

**Slide Bearings Type EG, ER**  
**with external oil supply**



RENK AKTIENGESELLSCHAFT

Werk Hannover

Weltausstellungsallee 21

D - 30539 Hannover

Telephone: (0511) 8601-0

Telefax: (0511) 8601-266

e-mail: [gleitlager.hannover@renk-ag.com](mailto:gleitlager.hannover@renk-ag.com)

<http://www.renk.de>

All rights reserved. Copy or reproduction without prior permission of RENK Aktiengesellschaft Hannover prohibited.

**Content**

Bearing Coding .....	5
General Drawing of the EG, ER Slide Bearing with External Oil Supply .....	7
General Drawing of the Thrust Part with RD-Thrust Pads .....	9
General Drawing of the Loose Oil Ring .....	11
General Drawing of the Floating Labyrinth Ring with Seal Carrier .....	13
General Drawing of the Rigid Labyrinth Seal .....	15
General Drawing of the Baffle .....	17
General Drawing of the Dust Flinger .....	19
<b>1 Considerations for Use .....</b>	<b>21</b>
<b>2 Safety Instructions .....</b>	<b>22</b>
<b>3 Operating Instructions after Standstill .....</b>	<b>23</b>
<b>4 Maintenance Schedule .....</b>	<b>24</b>
<b>5 Oil Change .....</b>	<b>25</b>
<b>6 Dismantling of the Bearing .....</b>	<b>26</b>
6.1 Tools and equipment .....	26
6.2 Use of lifting equipment .....	26
6.3 Preparation for dismantling .....	28
6.4 Dismantling of the shaft seals .....	28
6.4.1 Floating labyrinth seal (Type 10) .....	29
6.4.2 Floating labyrinth seal with dust flinger (Type 11) .....	29
6.4.3 Floating labyrinth seal with baffle (Type 12) .....	29
6.4.4 Rigid labyrinth seal (Type 20) .....	29
6.4.5 Rigid labyrinth seal with dust flinger (Type 21) .....	29
6.4.6 Rigid labyrinth seal with baffle (Type 22) .....	29
6.5 Dismantling of the top half of the housing .....	30
6.6 Removal of the top half of the shell .....	30
6.7 Dismantling of the loose oil ring .....	30
6.8 Removal of the bottom half of the shell .....	31
<b>7 Cleaning and Checking of the Bearing .....</b>	<b>32</b>

<b>8</b>	<b>Assembly of the Bearing.....</b>	<b>35</b>
8.1	Fitting in the bottom half of the shell.....	35
8.2	Installation of the loose oil ring .....	36
8.3	Fitting in the top half of the shell.....	37
8.4	Closing of the bearing .....	38
8.5	Assembly of the shaft seals .....	40
8.5.1	Floating labyrinth seal (Type 10) .....	40
8.5.2	Floating labyrinth seal with dust flinger (Type 11).....	44
8.5.3	Floating labyrinth seal with baffle (Type 12).....	45
8.5.4	Rigid labyrinth seal (Type 20).....	45
8.5.5	Rigid labyrinth seal with dust flinger (Type 21) .....	47
8.5.6	Rigid labyrinth seal with baffle (Type 22) .....	47
<b>9</b>	<b>Starting Operation after Inspection.....</b>	<b>48</b>
<b>10</b>	<b>Corrosion Protection for Longer Standstill Periods .....</b>	<b>50</b>
<b>11</b>	<b>Transport Protection.....</b>	<b>51</b>
<b>12</b>	<b>Glossary .....</b>	<b>52</b>

## **Bearing Coding**

## Maintenance and Inspection

①	②	③	④	⑤	⑥
Type	Housing	Heat Dissipation	Shape of Bore and Type of Lubrication	Thrust part	Size - Diameter
E	R - finned pedestal bearing	Z - lubrication by oil circulation with external oil cooling	C - plain cylindrical bore without oil ring	Q - without thrust part (non-locating bearing )	9 80≤D≤100
	G - smooth pedestal bearing	X - lubrication by oil circulation with external oil cooling for high oil throughput	L - plain cylindrical bore with loose oil ring	B - plain sliding surfaces with oil grooves (locating bearing)	11 100≤D≤125
					14 125≤D≤160
		U - circulating pump and natural cooling	Y - two-lobe bore (lemon shape) without oil ring	E - taper land faces for one sense of rotation (locating bearing)	18 160≤D≤200
		T - circulating pump and water cooling (finned cooler in oil sump )	V - four-lobe bore without oil ring	K - taper land faces for both senses of rotation (locating bearing)	22 200≤D≤250
					28 250≤D≤315
				A - elastically supported circular tilting pads (RD - thrust pads) (locating bearing)	

### Example for bearing coding:

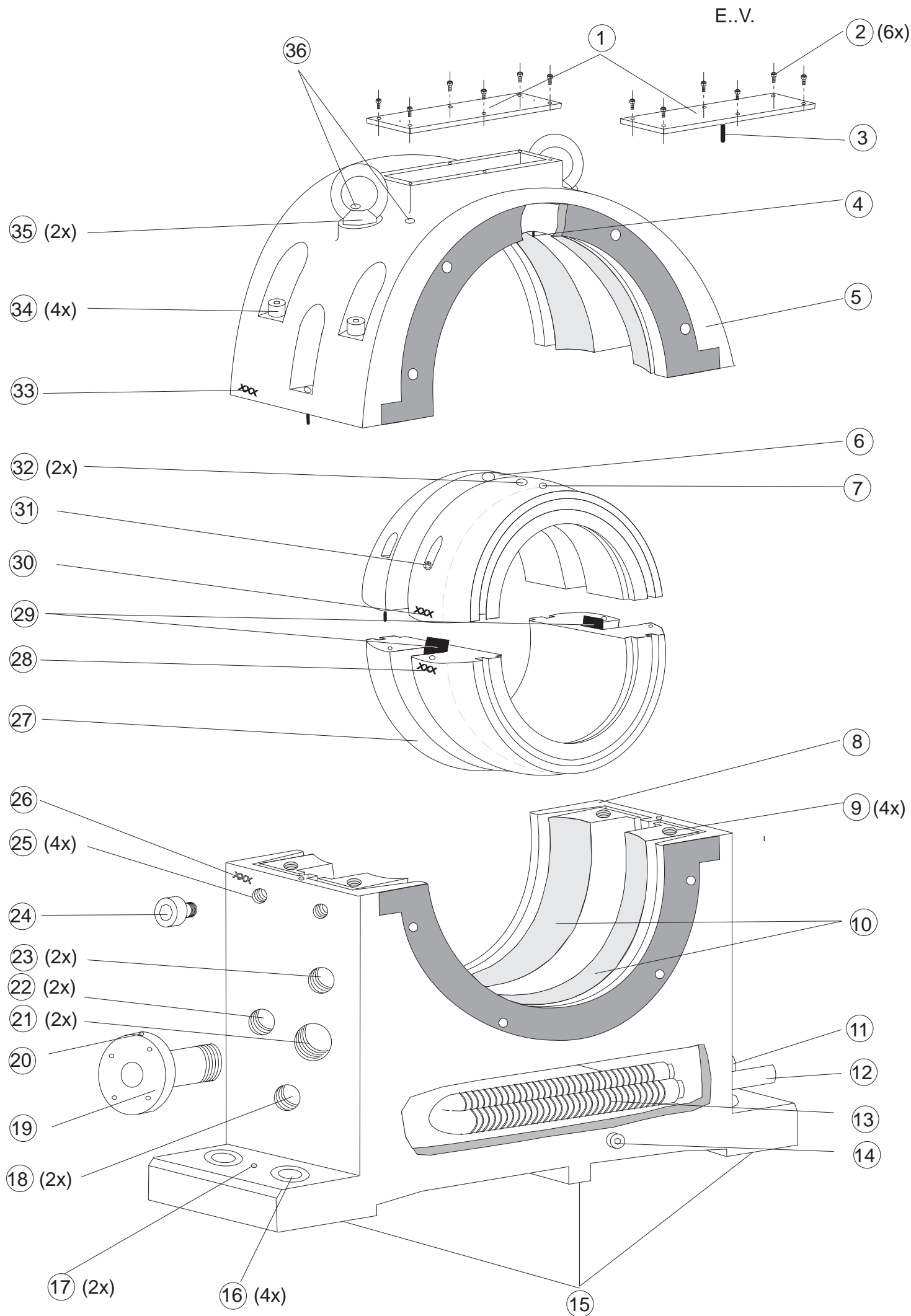
① E    ② G    ③ Z    ④ L    ⑤ A    ⑥ 22-200

*Type E slide bearing with smooth foot-mounted housing, lubrication by oil circulation with external oil cooling, plain cylindrical bore with loose oil ring, locating bearing with circular tilting pads, size 22, diameter 200.*

### Shaft seals

- Type 10 - floating labyrinth seal (IP 44)
- Type 11 - floating labyrinth seal with dust flinger (IP 54)
- Type 12 - floating labyrinth seal with baffle (IP 55)
  
- Type 20 - rigid labyrinth seal (IP 44)
- Type 21 - rigid labyrinth seal with dust flinger (IP 54)
- Type 22 - rigid labyrinth seal with baffle (IP 55)

**General Drawing of the  
EG, ER Slide Bearings  
with external oil supply**

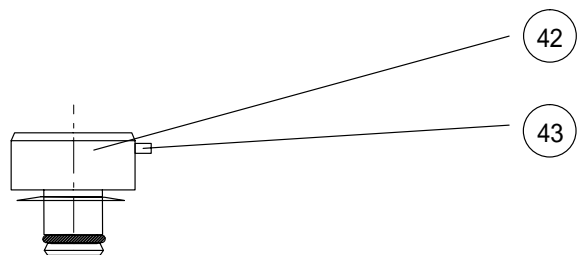
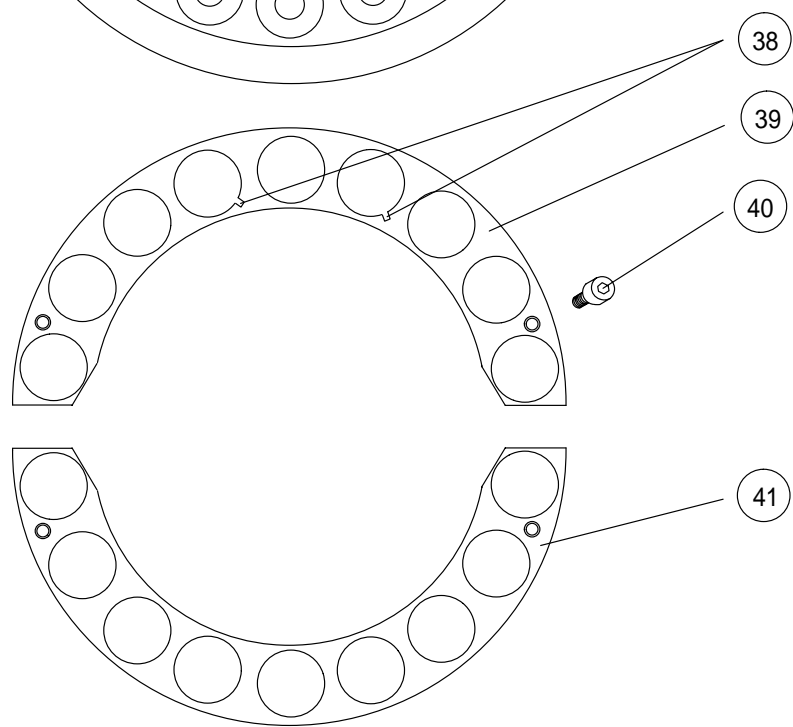
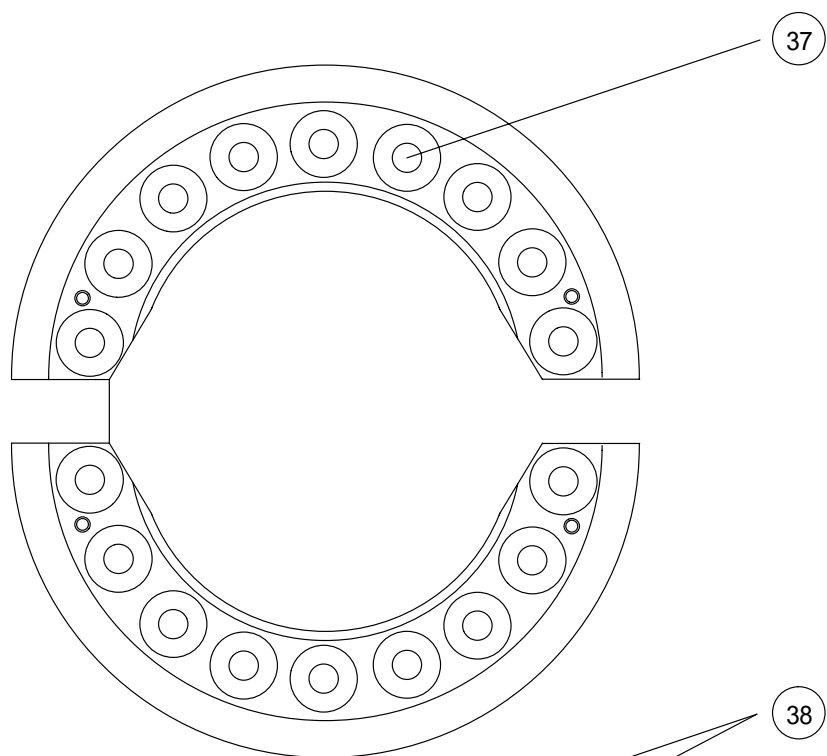




