FOR MECHANICAL SEALS

Straight-through dismountable vessel of mechanical seals with a glass visual indicator of level is designed for the use with mechanical seals of plans API 52 and 53A on the equipment pumping contaminated operation product.

Circulating water is used as coolant liquid.

### TECHNICAL PARAMETERS

Material, steel .....	09Г2С, 12Х18Н10Т
Working pressure, Mpa .....	2,5
Test pressure, Mpa .....	3,7
Rated temperature, °C .....	from -60 to +200
Volume at normal level, l .....	9,0
Volume at minimum level, l .....	5,0
Efficient cooling capacity, kVt .....	12
Coolant flow rate, m <sup>3</sup> /h .....	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup> .....	8



## VESSEL SBTU10 FOR MECHANICAL SEALS

The coil nonseparable vessel of mechanical seals of extended volume (20 l) with a glass indicator of level is designed for use with mechanical seals (shaft deameter more then 60 mm) of plans API 52 and 53A.

It is produced in accordance with GOST 32600-2013.

### TECHNICAL PARAMETERS

Material, steel .....	12X18H10T
Working pressure, MPa .....	4,0
Test pressure, MPa .....	5,8
Rated temperature, °C .....	from -60 to +200
Volume at normal level, l .....	22,0
Efficient cooling capacity, kVt .....	9
Coolant flow rate, m <sup>3</sup> /h .....	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup> .....	8



## VESSEL SBTU11 FOR MECHANICAL SEALS WITH HYDROACCUMULATOR (API682: PLAN53B)

The coil nonseparable tank of mechanical seals with hydraulic accumulator.

It is produced in accordance with API 682: Plan 53B.

### TECHNICAL PARAMETERS

Material, steel .....	12X18H10T
Working pressure, MPa .....	4,1
Test pressure, MPa .....	5,8
Rated temperature, °C .....	from -60 to +200
Volume at normal level, l .....	10,0
Efficient cooling capacity, kVt .....	9
Coolant flow rate, m <sup>3</sup> /h .....	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup> .....	8



## VESSEL SBTU18 FOR MECHANICAL SEALS

The coil nonseparable vessel of mechanical seals is designed for the use with bearing and seals blocks of plans API 52 и 53A. It is produced with a bypass, and with glass visual level indicator.

### TECHNICAL PARAMETERS

Material, steel .....	09Г2С, 12X18H10T
Working pressure, MPa .....	up to 4,2
Test pressure, MPa .....	6,0
Rated temperature, °C .....	from -60 to +200
Volume at normal level, l .....	13,0
Efficient cooling capacity, kVt .....	15
Coolant flow rate, m <sup>3</sup> /h .....	0,5 ... 2,0
Pressure of coolant, kg/sm <sup>2</sup> .....	8





## SLIDING BEARINGS

### FEATURES

- High load – bearing capacity.
- Reliability of the construction.
- High technical production.
- Monoblock design.
- Increased overhaul mileage.
- Operation environment: any liquid

### AXIAL SLIP BEARINGS



The design of the bearing units is based on the principle of maintaining a plane-parallel contact, which is insured by the mobility of the working segment due to the elastic deformation of the segment monoblock.

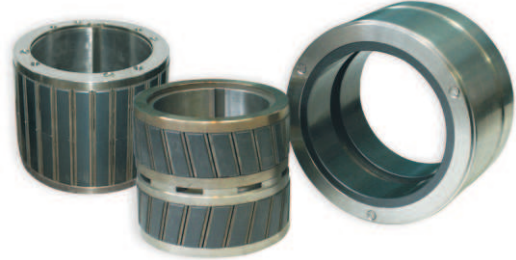
The design of the monoblock is free from the multi-link mechanism of traditional designs, and as a result, from high contact stresses, constant friction and wear.

The bearing has high reliability and guaranteed service life.

### TECHNICAL PARAMETERS

<i>Slip speed, m/s</i>	<i>up to 100</i>
<i>Axial load, kg</i>	<i>up to 40 000</i>
<i>Specific load, kgs/sm<sup>2</sup></i>	<i>up to 50</i>
<i>Shaft diameter, mm</i>	<i>from 50 to 300</i>

### RADIAL (REFERENCE) SLIP BEARINGS



The design allows to solve the problem of use bearing elements from materials with different physical and mechanical properties – structural steels and ceramics, graphite materials.

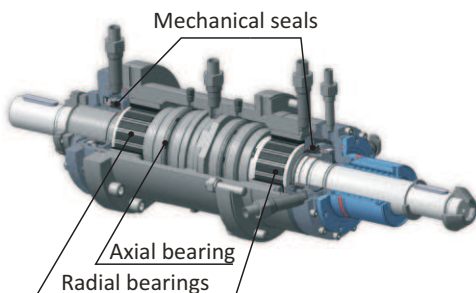
The bearing maintains a constant gap in the pair of friction in all operating modes.

The rotating part of the bearing is mounted on the shaft without clearance.

Friction elements are produced from wear-resistant materials in various combinations.

