

## MECHANICAL SEAL AR and FN



### TEN AR....:

**Mechanical seal for plain shafts, rotating spring**

- \* single seal
- \* unbalanced
- \* rubber bellows
- \* independent of direction of rotation



A rubber bellows seal of short axial fitting length and large range of applications for mass-producing cold water pumps. Suitable for use in the home and garden, in whirlpool massage pumps, dishwasher pumps, plastic immersion pumps, vortex vacuum pumps, etc.

TEN AR mechanical seal offers an optimal price/performance ratio.

Type	Dimensions PF	Type	Dimensions PF
AR 6	22 x 6 x 4	AR 19	42 x 20 x 8
AR 8	26 x 12 x 8	AR 20	42 x 20 x 8
AR 10	26 x 12 x 8	AR 20 S	45 x 25 x 10
AR 11	26 x 12 x 8	AR 22	45 x 25 x 10
AR 12	26 x 12 x 5,5	AR 23	50 x 25 x 10
AR 12	26 x 12 x 8	AR 24	50 x 25 x 10
AR 13	26 x 13 x 5,5	AR 25	50 x 25 x 10
AR 13	26 x 13 x 8	AR 25 R	50 x 25 x 10
AR 14	29,5 x 16 x 8	AR 26	50 x 27 x 10
AR 15	29,5 x 16 x 8	AR 27	57 x 32 x 10
AR 15	38 x 16 x 8	AR 28 M	57 x 32 x 10
AR 16 R	29,5 x 16 x 8	AR 30	57 x 32 x 10
AR 16 R	38 x 16 x 8	AR 32	57 x 32 x 10
AR 16	42 x 20 x 8	AR 35	63 x 36 x 10
AR 17	42 x 20 x 8	AR 38	68 x 40 x 12
AR 18	42 x 20 x 8	AR 40	68 x 40 x 12

**TEN-FN Mechanical seal for plain shafts, rotating spring**

- single seal
- unbalanced
- conical spring
- dependent on direction of rotation

An economically priced seal with conical spring for a wide range of applications. Recommended for tandem pumps, clean water pumps and pumps for home and garden. The rotating ceramic seal face is loosely sealed in the mounting part with an additional O-ring.



TIPO	Dimensioni PF	TIPO	Dimensioni PF
FN 10	18,1 x 10 x 5,5	FN 20	30,9 x 20 x 8
FN 11	20,6 x 12 x 5,5	FN 22	35,4 x 22 x 8
FN 12	20,6 x 12 x 5,5	FN 24	35,4 x 24 x 8
FN 13	23,1 x 14 x 6	FN 25	38,2 x 25 x 8,5
FN 14	23,1 x 14 x 6	FN 28	43,3 x 30 x 9
FN 15	26,9 x 16 x 7	FN 30	43,3 x 30 x 9
FN 16	26,9 x 16 x 7	FN 32	43,3 x 30 x 9
FN 17	26,9 x 17 x 7	FN 35	53,5 x 35 x 11,5
FN 18	30,9 x 18 x 8	FN 38	60,5 x 38 x 11,5
FN 19	30,9 x 20 x 8	FN 40	60,5 x 40 x 11,5

