



DICHTA®

**C-O PTFE LIP SEALS**



## C-O PTFE Lip seals

**C-O PTFE lip seal** is a rotary shaft seal consisting of a stainless steel outer case, a virgin or filled PTFE lip and a rubber gasket with the function of static sealing element.

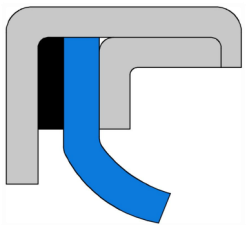
### Advantages

- Temperature resistant up to +260 °C
- Excellent chemical resistance
- Useable in food and pharma applications
- Good in dry applications
- Very suitable for high shaft speed
- Low friction

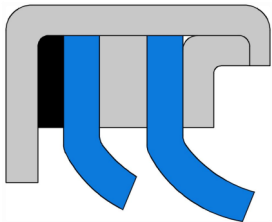
### Applications

- Pumps
- Agitators and mixers
- Separators
- Screw compressors
- Centrifuges
- Gear boxes

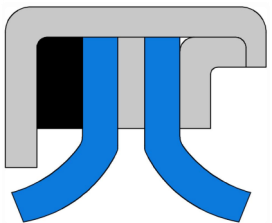
Description of standard C-O PTFE lip seal types



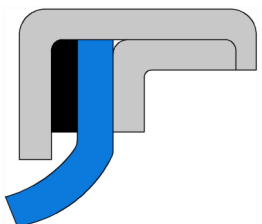
**C-O** Metal cased, single lip



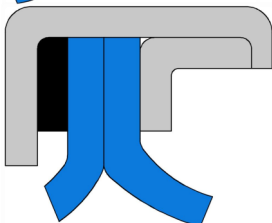
**C-OD** Metal cased, double lip in tandem



**C-OBTB** Metal cased, double lip back to back



**C-O REV** Metal cased, single lip reverse



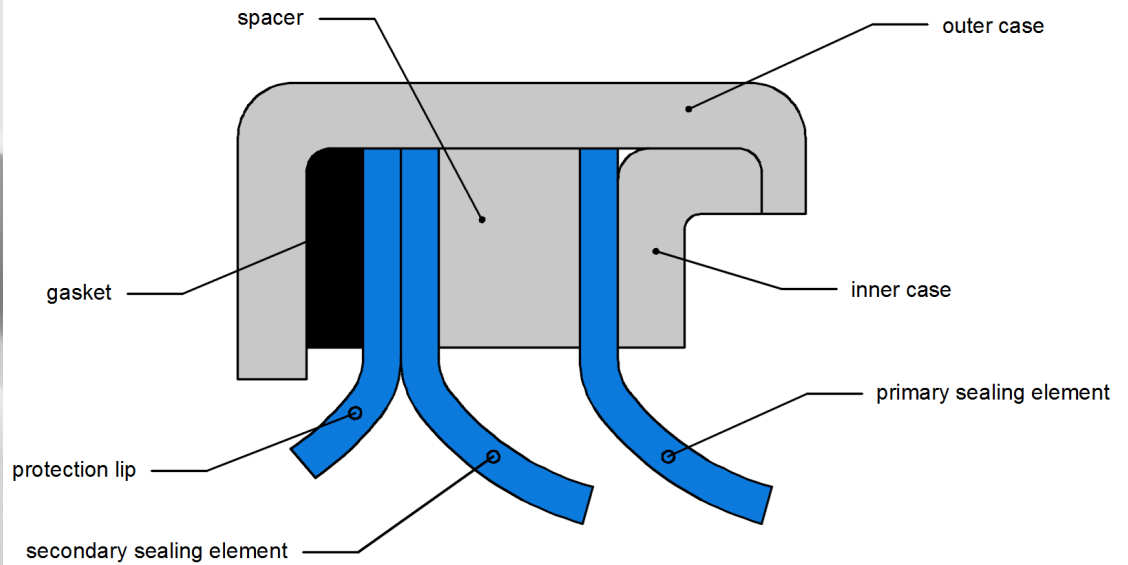
**C-OS** Metal cased, with protection lip

All C-O PTFE lip seal types are also available with hydrodynamic ribs for left or right rotation.



### Technical data

#### Description of lip seal



#### Inner and outer case and spacer

Inner and outer metal case are used to retain mechanically the sealing element. Spacer is a device placed between primary and secondary lip (if present).