- 1 Top sight glass
- 2 Screw
- 3 Positioning pin
- 4 Positioning pin
- 5 Housing - top half
- 6 Shell - top-half
- 7 Hole for positioning pin
- 8 Housing - bottom-half
- 9 Tapped hole
- 10 Spherical surface
- 11 Cooling water inlet or outlet (Type E.T..)
- 12 Cooling water outlet or inlet (Type E.T..)
- 13 Cooler (Type E.T..)
- 14 Hexagon head plug (Oil drain plug)
- 15 Foot plate (Type ER...)
- 16 Foot plate holes
- 17 Hole for dowel pin
- 18 Tapped hole for oil sump temperature measurement
- 19 Oil outlet pipe with special pipe nut and lead seal
- 20 Marking (Type E..L.)
- 21 Tapped hole for oil outlet connection
- 22 Tapped hole for journal bearing temperature measurement
- 23 Tapped hole or oil inlet connection
- 24 ScREW plug
- 25 Tapped hole for thrust part supply (optional)
- 26 Engraved number
- 27 Shell - bottom part
- 28 Engraved number
- 29 Metal tab (optional for E.ZLA )
- 30 Engraved number
- 31 Screw (split line of the shell)
- 32 Tapped hole (shell-top and bottom halves from size 14)
- 33 Engraved number
- 34 Screw (split line of the housing)
- 35 Eye bolt
- 36 Tapped hole for thrust part temperature measurement (optional)



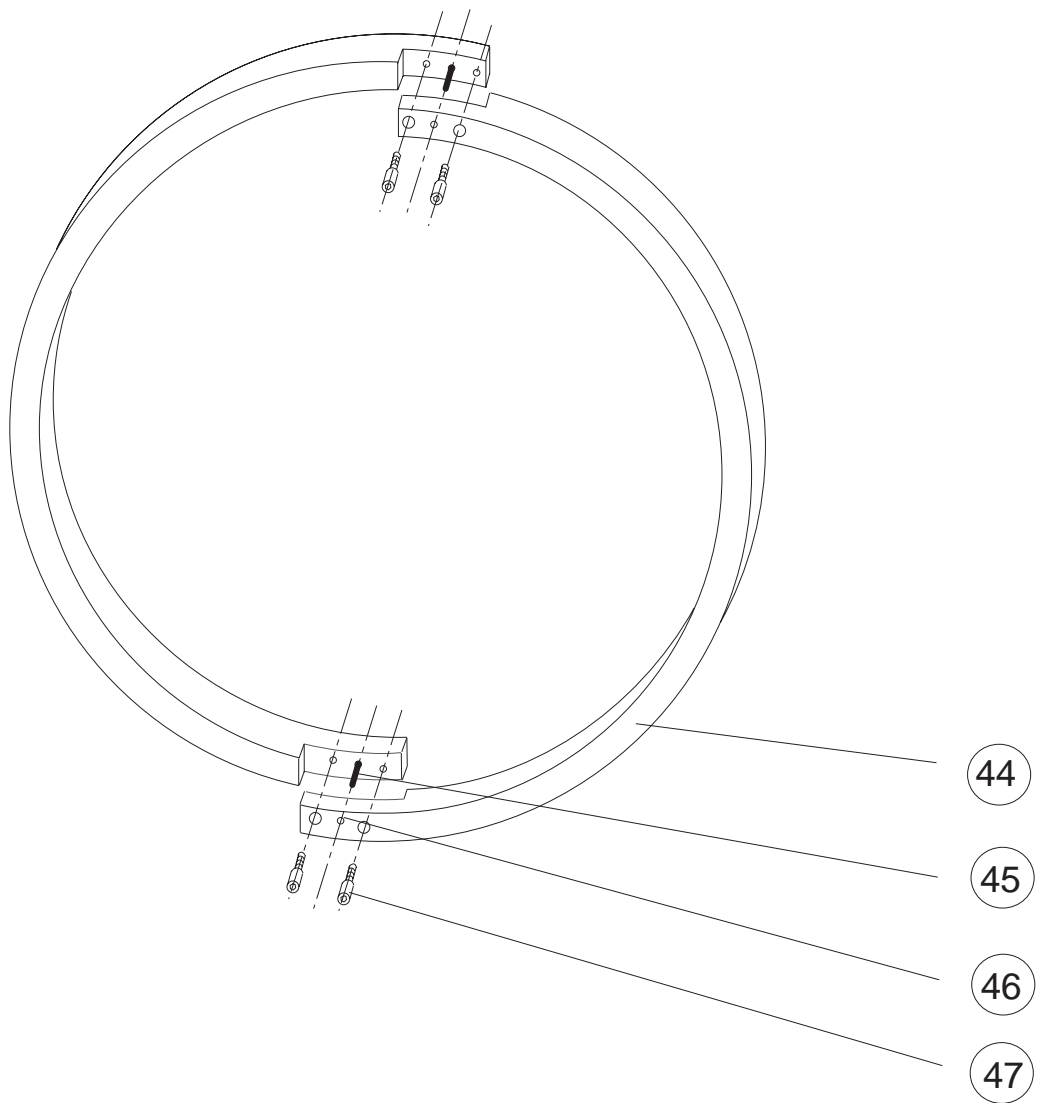
**General Drawing of the  
Thrust Part with Circular Tilting Pads  
(RD-Thrust Pads)**



- 37 Carrier ring
- 38 Location groove
- 39 Shroud ring top half
- 40 Screw
- 41 Shroud ring bottom half
- 42 Circular tilting pad (RD-thrust pad)
- 43 Anti - Rotation pin