## OPERATING LIMITS

$$d_1 = 6 \div 60 \text{ mm}$$

$$p = 6 \text{ kg/cm}^2$$

$$v = 10 \text{ m/s}$$

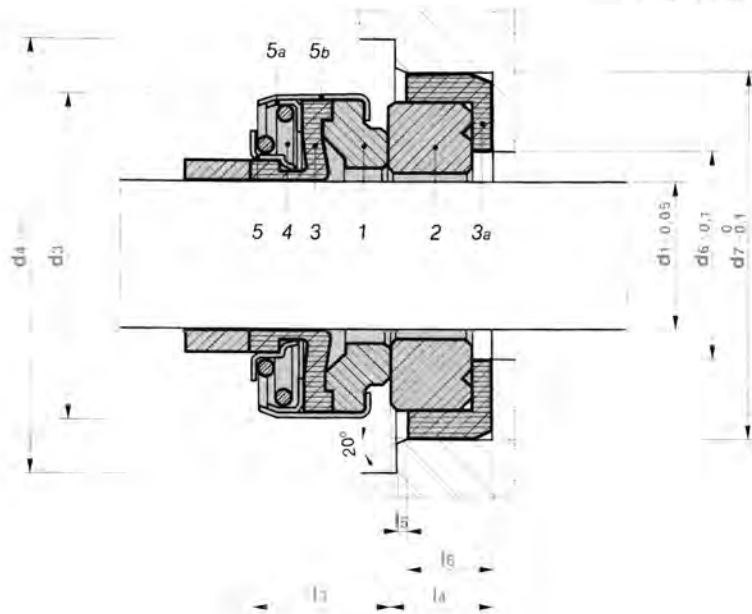
$$t = -20 \div +140^\circ\text{C}$$

Operating limits depend on PV factor

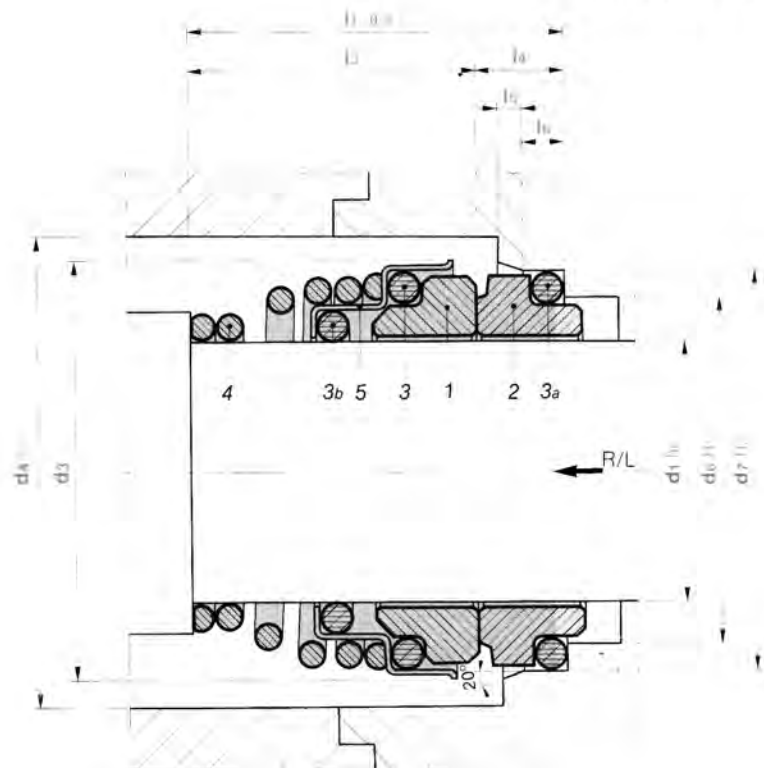
## COMPONENTS

- 1 Seal face
- 2 Stationary seat
- 3 Bellow
- 3a Gasket
- 4 Compression spring
- 5 Ring
- 5a Locking ring
- 5b Collar

## TEN AR



## TEN FN



## OPERATING LIMITS

$$d_1 = 10 \div 35 \text{ mm}$$

$$p = 10 \text{ kg/cm}^2$$

$$v = 20 \text{ m/s}$$

$$t = -20 \div +180^\circ\text{C}$$

Operating limits depend on PV factor

## COMPONENTS

- 1 Seal face
- 2 Stationary seat
- 3 O-Ring
- 3a O-Ring
- 3b O-Ring
- 4 Compression spring
- 5 Collar

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## 5) OPERATING LIMITS

Shaft diameter	$d_1$ [mm]
Pressure to be sealed	$p_{max}$ [bar]
Temperature of medium	$t$ [°C]
Sliding speed	$v$ [m/s]

Model of seal	Diameter $d_1$	Pressure $p_{max}$ (*)	Temperature $t$ (**)	Speed $v$ (*)
<b>AR</b>	6 ÷ 60	6	-20 ÷ +140	10
<b>FN</b>	10 ÷ 40	10	-20 ÷ +180	20

(\*) The operating limits vary according to the materials of the sliding parts and directly depend on the PV factor.