#### Materials used

- Stainless steel AISI 316L (standard)
- Carbon steel
- Alloy C276

#### Sealing and dust lips

Sealing element and dust lip (if present) are made of thermoplastic material: virgin or filled PTFE (see Table 1).

#### Gasket

Gasket is a rubber element positioned between the sealing element and the inner face of the outer metal shell to prevent a potential leakage path.

#### Materials used

- NBR
- FPM
- SIL
- EPDM
- Filled PTFE

**Power loss through friction on seal lip**

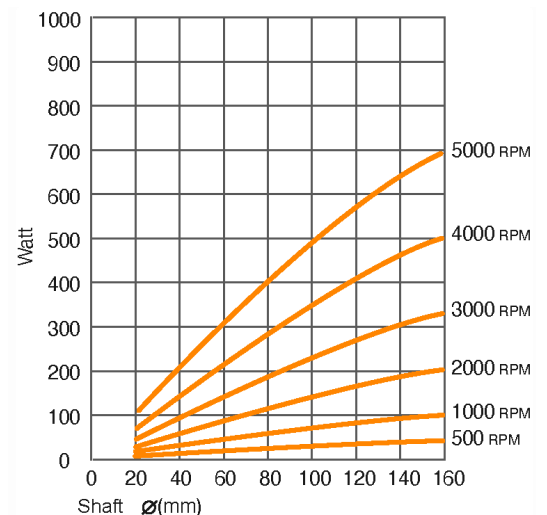


Table 1 – Sealing lip materials

Characteristics	PTFE							Polyurethane
	Virgin	Carbon-Graphite	Glass	Glass + Molybdenum Disulfide (MoS2)	Barium Sulfate (BaSO4)	EkonoI	Hollow Glass Microspheres	
TFM Base		X		X	X	X	X	
Wear	C	B	A	A	B	A	B	A
Abrasion	C	A	A	A	B	B	B	A
Dry-running	C	B	C	B	B	A	A	A
Deformation	C	A	B	A	A	A	A	B
Chemical resistance	A	A	A	A	A	A	A	C
Dimensional stability	C	B	B	A	B	B	B	C
Friction	B	B	B	A	B	B	A	B
FDA	X		X		X	X	X	

**Legenda**

- A = Very good
- B = Medium
- C = Poor
- X = Applicable



**Installation and operation**

**Shaft**

The shaft surface finish is of primary importance for efficient sealing and for achieving a useful lifetime. According to ISO 16589-1 minimum hardness required is 30 Rockwell C. Based on our experience we recommend using a hardness of minimum 45 HRC up to 1,5 bar of pressure and minimum 60 HRC over 1,5 bar.

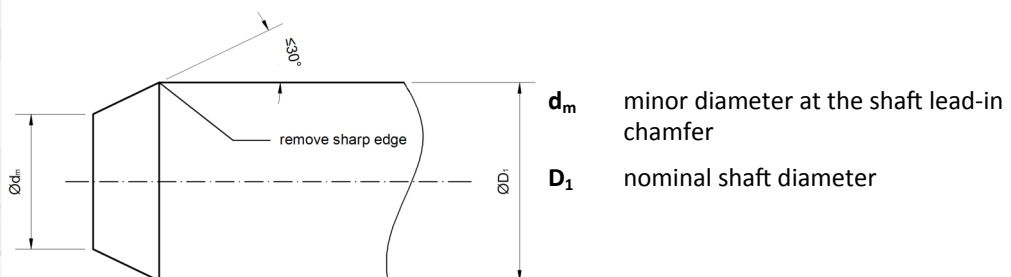
Surface finish must be between  $R_a$  0,2  $\mu\text{m}$  and  $R_a$  0,4  $\mu\text{m}$ .

As specified in ISO 286-2 (see Table 2) the shaft shall have a tolerance not greater than h11.

**Table 2 – h11 tolerances**

Diameter [mm]		Tolerance [mm]
from	to	h11
6	10	0 -0,090
10	18	0 -0,110
18	30	0 -0,130
30	50	0 -0,160
50	80	0 -0,190
80	120	0 -0,220
120	180	0 -0,250
180	250	0 -0,290
250	315	0 -0,320
315	400	0 -0,360

The mounting end of the shaft should have a chamfer inclined less than 30°, with rounded and polished edge (see Table 3). If a radius is used instead of a chamfer, its value shall be between 1,8 and 3,0 mm.