**General Drawing of the  
Loose Oil Ring**



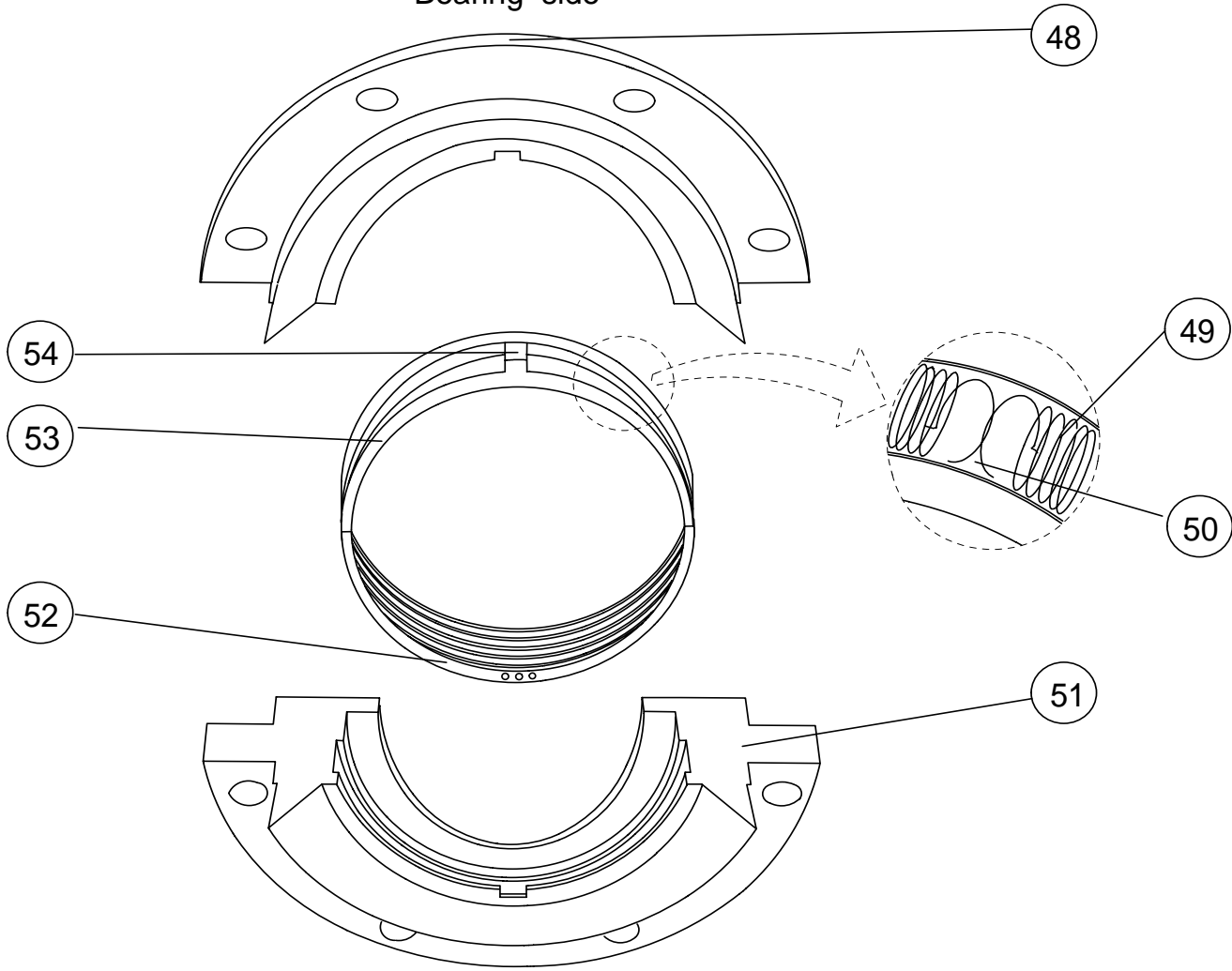


- 44 Loose Oil Ring
- 45 Dowel pin
- 46 Hole
- 47 Screw

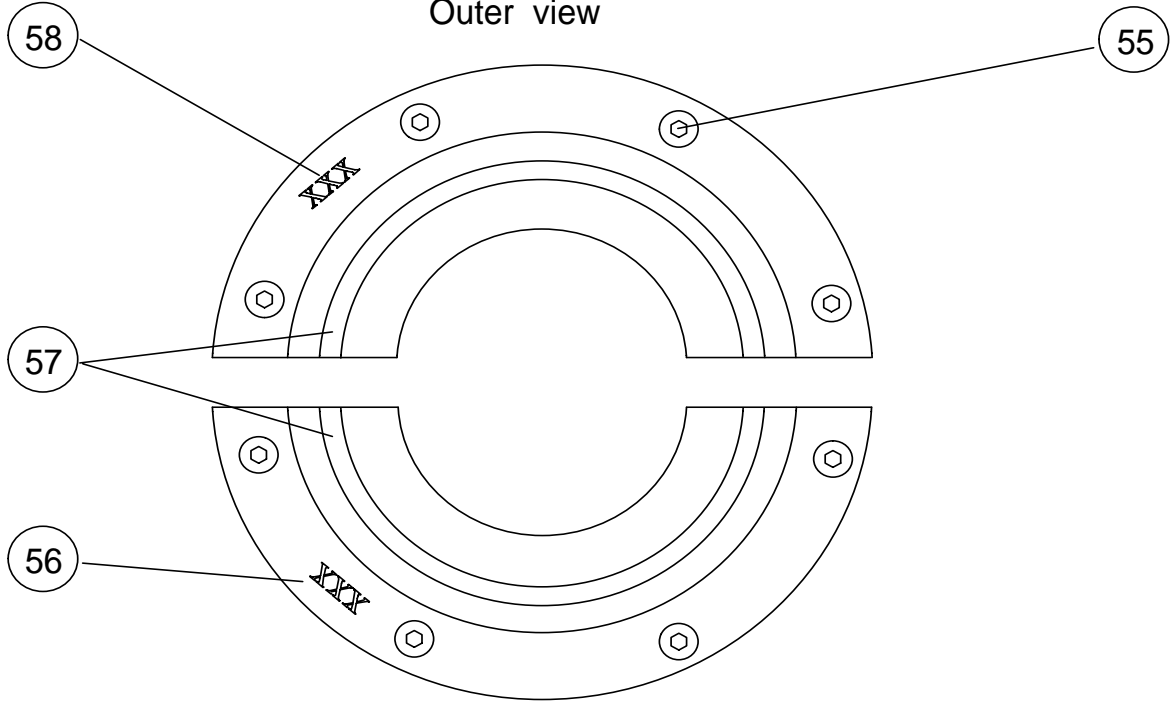


**General Drawing of the  
Floating Labyrinth Seal  
with Seal Carrier**

Bearing side



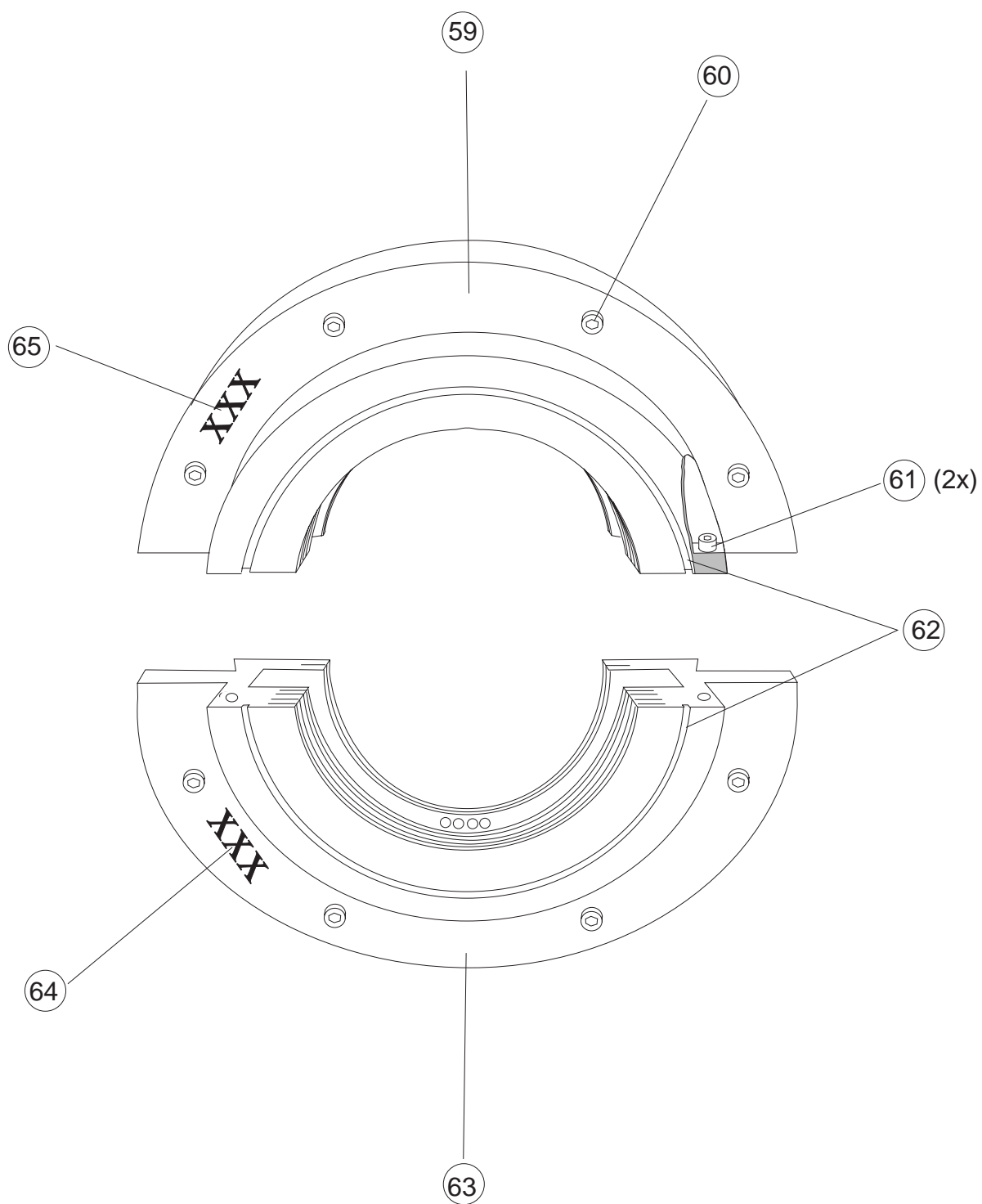
Outer view



48	Seal carrier - top half
49	Garter spring
50	Groove
51	Seal carrier - bottom half
52	Bottom half of the seal
53	Top half of the seal
54	Anti - rotation pin
55	Screw
56	Engraved number
57	Groove ( Type 11 )
58	Engraved number



**General drawing of the  
Rigid Labyrinth Seal**

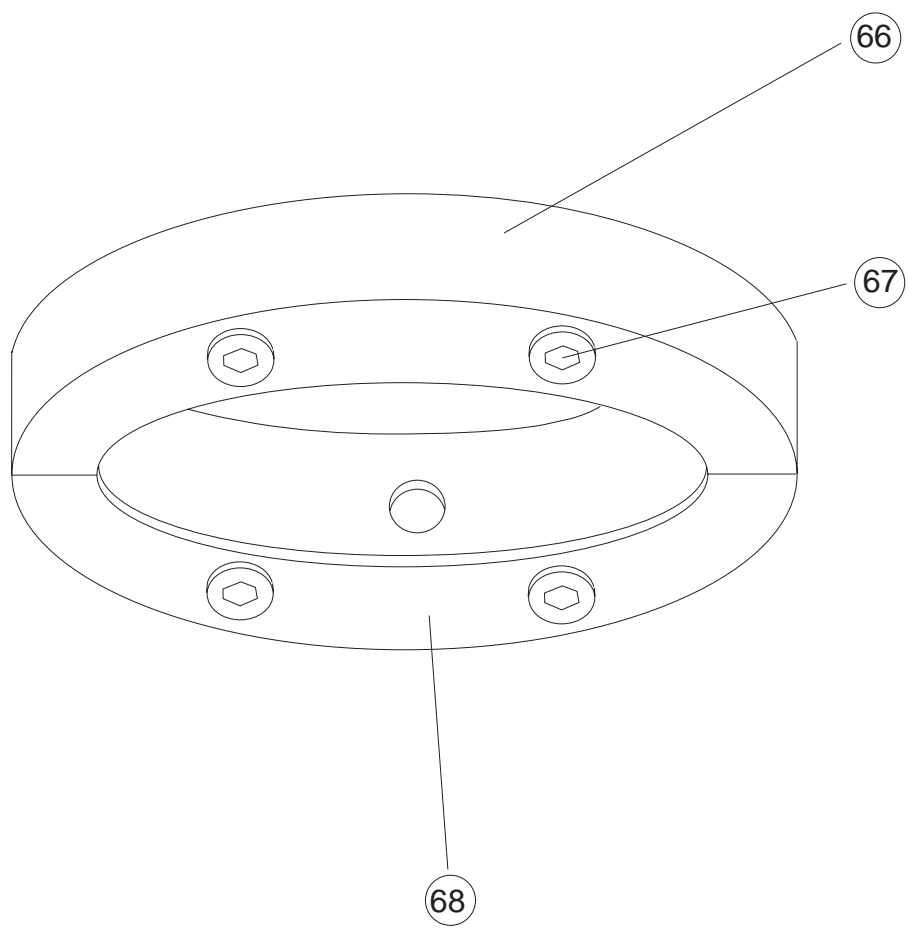




- 59 Rigid labyrinth seal - top half
- 60 Screw
- 61 Screw (split line)
- 62 Groove ( Type 21 )
- 63 Rigid labyrinth seal - bottom part
- 64 Engraved number
- 65 Engraved number



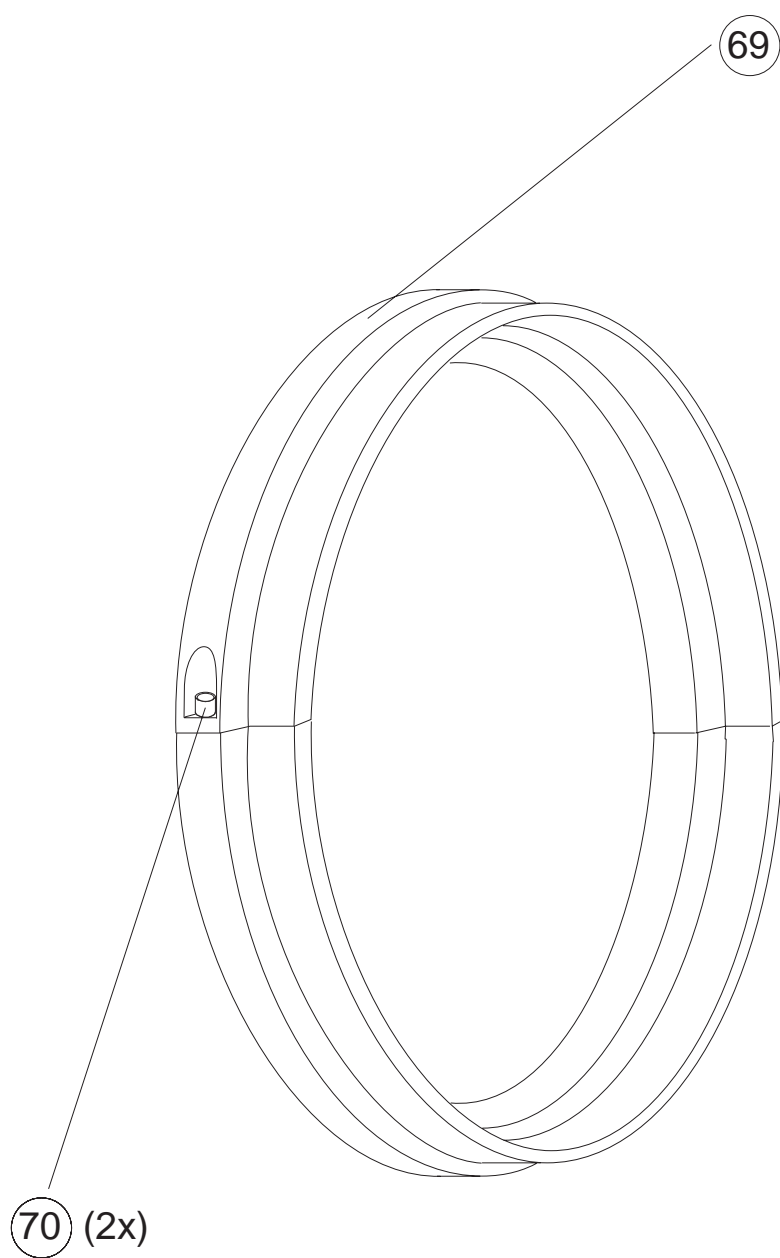
**General Drawing of the  
Baffle**



- 66 Baffle - top half
- 67 Screw
- 68 Baffle - bottom half



**General Drawing of the  
Dust Flinger**





- 69 Dust flinger
- 70 Screw (split line)



### 1 Considerations for Use

The instructions for maintenance and inspection are addressed to qualified technical personnel (fitters, mechanic installers, mechanical engineers).