(\*\*) The temperature is in terms of the elastomers used in the seal

Operation under several limit values should be avoided. Higher loads (pressure, temperature, speed) can increase wear or lead to damage of sliding faces or elastomers. This could result in a shorter life and in the risk of a sudden seal failure endangering men and environment.

Operation under conditions lying outside the operating limits is not suggested.

## WORKING CONDITIONS

The mechanical seal should be constantly wetted by liquid medium. It is absolutely to avoid a dry running of the seal.

The medium to be sealed should not damage the mechanical seal neither chemically (corrosion, embrittlement) nor physically (erosion, abrasion).

The seal are also usable as multiple mechanical seals in tandem arrangement together with a quench supply or as double mechanical seals together with a barrier fluid system.

In case of double opposite mechanical seal assembly, we recommend to use a barrier fluid suitable with the circulating product, at a pressure of 1,5 ÷ 2 bar higher than the fluid to be sealed.

## MATERIALS

The following table is showing the limit running temperatures for conventional OR (elastomers and non-elastomers):

Elastomers		Temperature	Notes
<b>Nitrile rubber</b>	<b>P</b>	- 20 ÷ + 90°C	
<b>Chloroprene rubber</b>	<b>C</b>	- 30 ÷ + 120°C	
<b>Ethilenpropilene</b>	<b>E</b>	- 40 ÷ + 140°C	not resistant to mineral oil and grease
<b>Silicon</b>	<b>S</b>	- 50 ÷ + 200°C	
<b>Viton°</b>	<b>V</b>	- 20 ÷ + 200°C	in hot water at max 120°C
<b>Buthile rubber</b>	<b>B</b>	- 40 ÷ + 140°C	not resistant to mineral oil and grease
<b>Kalrez°</b>	<b>X</b>	+ 270°C	possible swelling in fluoride solvents
<b>Teflon°</b>	<b>T</b>	- 200 ÷ + 250°C	

The following table is showing the materials used to realise the different components of mechanical seal.



## MATERIALS OF THE SLIDING FACES

### SYNTHETIC CARBONS

- A** Antimony impregnated carbon
- B** Resin impregnated carbon
- B1** Resin agglomerate carbon
- B2** Impregnated resin hard carbon (machined carbon)
- B3** Non impregnated resin carbon
- B4** Impregnated resin soft carbon

### PLASTIC MATERIALS

- Y** PTFE glass reinforced (25%)
- Y1** PTFE graphite reinforced
- Y2** PTFE fiberglass reinforced (15%)

### CARBIDES

- U** Antiacid tungsten carbide (insert)
- U1** Antiacid tungsten carbide (integral)
- Q1** Integral silicon carbide
- Q2** Porous silicon carbide
- Q6** Reduced sticktion silicon carbide

### CERAMICI MATERIALS

- V** Allumin oxyde 99,5%
- V1** Allumin oxyde 96-98%
- X** Steatite

### METALLIC MATERIALS

- E** Cr steel (AISI 420)
- F** Cr-Ni steel (AISI 304)
- F1** Cr-Ni steel (AISI 431)
- G** Cr-Ni-Mo steel (AISI 316)
- S** Cr-Mo cast-iron
- S1** Ni-Cr cast-iron

## MATERIALS OF THE SECONDARY SEALS

### ELASTOMERS

- P** Nitrile rubber (NBR)
- P1** Nitrile rubber NBR 80±5 IRHD
- P2** Nitrile rubber NBR WRC approved
- P4** Hydrogenated nitrile rubber (HNBR) Therban
- P5** Nitrile rubber NBR antiozone
- N** Chloroprene rubber (CR)
- B** Butyle rubber (IIR)
- E** Etilen propilene rubber (EPDM)
- E2** EPDM rubber WRC approved
- E3** Peroxyde EPDM rubber
- S** Silicon rubber (Si)
- V** Viton Fluoroelastomers
- V1** Viton Fluoroelastomers green pigmented
- M** Single PTFE coated Viton
- M1** Double PTFE coated Viton
- X** Kalrez