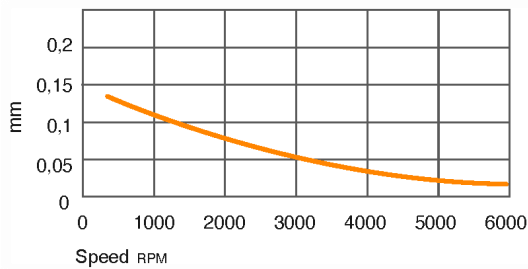


**Table 3 – chamfer**

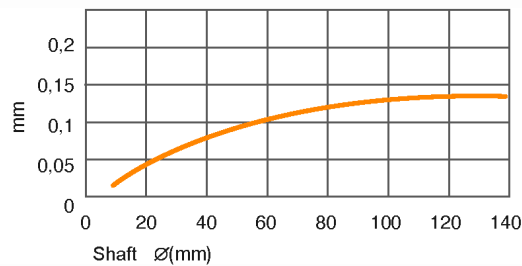
Nominal shaft diameter [mm]		Nominal shaft diameter [mm]	
$D_1$	$d_m$ max.	$D_1$	$d_m$ max.
$D_1 \leq 10$	$D_1 - 1.5$	$50 < D_1 \leq 70$	$D_1 - 4.0$
$10 < D_1 \leq 20$	$D_1 - 2.0$	$70 < D_1 \leq 95$	$D_1 - 4.5$
$20 < D_1 \leq 30$	$D_1 - 2.5$	$95 < D_1 \leq 130$	$D_1 - 5.5$
$30 < D_1 \leq 40$	$D_1 - 3.0$	$130 < D_1 \leq 240$	$D_1 - 7.0$
$40 < D_1 \leq 50$	$D_1 - 3.5$	$240 < D_1 \leq 480$	$D_1 - 11.5$

Working conditons regarding shaft runout and misalignment between shaft and bore need to respect the limits according to below diagrams.

**Acceptable radial runout**



**Acceptable shaft to bore misalignment**



### Housing bore

Recommended machining tolerances of the housing bore diameter for lip seals are ISO H8 according to ISO 16589-1 (see Table 4).

**Table 4 – H8 tolerances**

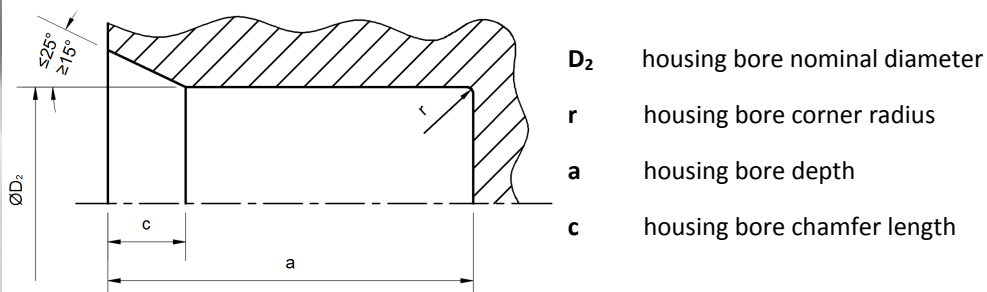
Diameter [mm]		Tolerance [mm]
from	to	H8
10	18	+0,027 0
18	30	+0,033 0
30	50	+0,039 0
50	80	+0,046 0
80	120	+0,054 0
120	180	+0,063 0
180	250	+0,072 0
250	315	+0,084 0
315	400	+0,089 0
400	500	+0,097 0



The maximum surface roughness of the housing according to ISO 16589-1 is  $R_a$  1,6 to  $R_a$  3,2  $\mu\text{m}$ .

We recommend the use of a shoulder or a spacer ring against which the seal can be installed. Should this not be possible the installer has to pay special attention that the seal is installed perpendicularly to the shaft axis.

To ease installation the entrance of the bore should have a chamfer inclined by  $15^\circ$  -  $25^\circ$  and a depth according to the ring thickness (see Table 5).