Read these instructions carefully before starting assembly.

Slide bearings of type EG and ER are almost universally used in the engineering industry. Therefore it is not possible to provide detailed information on all possible types and range of applications for these bearing types. For instance, the position of the connection points for supply and monitoring equipment is determined by the place of application ( in the following called " installation " ). Please keep ready the guidelines with the technical documentation before starting assembly and operation of the slide bearings.

Additional technical documentation with detailed information is supplied in the case of special design bearings. Please contact RENK Export or Domestic Department for supplementary information on bearings. Please indicate the bearing coding and the full reference number, too.

Following indications should be observed when reading these instructions.

Safety instructions are marked as follows:



**Danger!**

Warning of dangers for personnel.  
Example: *Warning of injury*

**Attention!**

Warning of damage for the bearing or installation.

Useful recommendations and additional information are framed.

**E...Q**

This is how chapters, instructions or recommendations are marked when referring to a single type or size of a bearing.

*Example: Slide bearing type E without thrust pads ( non-locating bearing )*

- Instruction follows.

• Beginning of an enumeration.

( ) This is how the different parts of a bearing as described in the general drawings ( numbers ) are marked in the text.

- Use the enclosed check-list before starting assembly or operation. Copies available on request.
- The check list provides the experienced mechanical fitters of RENK bearings with the necessary instructions for installation and operation.

## 2 Safety Instructions



### **Danger!**

The maintenance and inspection of the slide bearings should be carried out by:

- persons nominated by the safety representative
- persons correspondingly trained and instructed
- persons with knowledge on appropriate standards, regulations and accident prevention rules
- persons with knowledge on first-aid measures and local rescue centers.



### **Warning of injury!**

Before starting work on the bearing:

- Switch off the installation.
- Make sure the installation is not in operation.

Never lift or transport machines, etc. by the bearing eye bolts. These are only intended for assembly and dismantling of the bearing !



### **Warning of injury!**

Do not grab such heavy bearing parts as the housing during assembly or dismantling works. This could result in bruising or injury to hands !

### **Attention**

All parts of a slide bearing consisting of top and bottom halves such as the housing, shells, shaft seals are marked by engraved numbers. Fit together only the parts with the same number.

### **Attention**

In case

- the admissible bearing temperature exceeds 15 K
- inadmissible vibrations occur
- unusual noises or odours are noticed
- monitoring equipment triggers alarm

shut down the installation and inform the maintenance personnel in charge.

### **Attention**

Do not operate the bearing below the transition speed values indicated in the bearing calculation, thus avoiding inadmissible operating conditions, which could lead to damage to the bearing.

### **Attention!**

Please observe our leaflet Technical Information No. 85 which refers to various sealing compounds for extended technical applications.

## 3 Operating Instructions after Standstill

- Clean the external parts of the bearing. Dust and dirt impede the radiation of the heat.
- Check with the instructions for the use of the lubricating oil if an oil change is necessary. Depending on the duration of the standstill an oil change is either prescribed or recommended. Carry out the oil change as indicated in Chapter 5.
- Retighten the screws (34) to the following torque rates:

Bearing Size	9	11	14	18	22	28
Torque [Nm] $\mu_{\text{tot}} = 0,1$ (lightly oiled)	40	69	170	330	570	1150

- Tighten the foot plate bolts by using the necessary torque. The torque rates depend on:
  - the used foot plate bolts
  - the material the housing is made of and the foundation (see also the Technical Documentation of the Installation).
- Check the firm position of the top sight glass (1). The screws (2) should be hand-tight.
- Retighten the connection holes for oil in-and outlets, the oil supply hole for the thrust part (optional). The necessary torque rates depend on the used pipe joints.

In case a thermo sensor or/and an oil sump thermometer are used:

- Check that they are well fitted (see also the manufacturer's instructions).
- Retighten all screw plugs (24) in the tapped holes (14), (18), (21), (22), (23), (25), (36) to the necessary torque rates:

Screw plug threads	G 3/8	G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2	G 2	G 2 1/2
Torque [Nm] for plugs with moulded on plastic seal	30	40	60	110	160	230	320	500
Torque [Nm] for plugs with elastic seal	34	60	85	130	240	300	330	410

- Start operating the oil supply system and check its functioning ( see also the Technical Documentation of the Installation ). The supplied oil quantity at the bearing oil inlet must correspond to the values indicated in the EDP-calculations.
- Check the functioning of the temperature monitoring equipment.

### E..T.

- Check the functioning of the cooler.

The bearing is now ready to work.

### **4 Maintenance Schedule**

Maintenance work	Deadline
Exterior cleaning of the bearing	every 100-1000 hours
Oil change	Bearing in reversing operation every 5.000 operating hours Bearing in continuous operation every 20.000 operating hours (please observe also the indications for the use of the lubricating oil).
Bearing inspection	During prevention maintenance work for the installation. Immediately if: <ul style="list-style-type: none"><li>• the bearing temperature exceeds 15 K over the indicated value (see the EDP-calculations)</li><li>• unusual operating noises occur</li><li>• unusual changes of the lubricating oil become visible</li><li>• the oil level has increased in the case of bearing type <b>E.T....</b></li></ul>

**5 Oil Change****Risk of pollution!**

Please observe the instructions for the use of the lubricating oil. The manufacturer can provide information on waste oil disposal.

- Shut down the installation and secure it against unintended operation.
- Shut down the oil supply system.
- Take all necessary measures to collect the whole quantity of the lubricating oil.
- Drain the lubricating oil in still warm condition. Impurities and residues will thus be scavenged.

Go ahead as follows:

- Unscrew the hexagon head plug (14). Drain the lubricating oil and collect it.

**Attention!**

In case where the lubricating oil contains unusual residues or is visibly changed, eliminate the causes. If necessary, carry out an inspection.

- Tighten the hexagon head plug (14) to the following torque rates:

Bearing size	9	11	14	18	22	28
Torque [Nm]	30	30	30	40	60	60

- Clean the oil container.
- Fill up the oil supply system with lubricating oil. Use a lubricant with the viscosity specified on the bearing type plate.
- Start the oil supply system in order to fill up the bearing with lubricating oil.

The bearing is ready to work when the quantity of oil supplied at the bearing oil inlet corresponds to the values indicated in the EDP-calculations.

## **6 Dismantling of the Bearing**

### **6.1 Tools and equipment**

- Following tools and equipment are necessary:
  - Allan key set
  - Wrenching key set
  - Open-jawed spanner set
  - Feeler gauges (up 0,05 mm)
  - Caliper gauge
  - Emery paper, plain scraper
  - Oil stone
  - Lifting equipment
  - Permanent sealing compound
  - Clean (cloth weave) rags
  - Oil with the viscosity indicated (see bearing type plate)
  - Detergents
  - Liquid screw locking compound (e.g. LOCTITE 242)
  - Liquid sealing compound and Teflon tape.

### **6.2 Use of lifting equipment**



#### **Risk of injury!**

Before transport or lifting check if the eye bolts are tight! Insecure eye bolts could result in bearing becoming loose.

Before moving the bearing by the eye bolts make sure that the screws at the split line are tightened, otherwise the bottom half of the bearing could become detached.

Make sure that the eye bolts are not exposed to bending stress, otherwise the bolts could break.

Follow exactly the instructions for the use of the lifting equipment.

- Use lifting equipment for following assembly and transport works:

Transport/Assembly of:	Use lifting equipment for the following bearing sizes
Whole bearing unit	9-28
Top half of the housing	14-28
Bottom half of the housing	11-28
Shells	14-28



- Following steps are to be observed before using the lifting equipment:

**Whole bearing unit**

- Check that the screws are tight (34):

Bearing size	9	11	14	18	22	28
Torque [Nm] $\mu_{\text{tot}} = 0,1$ (lightly oiled)	40	69	170	330	570	1150

- Check that the eye bolts are tight (35).
- Connect the lifting equipment to the eye bolts (35).

**Top half of the housing**

- Check that the eye bolts are tight (35).
- Connect the lifting equipment to the eye bolts (35).

**Bottom half of the housing**

- Screw two eye bolts (35) with suitable threads tight into the cross-placed opposite tapped holes (9).

Bearing size	9	11	14	18	22	28
Tapped hole	M 10	M 12	M 16	M 20	M 24	M 30

- Connect the lifting equipment to the eye bolts (35).

**Shells**

- Screw two eye bolts or screw hooks with suitable threads tight into the tapped holes (32):

Bearing size	14	18	22	28
Tapped hole	M 8	M 12	M 12	M 16

- Connect the lifting equipment to the screw hooks.

### 6.3 Preparation for dismantling

**Attention!**

Make sure that the work place is clean. Contamination and damages to the bearing, especially of the working surfaces, have a negative influence on the operating quality and could lead to premature damage.

**Attention!**

Do not use any violence or force!

E..T.

- Shut down the installation and ensure it against unintended operation.
- Shut down the oil supply system.
- Interrupt the cooling water supply.
- Dismantle all thermo sensors from the tapped holes (22), (36).
- Take all necessary measures to collect the lubricating oil.
- Unscrew the hexagon head plug (14) and collect the lubricating oil.

**Risk of pollution!**

Please observe the instructions for the use of the lubricating oil. The manufacturer can provide necessary information on waste oil disposal.

- Tighten the hexagon head plug (14) to the following torque rates:

Bearing size	9	11	14	18	22	28
Torque (Nm]	30	30	30	40	60	60

- Inform yourself about maintenance and inspection of the oil supply system ( see also the Technical Documentation of the Oil Supply System ). Carry out all necessary maintenance and inspection works.

### 6.4 Dismantling of the shaft seals

- Dismantle both shaft seals of the bearing.  
Proceed correspondingly to the seal type:

- |   |               |
|---|---------------|
| • Floating labyrinth seal (Type 10)                   | Chapter 6.4.1 |
| • Floating labyrinth seal with dust flinger (Type 11) | Chapter 6.4.2 |
| • Floating labyrinth seal with baffle (Type 12)       | Chapter 6.4.3 |
| • Rigid labyrinth seal (Type 20)                      | Chapter 6.4.4 |
| • Rigid labyrinth seal with dust flinger (Type 21)    | Chapter 6.4.5 |
| • Rigid labyrinth seal with baffle (Type 22)          | Chapter 6.4.6 |

### Type 10

#### 6.4.1 Floating labyrinth seal (Type 10)

- Loosen all screws (55) and remove.
- Remove simultaneously in axial direction both top half (48) and bottom half (51) of the seal carrier from the housing.
- Shift a little (about 20 mm ) the top half (53) of the seal. Tilt it over carefully until the garter spring (49) unbends.



#### **Warning of injury!**

During dismantling of the floating labyrinth seal hold tight the garter spring (49) which is under tension and could bounce back and lead to injury.

- Open the garter spring (49) and remove the bottom half of the seal (52) from the shaft.

### Type 11

#### 6.4.2 Floating labyrinth seal with dust flinger (Type 11)

- Dismantle the dust flinger (69). Loosen the screws (70) and take out the dust flinger (69) from the groove (57) of the seal carrier. Remove both halves of the dust flinger.
- Go on as indicated for type 10 (see Chapter 6.4.1).

### Type 12

#### 6.4.3 Floating labyrinth seal with baffle (Type 12)

- Disconnect both top (66) and bottom (68) halves of the baffle by removing the screws (67).
- Go on as indicated for type 10 (see Chapter 6.4.1).

### Type 20

#### 6.4.4 Rigid labyrinth seal (Type 20)

- Loosen all screws (60) and remove.
- Remove the screws (61).
- Remove simultaneously in axial direction both top (59) and bottom (63) halves of the rigid labyrinth seal.

### Type 21

#### 6.4.5 Rigid labyrinth seal with dust flinger (Type 21)

- Dismantle the dust flinger (69). Loosen the screw (70) and take out the dust flinger (69) from the groove (62) of the rigid seal. Remove both halves of the dust flinger.
- Go on as indicated for type 20 (see Chapter 6.4.4).