### NON ELASTOMERS

- T** PTFE
- T1** reinforced PTFE

## SPRINGS AND CONSTRUCTION MATERIALS

- D** Carbon steel
- F** Cr-Ni steel (AISI 304)
- F1** Cr-Ni steel (AISI 431)
- G** Cr-Ni-Mo steel (AISI 316)
- M** Hastelloy B
- M1** Hastelloy C

## TEN AR

Rotary ring:	A, B, B2, B3, Q1, U, Y, Y2
Stationary ring:	X, V, V1, Q1, Q2, E, F1, G
Elastomers:	P, P2, P4, P5, E, E2, V, V1
Spring:	F, G

## TEN FN

Rotary ring:	A, B, X, V, V1, Q1, U1
Stationary ring:	A, B, X, V, V1, Q1, U1
Elastomers:	P, E, V, T
Spring:	G

## EMISSIONS (LEAKAGE)

A mechanical seal is a dynamic seal that cannot be free of leakage due to phisical and technical reasons.

Seal design, manufacture tolerances, operating conditions, running quality of the machine, etc. mainly define the leakage value. In fact, compared to other dynamic sealing systems, there is few leakage.

A possibly incresead leakage during start-up will decrease to a normal quantity after the running-in period of the sliding faces.

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The leakage can be liquid or gaseous, depending on the aggressiveness of the medium to be sealed.

Medium may splash out if the seal fails.

Personal injury may be prevented by the user providing for splash protection and wearing safety goggles.

Care has to be taken by the user for proper disposal of the leakage.

Leakage of mechanical seal at outboard side has to be drained and disposed properly.

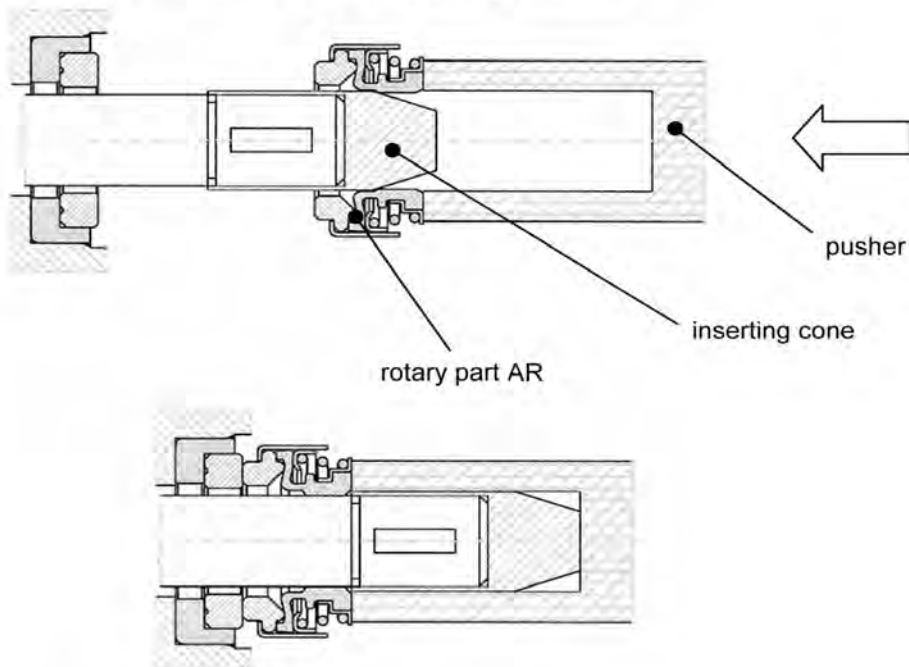
Components which may get in contact with the leakage have to be corrosion-resistant or have to be adequately protected.

## **Never put EPDM elastomers in contact with mineral oil or greases.**

Any problem or anomaly, please contact our technical department for the opportune explanations informations.

Following the above instructions helps to avoid damages to the sealing system and subsequent leakag

- *Example of assembly of a AR seal (straight assembly)*



- *Example of assembly of a -AR seal (reverse assembly)*