**Table 5 – housing bore dimensions**

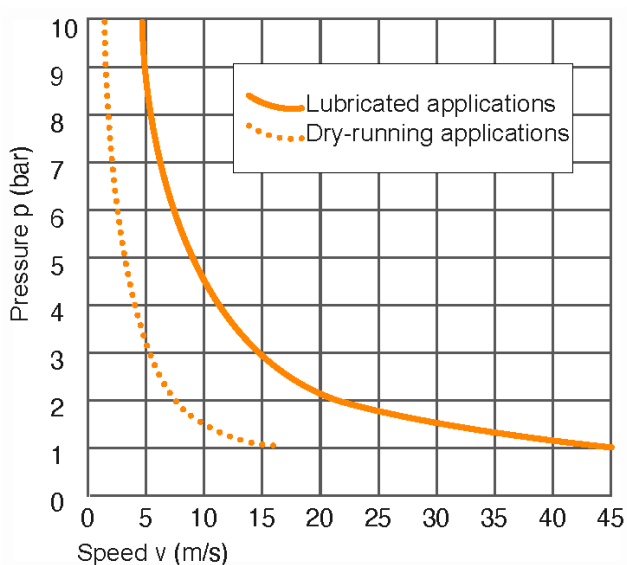
Nominal width b [mm]	a (min.) [mm]	c [mm]	r (max.) [mm]
≤10	b+1,2	0,70 to 1,00	0,50
>10	b+1,5	1,30 to 1,70	0,75

### Pressure

Standard types are normally used with atmospheric pressure on the air side and sealing fluids at pressures from 0 bar to 10 bar.

Special types can reach pressures up to 25 bar.

### p x v diagram





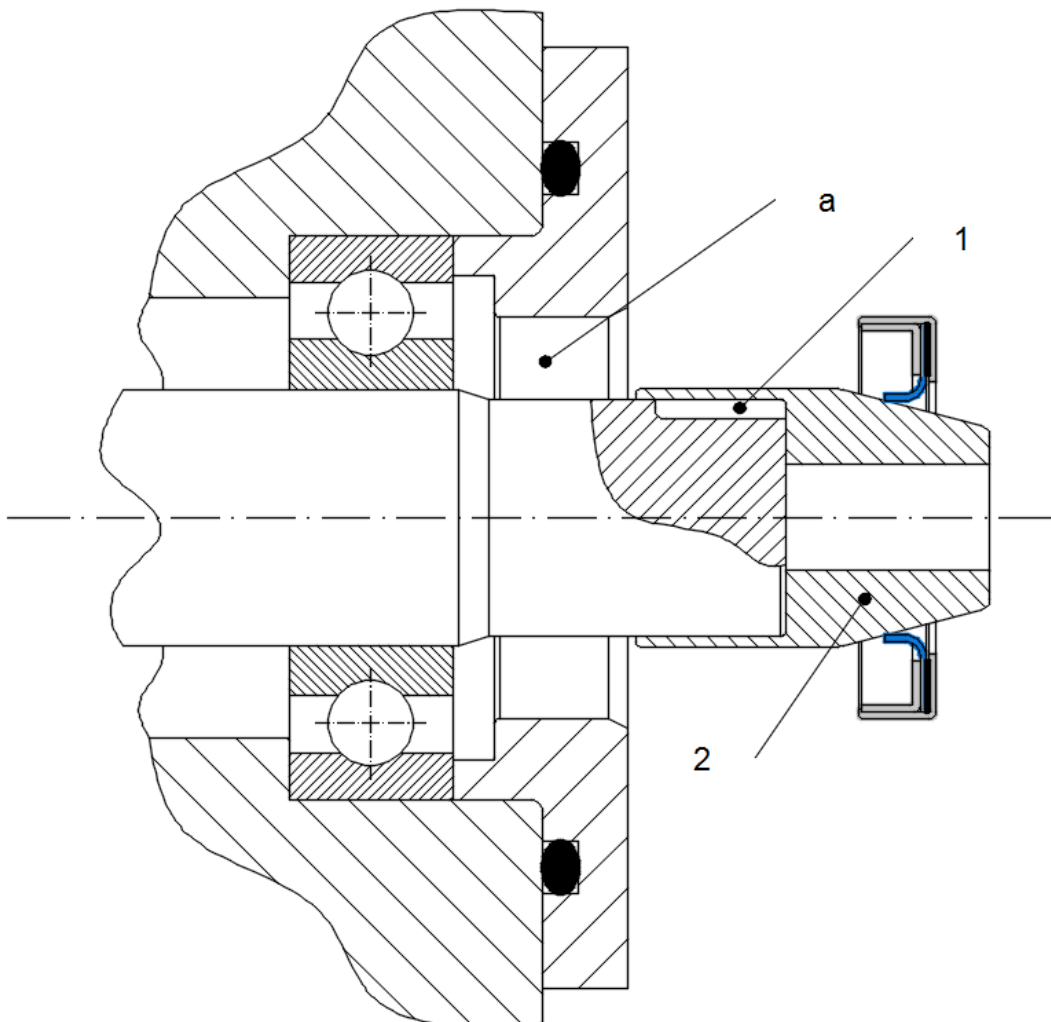
## C-O PTFE Lip seals

### Installation

Installation tools (such as illustrated in Figure 5) shall be used to press the seal into place.