## MODERNIZATION OF PUMPS BEARING AND SEALS BLOCKS (BSB)

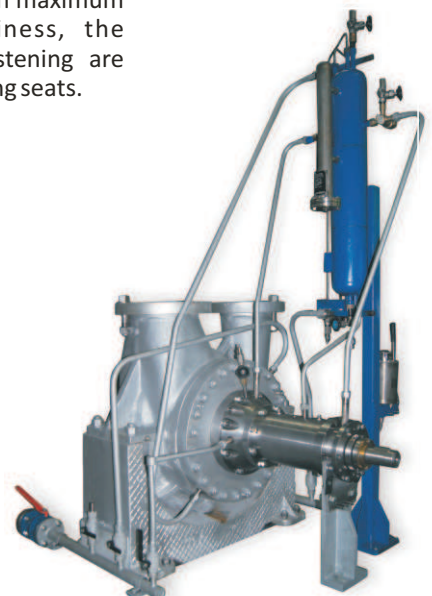
The experience of work of ANOD Ltd in the market of mechanical seals showed that the most vulnerable pump units are the support and sealing systems. In order to solve the problems connected with the inconveniences of traditional design of pumps our specialists developed the bearing sealing block (BSB).



**(BSB), the bearing sealing block** is a pump unit that combines both a supporting and sealing system in one case. A simplified construction looks like a double mechanical seal, between the stages of which in the sturdy housing are placed two thrust and two radial sliding bearings. The bearing sealing block and auxiliary lubrication and cooling system has been fully certified for it in accordance with TR CU 010/2011 and TR CU 012/2011.

BSB is produced for scheme of double sealing as well as for scheme of single sealing, it's also possible use the single scheme with protective stage (for operation on a pumped environment). Barrier liquid lubricates and cools the bearings and sealings. For cooling of barrier liquid for the double scheme there uses auxiliary system of barrier liquid which is similar with the used one for the mechanical seal.

BSB is supplied in maximum installation readiness, the installation and fastening are performed on existing seats.



## 5-ANGK PUMP UNITS WITH BEARING AND SEAL BLOCK

### TECHNICAL PARAMETERS

Speed, rpm	1000, 1500, 3000
Flow, m <sup>3</sup> /h	from 5 to 5200
Head, m	from 40 to 200
Power, kW	up to 800
Casing pressure, PN, kg/cm <sup>2</sup>	16, 25, 40, 50, 63
Temperature, °C (up to)	up to 400
Service life, h (no less than)	40 000
Life cycle, y (no less than)	20



### FEATURES

- Furnished with highly reliable bearing seal blocks.
- Plain bearings are placed in cavity formed by means of block body and seals, making the block hermetically tight on both sides.
- Block lubrication and cooling are performed with the help of clean barrier fluid, whose circulation is carried out by built-in impeller.
- Installation diagram is in compliance with API682: Plan 52 or Plan 53.
- Improved vibroacoustic characteristics.
- Furnished with up-to-date plate couplings.
- Russian or foreign electromotors.
- Provided with modern reliable control equipment, including thermometer, pressure difference sensor, rotameter.



## THE HISTORY OF SUCCESS

Research and production center “ANOD” (RPC “ANOD”) was founded in 1992. The base of the staff was people the occupation of whose was connected with the designing and engineering of the most up-to-date samples of technic, used in nuclear power engineering.

So, in 1975, Tokarev Evgeniy Pavlovich designed a mechanical seal of the shaft of circulating pump, which had better technical characteristics than its world analogues. Tokarev E.P. was awarded with a gold medal VDNH and the SM USSR award by the government of the USSR. The engineering criteria, defined by Tokarev stay actual nowadays, they helped the foundation of Research and production Center “ANOD” as one of the leading companies in Russia in designing and production of mechanical seals.

RPC “ANOD” started its rising from the production of mechanical seals. Over the years the company became the leader in the market of mechanical seals in Russia and in the neighbour countries. While “ANOD” was designing new products that gave the start to the new successful and independent directions of its development.

Today “ANOD” is mechanical seals, plain bearings, bearing sealing blocks, pumping units and fittings. The company has been and developed for 25 years, changing with the world and at the same time trying to change the world itself. “ANOD” is distinctive and unique, the company has its own character, its own point of view, its philosophy of life and the attitude to the produced items.



## RELIABLE PRODUCTS

Products produced by “ANOD” have proved their reliability since the time of its foundation. The products application helps to solve many problems of exploitation, allows to reduce the number of service specialists, cut the labor and energy losses, increase the ecological friendliness of the production.

Mechanical seals of “ANOD” brand of monoblock performance are good at stable operation at the difference of temperatures and pressures, have an increased resource and high degree of unification, minimum of components.

Aggregates of pump type ANKG produced by “ANOD” are designed to pump oil, oil products, liquefied petroleum gases and other liquids, and are produced in accordance with GOST and have high efficiency.

Axial and radial plain bearings produced by “ANOD” of monoblock performance have a high load-bearing capacity, have a simple and reliable construction, 5-year overhaul mileage and work in any liquid.

“ANOD” carries out the modernization of pumps with the use of blocks of bearing seals. As a result of modernization, they reduce energy consumption, improve vibro-acoustic characteristics of pumps, increase the overhaul period that gives 'the second life' to the pumps, including import pumps.

“ANOD” has designed innovative samples of pipeline fittings: shut-off valve, eccentric valve, two-segment crane, which are better in their operating parameters than their analogues, with the high class of tightness of closures and high resource characteristics.





**JSC RPC «ANOD»**  
**Svobody street, 63, Nizhniy Novgorod,**  
**Russia, 603003**  
**+7 (831) 233-77-03, 273-01-77**  
**[www.anod.biz](http://www.anod.biz), [info@anod.ru](mailto:info@anod.ru)**