### Type 22

#### 6.4.6 Rigid labyrinth seal with baffle (Type 22)

- Disconnect the top half (66) and the bottom half (68) of the baffle by removing the screws (67).
- Go on as indicated for type 20 (see Chapter 6.4.4).

### 6.5 Dismantling of the top half of the housing

**E..V.**

- Loosen the screws (2) and remove the bearing cover (1).
- Loosen the screws (34) and lift the top half of the housing (5).

### 6.6 Removal of the top half of the shell

- Unscrew the screws (31) and lift the top half of the shell (6).

#### **Attention!**

Do not damage the thrust and radial working surfaces.

#### **Attention!**

In the case of insulated housings (white plastic insulating foil) avoid any jamming of the top half of the shell when you lift it up.

Jamming could lead to damage of the insulating foil in the bottom half of the housing.

**E..L.**

### 6.7 Dismantling of the loose oil ring

- Open both split lines of the loose oil ring (44) by untightening and taking out the screws (47). Separate both halves of the loose oil ring (44) carefully without using any tools or other devices.

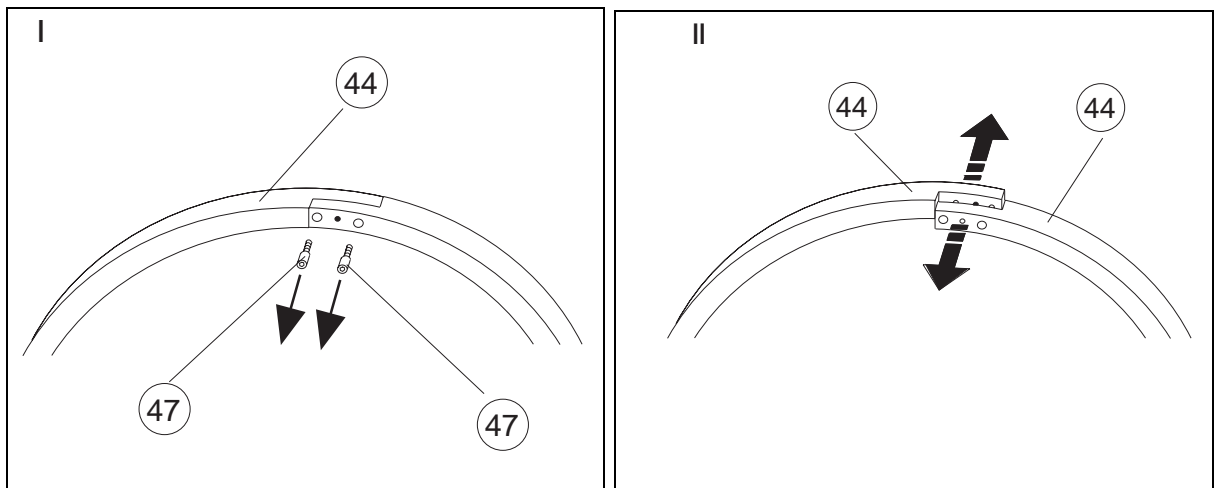


Illustration 1 Opening of the loose oil ring

To check the geometry of the loose oil ring put it together as follows:

- Press the positioning pin (45) into the holes (46).
- Adjust both halves of the loose oil ring till the split lines match each other.
- Tighten the screws (47).

### 6.8 Removal of the bottom half of the shell

**Attention!**

Make sure that all bearings mounted on a shaft line are opened. Loosen the screws at the split line of the housings.

**Attention!**

The lifting equipment should not come in touch with the seal and working surfaces of the shaft.

- Lift the shaft up to the point where shaft and bottom half of the shell (27) do not touch each other any more. Protect the shaft against unintended movement.
- Turn the bottom half of the shell (27) out of the bottom half of the housing (8) and remove it from the shaft.

**Attention!**

If the bottom half of the shell (27) is provided with metal tabs (29) do not remove them. They regulate the oil level in the oil pockets.

### **7      Cleaning and Checking of the Bearing**

#### **Attention!**

Use only non-aggressive detergents such as for instance

- VALVOLINE 150
- Alkaline cleaning compounds (pH-value 6 to 9, short reaction time).



#### **Warning of injury!**

Please observe the instructions for the use of the detergents.

#### **Attention!**

Never use cleaning wool or cloth. Residues of such materials left in the bearing could lead to excessive temperatures.

– Clean the following parts thoroughly:

- top half of the housing (5)
- bottom half of the housing (8)
- top half of the shell (6)
- bottom half of the shell (27)
- sealing surfaces of the top half (48) and bottom half (51) of the seal carrier or of the rigid labyrinth seal
- loose oil ring (44).

**E..L.**

## E..T.

- Check the condition of the cooler (13).

In case where the cooler (13) is incrustated with oil sludge:

- Dismantle the cooler. Remove the incrustation by using for instance a wire brush.
- Install the cooler (13) by placing it in angular adjustment into the bearing.

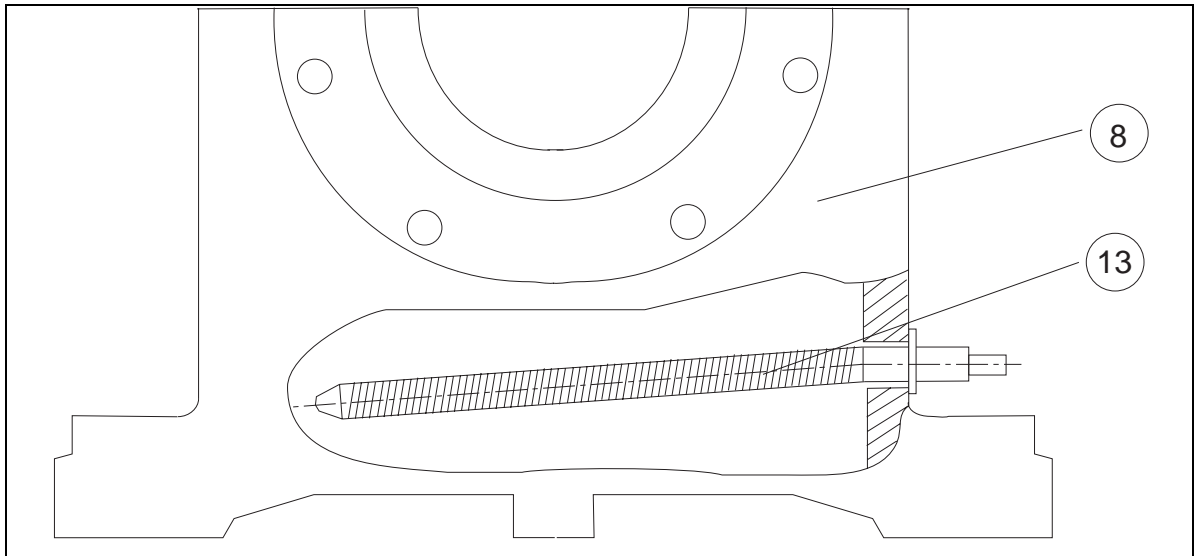


Illustration 2 Assembly position of the cooler

- Carry out a visual check of the wear condition of all bearing parts. The following table provides information on the parts that must be replaced in case of wear. The right evaluation of the wear condition, especially of the working surfaces of the shell, implies a lot of experience. If in doubt, replace the worn part with new ones.

Bearing part	Wear condition	Maintenance proceedings
Shell	Scoring	Bearing temperature before inspection: <ul style="list-style-type: none"> <li>• not increased - no new shells</li> <li>• increased- new shells</li> </ul>
	White metal lining damaged	New shell
	Bow wave ridges	New shells
Shaft seal	Baffles broken or damaged	New shaft seal
Loose oil ring	Geometrical form ( roundness, flatness ) visibly changed	New loose oil ring

**E..C.  
E..L.  
E..Y.  
Size  
9 - 14**

- Check the projection of the positioning pin (4) according to the values indicated below:

Bearing size	9	11	14	18	22	28
Projection of the positioning pin (4) mm	7	8	10	12	14	16

In case the projection is less than indicated,

- drive the positioning pin (4) into the top half of the housing (5) until the indicated value is reached.

**insulated  
bearings**

- Check the insulating layer of the spherical seating (10) of the top half (5) and bottom half (8) of the housing. In case of damage contact the RENK-sales agency in charge.

**E...A**

- Check the mobility of all RD-thrust pads (42).



### 8 Assembly of the Bearing

**Attention!**

Remove all impurities or other objects such as screws, nuts, etc. from inside the bearing. If left inside they could lead to damage of the bearing. Cover up the opened bearing during work breaks.

**Attention!**

Carry out all assembly operations without making use of force.

**Attention!**

Use a liquid screw locking compound (e.g. LOCTITE 242) to ensure all screws.

#### 8.1 Fitting in the bottom half of the shell

E...E

**Attention!**

Mounting the bottom half of the shell (not marked with an arrow) correctly will ease the assembly of the top half shell (marked with an arrow) (see chapter 8.3).

- Apply some lubricant to the spherical seating (10) in the bottom half of the housing (8) and to the working surfaces of the shaft. Use the same type of lubricant as indicated for bearing operation ( see type plate ).
- Place the bottom half of the shell (27) on the working surface of the shaft. Turn the bottom half of the shell (27) into the bottom half of the housing (8) with the split line surfaces of both halves in true alignment.

If the shell does not turn in easily, readjust the bottom half of the housing.

E...B,  
E...K,  
E...E,  
E...A

**Attention!**

These operations should be carried out most carefully. The thrust parts of the bottom shell must not be damaged.

- Lower the shaft until it rests on the bottom half of the shell (27).

E..L.

### 8.2 Installation of the loose oil ring

- Untighten and remove the screws (47). Separate both halves of the loose oil ring (44) carefully without using any tools or other devices.

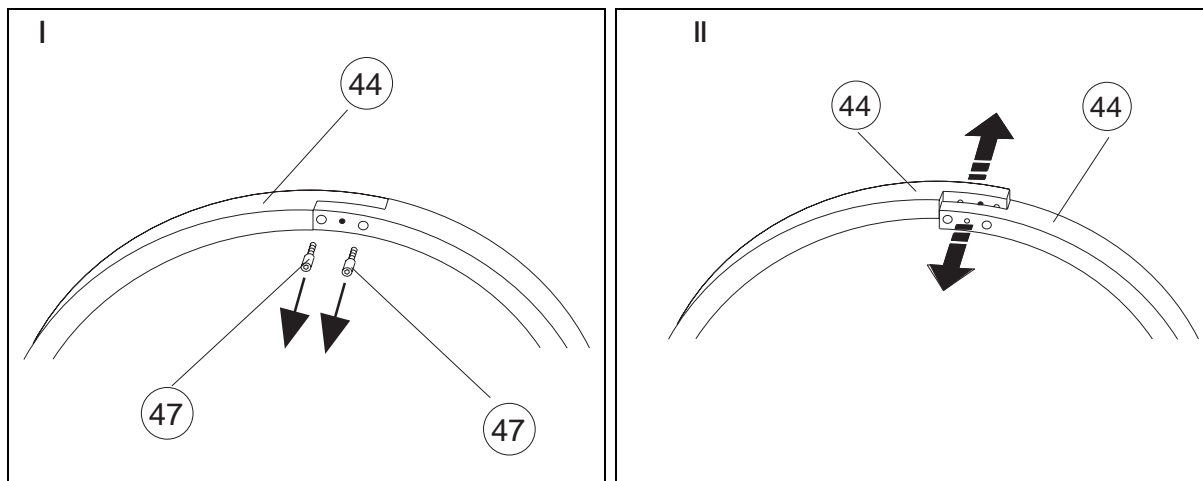


Illustration:3 Opening of the loose oil ring

- Place both halves of the loose oil ring into the shell groove (27) around the shaft. Press the dowel pins (45) of each split line into the corresponding holes (46).
- Adjust both halves of the loose oil ring till the split lines match each other.