The seal shall be aligned with a machined surface whether the seal is installed even with the housing bore front or bottomed against a shoulder (see Figure 5 and 6). Unfinished surfaces shall not be used because of the danger of misalignment of the seal. Care shall be taken not to deform the seal case by applying excessive pressure.

Special installation tools (see Figure 4) shall be used to prevent seal lip damage if the seal element slides over splines, keyways or holes.

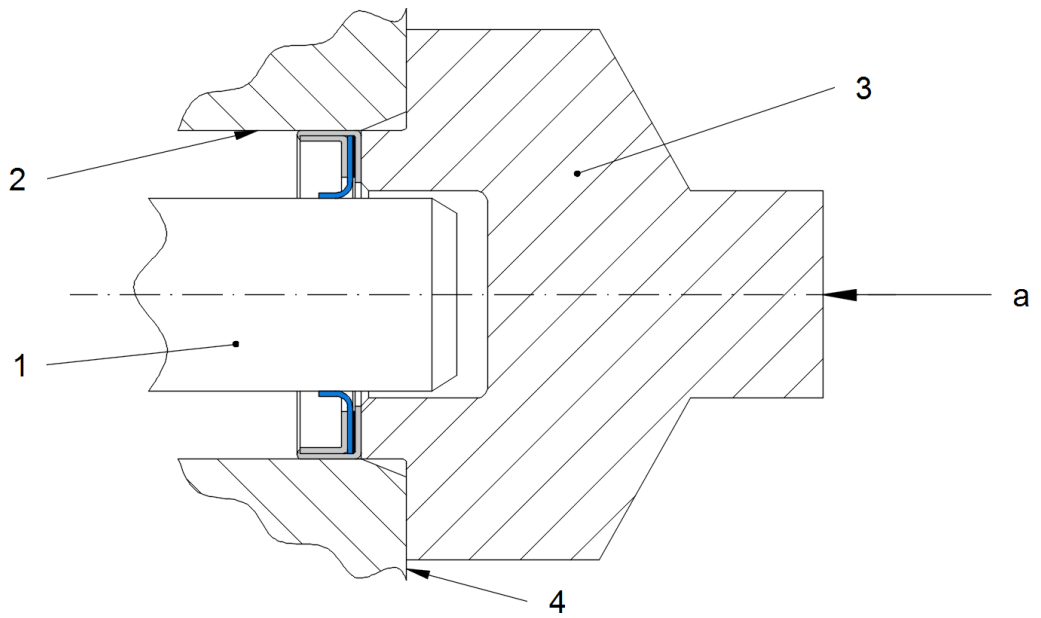


#### Key

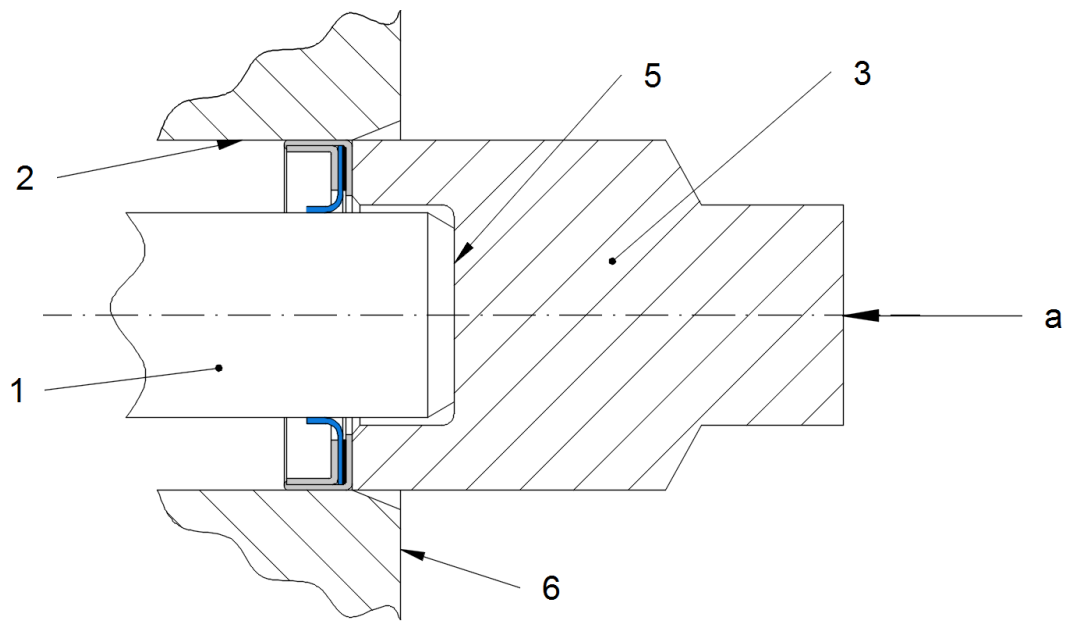
- 1 splines, keyways or holes
- 2 bullet nosed tool
- a seal installation space