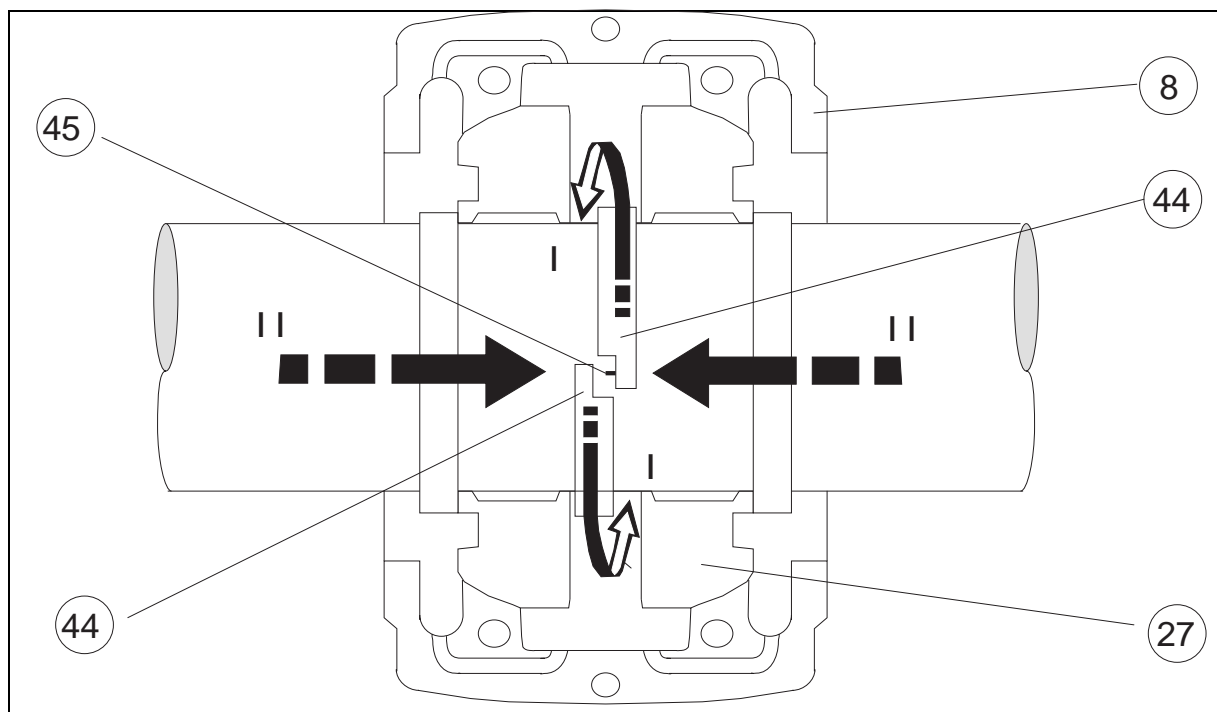


Illustration 4: Installation of the loose oil ring

- Tighten the screws (47) to the following torque rates:

Bearing size	9	11	14	18	22	28
Torque [Nm]	1,4	1,4	1,4	2,7	2,7	2,7

## 8.3 Fitting in the top half of the shell

- Apply some lubricant to the working surfaces of the shaft. Use the same type of lubricant as specified for bearing operation (see type plate).
- Check that the engraved numbers (28), (30) on the bottom and top halves of the shell correspond.
- Place the top half of the shell (6) on the shaft; both engraved numbers (28), (30) should be on the same side.

### Attention!

An incorrectly placed shell could jam the shaft thus leading to the damage of both shaft and bearing.

**E...B,  
E...K,  
E...E,  
E...A**

### Attention!

Place the top half of the shell carefully on the shaft. The thrust parts of the top half of the shell must not be damaged.

**insulated  
bearings**

In the case of bearings arranged for insulation monitoring, connect the black cable for insulation monitoring to the shell.

According to the bearing type, there are two possibilities of connection.

1. The black cable is provided with a cable connector.

- Plug the cable with the cable connector into the counterpart available on the top of the shell.
- Lead the cable through the cable gland in the bottom half of the housing and out of the bearing.
- Tighten the cable gland oil-tight.

2. The black cable is provided with an eyelet.

- Fasten the cable with the eyelet to the split line of the shell, by using one of the shell joint bolts.
- Lead the cable through the cable gland in the bottom half of the housing and out of the bearing.
- Tighten the cable gland oil-tight.

- Tighten up the screws (31) to the following torque rates:

Bearing size	9	11	14	18	22	28
Torque [Nm]	8	8	20	69	69	170

- Check the split line of the shell by using a feeler gauge. The split line gap should be less than 0,05 mm. If the split line is greater than this, dismantle both top and bottom (6), (27) halves of the shell. Rework the split line surfaces of the top half (6) and bottom half (27) of the shell with an oil stone.

**E..L.**

- Check the mobility of the loose oil ring (44).

**E..L.  
Marine  
Bearing**

A guide bush in the top half of the shell secures the function of the loose oil ring.

- Check the mobility of the loose oil ring (44) in the guide bush.

### E...E

Shells with taper land faces suitable only for one direction of rotation are marked with an arrow on the top half shell, which indicates the sense of rotation of the shaft.

The arrow indicates the allowed direction of shaft rotation after completion of the bearing assembly.

- Before mounting the top half of the housing check that the proposed direction of rotation of the shaft corresponds to the direction indicated by the arrow on the top half of the shell.
- If the directions match, continue the assembly of the bearing.
- If the directions do not match, the shell must be disassembled, re-aligned and mounted again.

#### Attention!

A wrongly placed shell, without observance of the direction of rotation of the shaft, impairs the operational safety of the bearing.

### 8.4 Closing of the bearing

- Check the true alignment of the shell (6),(27) and bottom half (8) of the housing.

### E..C. E..L. E..Y.

The positioning pin (4) in the top half of the housing fits in the corresponding hole (7). The shell is thus placed into its right position.

- Check that the engraved numbers (26) and (33) on the top and bottom halves of the housing correspond.
- Clean the split line surfaces of the top and bottom halves (5), (8) of the housing.
- Apply sealing compound to the whole surface of the split line of the bottom half (8) of the housing.

Please observe the instructions for the use of sealing compound.

- Lower the top half of the housing (5) vertically on the bottom half (8) of the housing. The engraved numbers (26) and (33) should be on the same side of the bearing. Lower the top half of the housing (5) till the split line of the housing is not visible any more.
- Gently hit the bottom half of the housing (8) with a nylon hammer, thus ensuring the alignment of the spherical seating.
- Insert the four screws (34). Tighten them crosswise to the following torque rates:

Bearing size	9	11	14	18	22	28
Torque [Nm] $\mu_{\text{tot}} = 0,1$ (lightly oiled)	40	69	170	330	570	1150

### E..V.

- Place the bearing cover (1) on the top half of the housing (5) and tighten down with the screws (2).

insulated  
bearings

### Insulation monitoring

In the case of electric insulated bearings provided with insulation monitoring, the cable coming out of the housing must be connected in a professional manner.

According to the type supplied, please follow the assembly instructions given below.

- a) The cable is very short and provided with a further cable connector at the end of it.  
This cable is ready for connection to the housing.  
The bottom half of the housing is provided with the counterpart.
- Plug the cable connector into the counterpart.

#### **Attention!**

This connection bypasses the electrical insulation of the bearing.  
In the case of electric machines, make sure at least one bearing is electrically insulated.

To check the electrical insulation, interrupt the connection cable - housing. Check the electrical resistance with a suitable measuring instrument. Make sure that both bearings and the coupling are electrically insulated.

- b) The cable has a free end. In this case the customer has to make the connection.

#### **Attention!**

If only one bearing is insulated, the end of the cable must not be earthed.

Any further connection depends on the customer's requirements related to the insulation monitoring and can not therefore be described here.

### 8.5 Assembly of the shaft seals

- Assemble both shaft seals of the bearing.  
Proceed according to the seal type used:
- Floating labyrinth seal (Type 10) Chapter 8.5.1
- Floating labyrinth seal with dust flinger (Type 11) Chapter 8.5.2
- Floating labyrinth seal with baffle (Type 12) Chapter 8.5.3
- Rigid labyrinth seal (Type 20) Chapter 8.5.4
- Rigid labyrinth seal with dust flinger (Type 21) Chapter 8.5.5
- Rigid labyrinth seal with baffle (Type 22) Chapter 8.5.6

#### Type 10

#### 8.5.1 Floating labyrinth seal (Type 10)

**Warning of injury!**

During assembly hold the garter spring ends (49) securely to avoid them suddenly releasing and causing possible injury!

Check the movement of the floating labyrinth seal on the shaft:

- Put the garter spring (49) around the shaft and hook both ends into each other.
- Put both halves of the seal (52), (53) in their place on the shaft.
- Put the garter spring (49) into the groove (50).
- Turn the floating labyrinth seal on the shaft.

**Attention!**

The floating labyrinth seal should turn easily on the shaft. A jammed seal could lead to overheating during operation and even to shaft wear.

If the floating labyrinth seal jams,

- dismantle the seal and
- remove the worn parts of the seal carefully, by using emery paper or a plain scraper.

- Dismantle the floating labyrinth seal.

- Apply a uniform layer of sealing compound to the seal surfaces and to the split line surfaces of both halves of the seal (52), (53).

Please observe the instructions for the use of sealing compound.

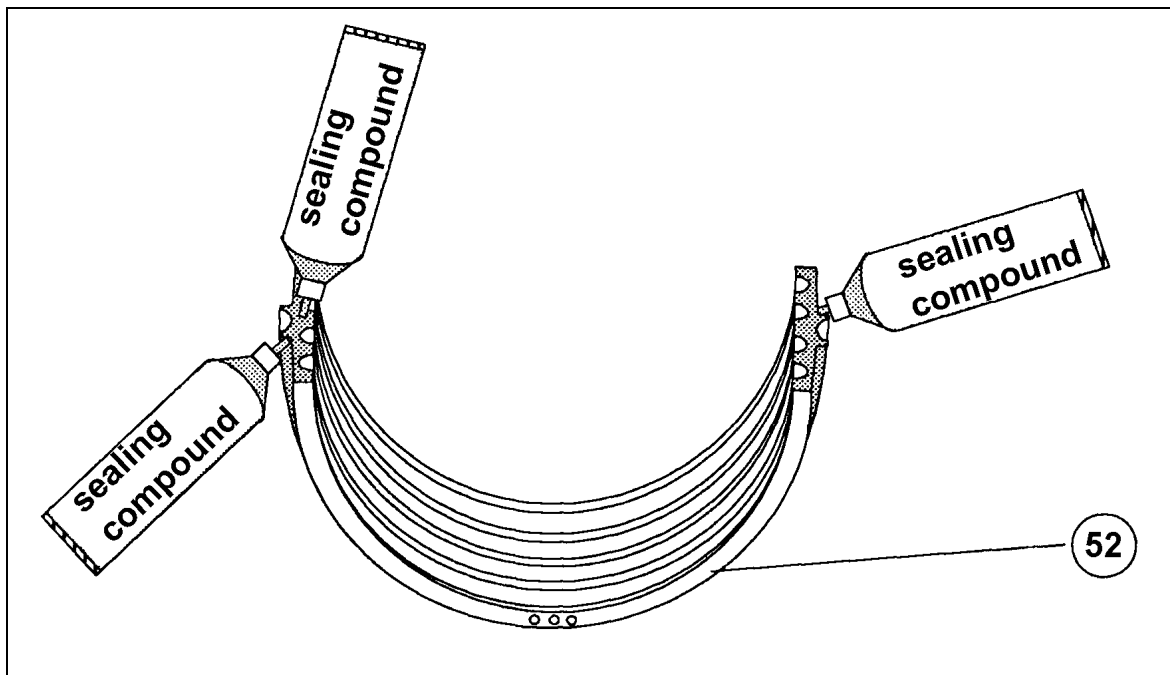


Illustration 5: Application of sealing compound to the floating labyrinth seal

- Press the bottom half of the seal (52) against the shaft.
- Place the top half of the seal (53) on the shaft and align both halves of the seal to each other.
- Place the garter spring (49) into the groove (50) and stretch until both ends can be hooked.

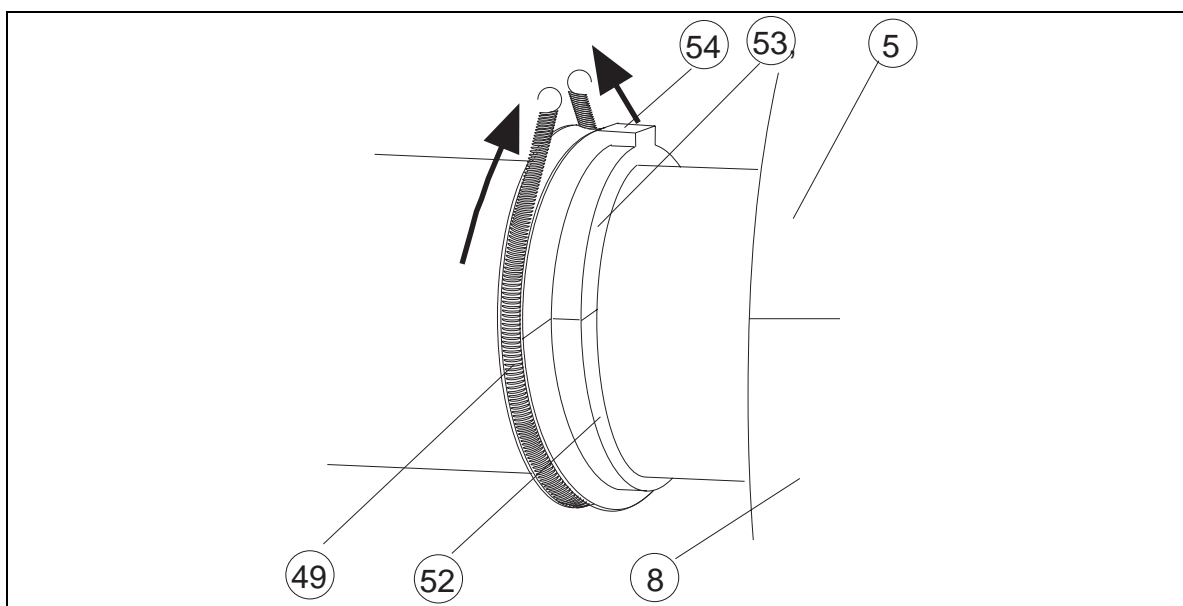


Illustration 6: Assembly of the floating labyrinth seal

- Place in true alignment the split line of the floating labyrinth seal and the split line of the seal carrier.
- Check that both engraved numbers (56) and (58) on top and bottom halves of the seal carrier (48), (51) correspond.
- Clean the following parts:
  - the seal surfaces of the top (48) and bottom (51) half of the seal carrier (the groove of the floating labyrinth seal, the flange surfaces)
  - the split line surfaces of the top (48) and bottom (51) half of the seal carrier
  - the flange surfaces of the housing.
- Apply a uniform layer of sealing compound to:
  - the lateral surfaces of the groove at the top (48) and bottom (51) half of the seal carrier
  - the flange surfaces of the top (48) and bottom (51) half of the seal carrier
  - the split line surfaces of the bottom half of the seal carrier (51).

Please observe the instructions for the use of sealing compound.

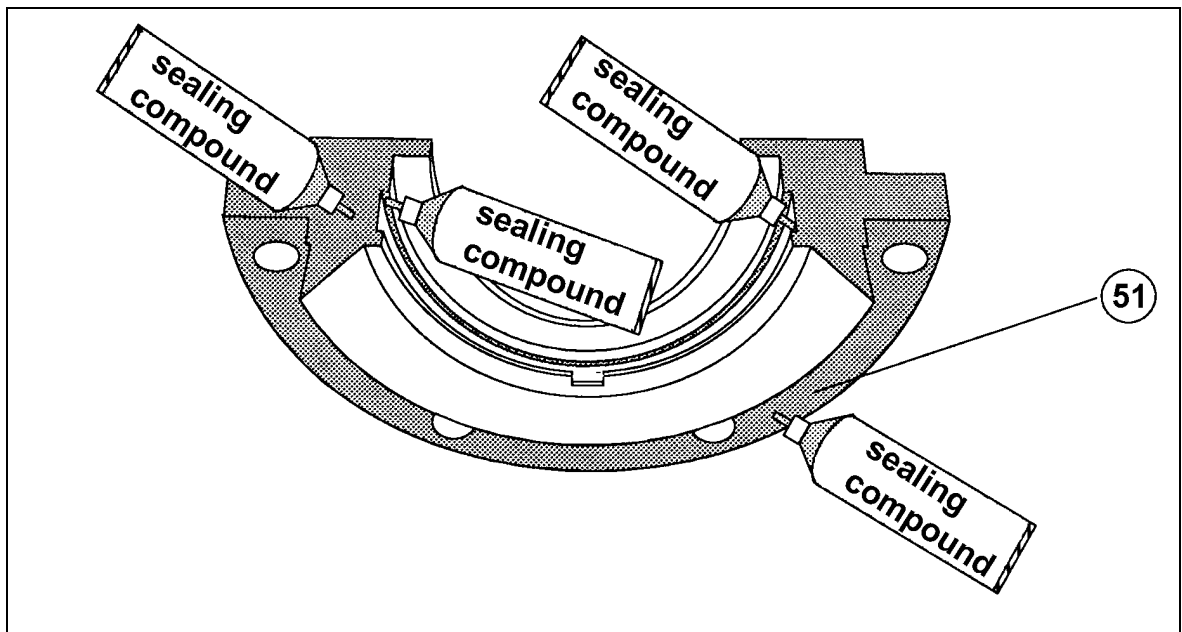


Illustration 7: Application of sealing compound to the seal carrier



- Place the top half of the seal carrier (48) on the top half of the seal (53). Press the bottom half (51) of the seal carrier against it. Push the shaft seal completely into the housing.

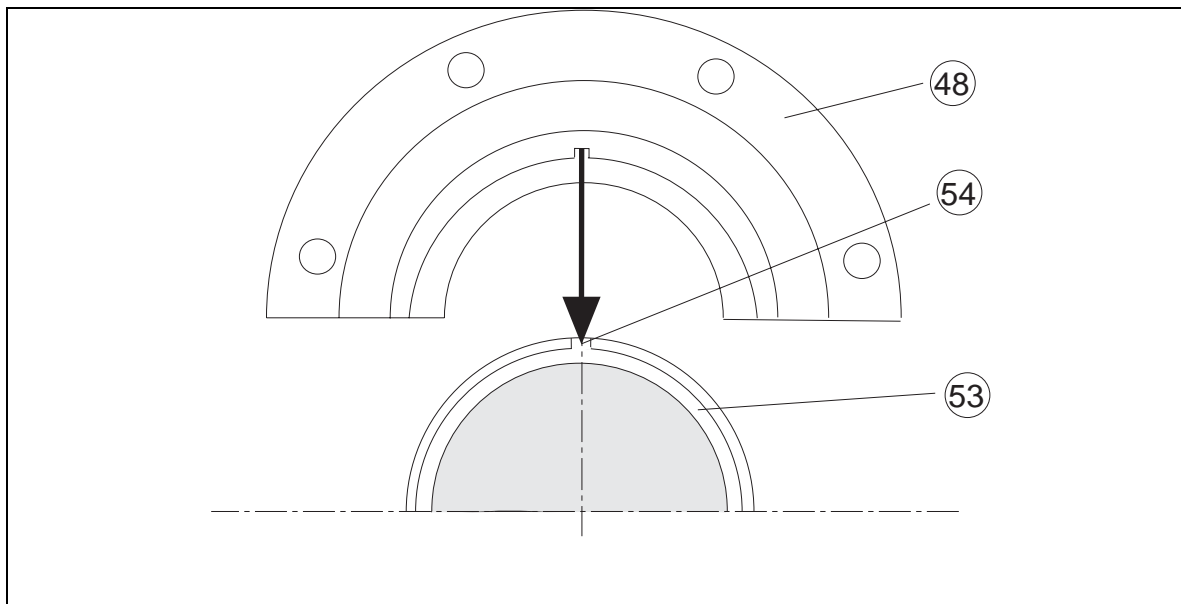


Illustration 8: Assembly of the seal carrier

- Place in true alignment the split lines of the seal carrier and the housing.
- Tighten up the screws (55) to the following torque rates:

Bearing size	9	11	14	18	22	28
Torque [Nm]	8	8	8	20	20	20

## Type 11

### 8.5.2 Floating labyrinth seal with dust flinger (Type 11)

- Assemble the floating labyrinth seal with dust flinger as described in Chapter 8.5.1, Floating labyrinth seal type 10.
- Place both halves of the dust flinger (69) in front of the shaft seal around the shaft. Loosely screw in the screws (70).

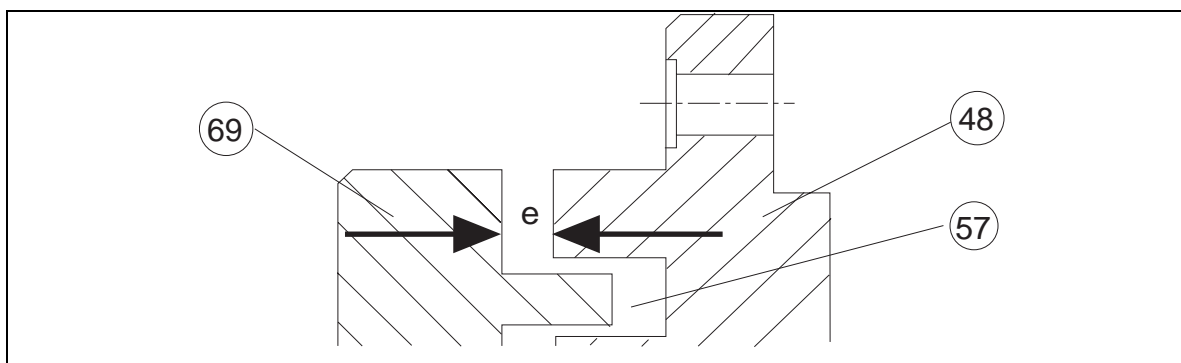


Illustration 9: Clearance between dust flinger and seal carrier

## E...Q

- Push the dust flinger (69) into the groove (57) of the seal carrier.
- Set the clearance "e" at the following figure around the whole unit:

**maximum longitudinal extension of the shaft in operation + 1 mm**

(Parameters indicated in the Technical Documentation of the Installation).

- Tighten up the screws (70) to the following torque rates:

Seal diameter [mm]	80-140	>140
Torque [Nm]	7	18

## E...B, E...K, E...E, E...A

- Push the dust flinger (69) into the groove (57) of the seal carrier.
- Set the clearance "e" at **1 mm** around the whole unit.
- Tighten the screws (70) to the following torque rates:

Seal diameter [mm]	80-140	>140
Torque [Nm]	7	18

## Type 12

### 8.5.3 Floating labyrinth seal with baffle (Type 12)

- Assemble the floating labyrinth seal with baffle as in Chapter 8.5.1, Type 10.
- Apply a uniform layer of sealing compound to the flange surfaces of the top half (66) and bottom half (68) of the baffle.
- Screw
  - the top half of the baffle (66) onto the top half of the seal carrier (48)
  - the bottom half of the baffle (68) onto the bottom half of the seal carrier (51).
- Tighten the screws (67) to the following torque rates:

Seal diameter [mm]	80-140	>140
Torque [Nm]	4	10

## Type 20

### 8.5.4 Rigid labyrinth seal (Type 20)

- Check if the engraved numbers (64) and (65) on the bottom half (63) and top half (59) of the rigid labyrinth seal correspond.
- Clean
  - the flange surfaces of the top half (59) and bottom half (63) of the rigid labyrinth seal
  - the split line surfaces of the top half (59) and bottom half (63) of the rigid labyrinth seal
  - the flange surfaces of the housing.
- Apply a uniform layer of sealing compound to the following parts:
  - the flange surfaces of the top half (59) and bottom half (63) of the rigid labyrinth seal
  - the split lines of the bottom half (63) of the rigid labyrinth seal.

Please observe the instructions for the use of sealing compound.