Figure 4 – Special installation tool for use with seal elements which slide over splines, keyways or holes





a) Installation tool bottoms on face machined square with housing bore



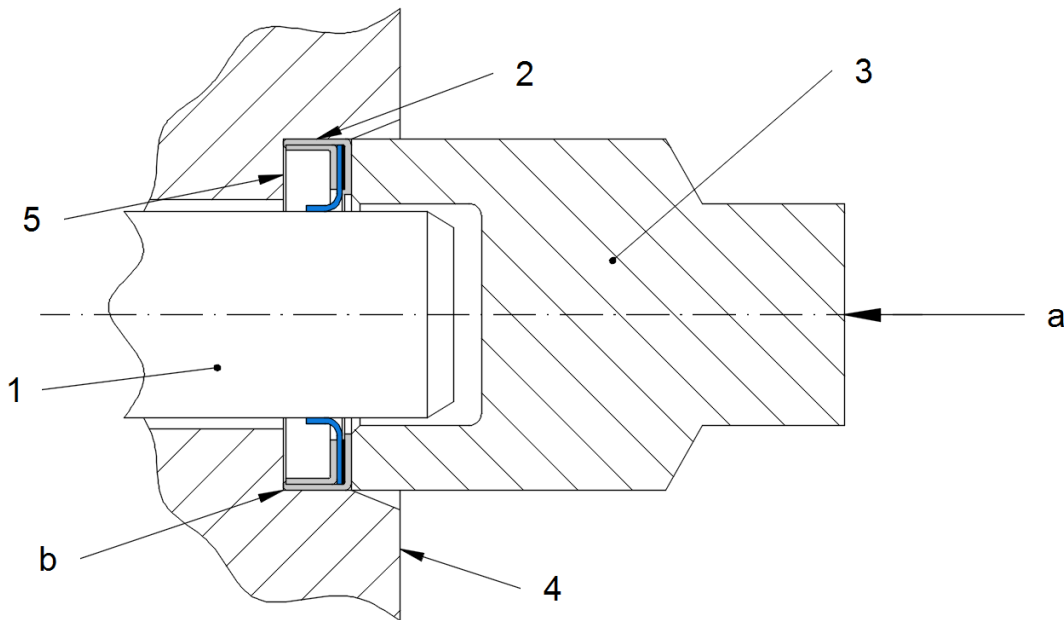
b) Installation tool bottoms on shaft

**Key**

- |   |                   |   |   |
|---|-------------------|---|---|
| 1 | shaft             | 4 | face machined square with housing bore    |
| 2 | housing bore      | 5 | shaft end machined square with shaft axis |
| 3 | installation tool | 6 | as-cast housing bore front                |
| a | load              |   |   |

**Figure 5 – Installation of seal – Through bore**

## C-O PTFE Lip seals



### Key

- 1 shaft
- 2 housing bore
- 3 installation tool
- 4 as-cast housing bore front
- 5 shoulder machined square with housing bore

- a load
- b back minimum radius

**Figure 6 – Installation of seal – Bottom bore: seal bottoms on machined housing bore shoulder**

### Storage and handling

Some storage precautions must be taken in order to avoid deterioration of the material. C-O PTFE lip seals should be stored in a dust free and dry atmosphere and they must be kept in their original wrapping which should only be opened just before installation. Samples should be repacked after inspection.

Do not drop rotary shaft seals on shelves or boxes, nor hang seals on hooks, wires or nails, since in either case the sealing lip can be damaged.

Seals should be used on a first-in first-out basis.





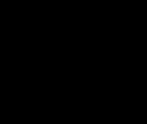
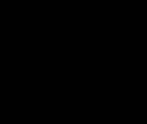
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