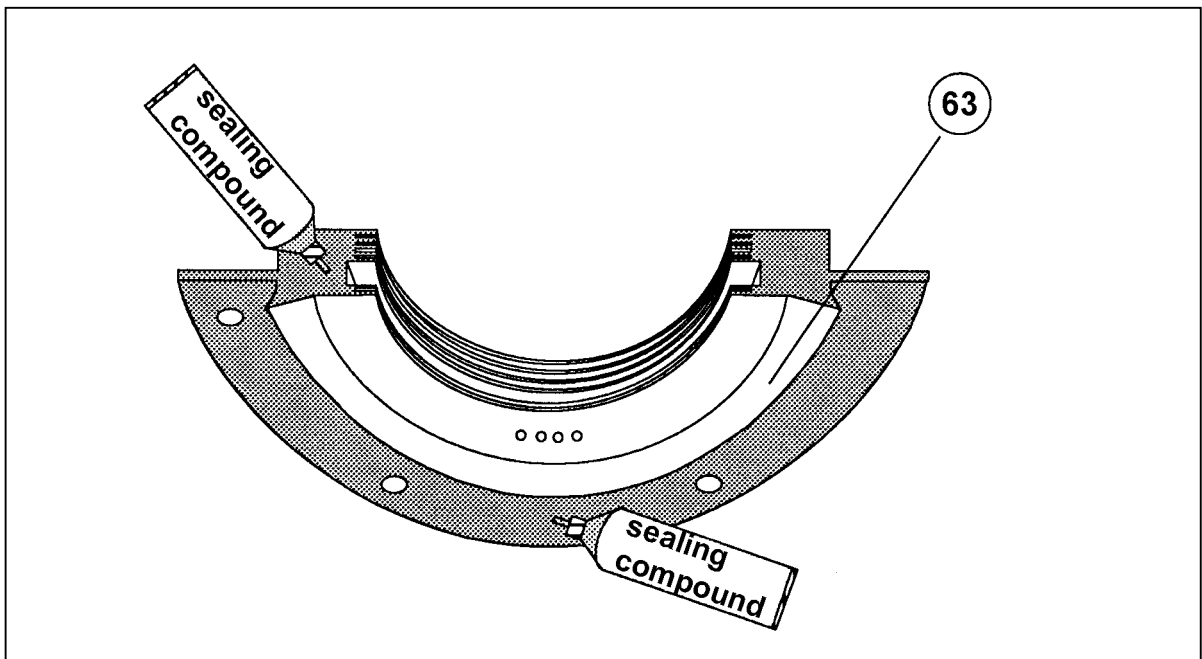


Illustration 10: Application of sealing compound to the rigid labyrinth seal

- Place the top half (59) of the rigid labyrinth seal on the shaft and press slightly the bottom half (63) of the rigid labyrinth seal from below against it. Lightly push the rigid labyrinth seal completely into the housing.
- Tighten the screws (61).
- Place in parallel alignment the split line of the rigid labyrinth seal and the split line of the housing. Press the rigid labyrinth seal slightly from below against the shaft. Adjust the rigid labyrinth seal in such a way that the clearance "f" between the shaft and the rigid labyrinth seal at both split lines has the same value.

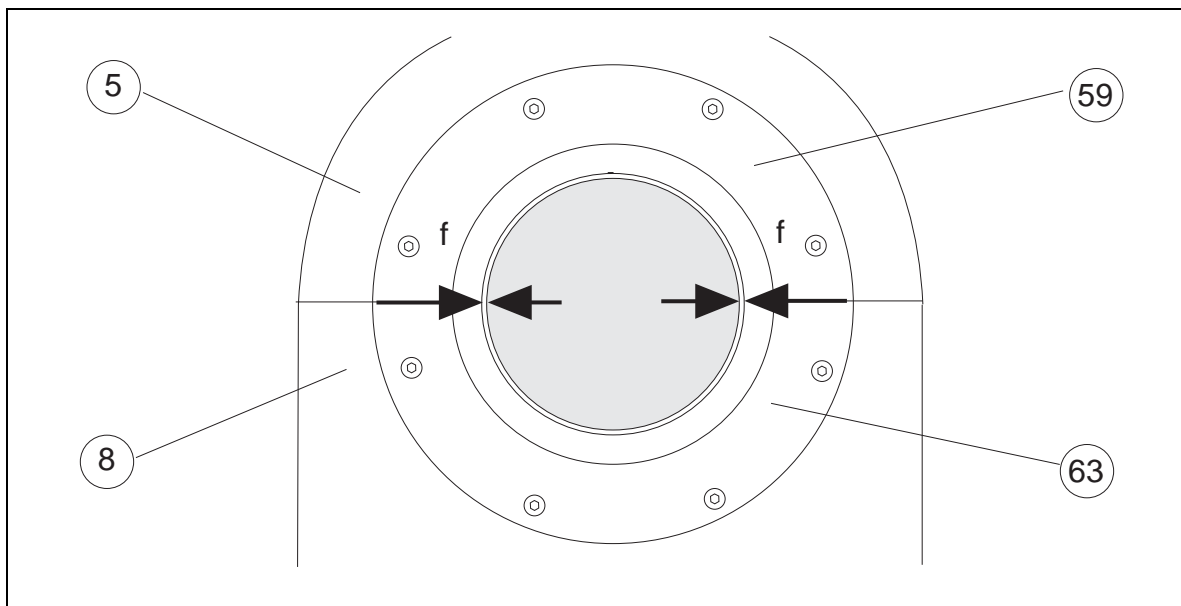


Illustration 11: Alignment of the rigid labyrinth seal

- Tighten the screws (60) to the following torque rates:

Bearing size	9	11	14	18	22	28
Torque [Nm]	8	8	8	20	20	20

**Type  
21**

**8.5.5 Rigid labyrinth seal with dust flinger (Type 21)**

- Assemble the rigid labyrinth seal with dust flinger as indicated in Chapter 8.5.4, Type 20.
- Place both halves of the dust flinger (69) round the shaft, in front of the rigid labyrinth seal. Loosen the screws (70).

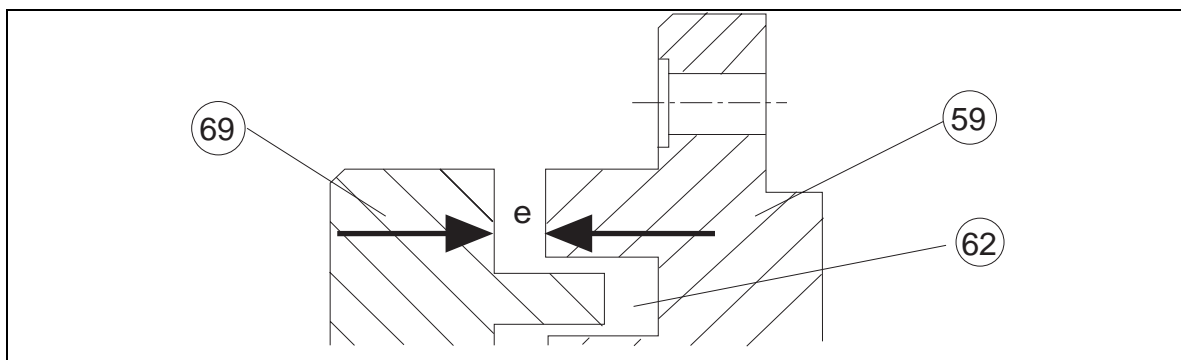


Illustration 12: Clearance between dust flinger and rigid labyrinth seal

**E...Q**

- Push the dust flinger (69) into the groove (62) of the rigid labyrinth seal.
- Set the clearance "e" at the following figure around the whole unit:  
**maximum longitudinal extension of the shaft in operation + 1 mm**  
(Parameters are indicated in the Technical Documentation of the Installation).
- Tighten the screws (70) to the following torque rates:

Seal diameter [mm]	80-140	>140
Torque [Nm]	7	18

**E...B,  
E...K,  
E...E,  
E...A**

- Push the dust flinger (69) into the groove (62) of the rigid labyrinth seal.
- Set the clearance "e" at **1 mm** around the whole unit.
- Tighten the screws (70) to the following torque rates:

Seal diameter [mm]	80-140	>140
Torque [Nm]	7	18

**Type  
22**

**8.5.6 Rigid labyrinth seal with baffle (Type 22)**

- Assemble the rigid labyrinth seal with baffle as described in Chapter 8.5.4.
- Apply a uniform layer of sealing compound to the flange surfaces of the top half (66) and bottom half (68) of the baffle.
- Tighten
  - the top half of the baffle (66) on the top half (59) of the rigid labyrinth seal
  - the bottom half of the baffle (68) on the bottom half (63) of the rigid labyrinth seal.
- Tighten the screws (67) to the following torque rates:

Seal diameter [mm]	80-140	>140
Torque [Nm]	4	10

### 9 Starting Operation after Inspection

- Fit the thermo sensors for:
  - temperature measurement of the journal part in the tapped holes (22)
  - temperature measurement of the thrust part in the tapped holes (36) (optional).
- Retighten all screw plugs (24) in the tapped holes (14), (18), (21), (22), (23), (25), (36) to the following torque rates:

Screw plug threads	G 3/8	G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2	G 2	G 2 1/2
Torque [Nm] for plugs with moulded on plastic seal	30	40	60	110	160	230	320	500
Torque [Nm] for plugs with elastic seal	34	60	85	130	240	300	330	410

- Check that the top sight glass (1) is tight; the screws should be hand-tight.
- Retighten the connection holes for oil inlet and oil outlet and the holes for the thrust part oil supply system (optional). The torque depends on the threaded joints used.
- Retighten the foot bolts to the necessary torque. The torque rate depends on:
  - the foot bolts used
  - the material the housing and the foundation are made of ( see the Technical Documentation of the Installation).
- Carry out a visual check of the assembled bearing.
- Fill up the oil supply system with lubricant. Use the same type of lubricant as specified on the type plate.
- Start operating the oil supply system in order to fill up the bearing with lubricant.
- Check
  - the way the oil supply system works (see also the Technical Documentation of the Installation).The lubricant quantity at the bearing oil inlet must correspond to the values indicated in the EDP-calculations.
  - that the temperature monitoring equipment works.

#### Attention!

- Not enough lubricant leads to temperature rises and thus to damages to the bearing.
- Too much lubricant leads to leakages.

#### E.T..

- Start operating the cooling water supply system and check its functioning.

The bearing is ready for operation.

- Supervise the bearing during the trial run ( 5 - 10 operating hours ).  
Pay special attention to:
  - the way the oil supply system works (necessary lubricant quantity, lubricant pressure before entering the bearing)
  - bearing temperature
  - sliding noises of the shaft seals
  - tightness
  - occurrence of inadmissible vibrations.

**Attention!**

If the bearing temperature exceeds the calculated value of 15 K (see the EDP-bearing calculations) stop the installation immediately. Carry out an inspection of the bearing and find out the causes.

### **10 Corrosion Protection for Longer Standstill Periods**

If you want to protect the bearing mounted on an installation against corrosion proceed as follows:

- Dismantle the bearing (see Chapter 6).
- Clean the bearing (see Chapter 7).
- Paint or spray the top half of the shell (6), the bottom half of the shell (27) and the shaft with TECTYL 511.
- Assemble the bearing (see Chapter 8).
- Close all tapped holes with screw plugs (24).
- Seal the gaps between
  - shaft seal and housing
  - shaft seal and shaftby using a self-adhesive, permanent tape.
- Remove the top sight glass (1). Spray some anti-corrosive such as TECTYL 511 or VALVOLINE into the bearing.
- Put a bag of dessicant (silicate gel) inside. The dessicant absorbs the humidity and prevents the formation of condensation water inside the bearing.
- Close the bearing tight with the top sight glass (1).

In case the standstill period is **longer than 1/2 year**:

- Repeat the preservation procedures.
- Put a new bag of dessicant into the bearing.

In case the standstill period **lasts more years**:

- Dismantle the shells.
- Preserve and store the bearing parts.



### 11 Transport Protection

In case of a machine equipped with slide bearings type EG, ER:

- Carry out the corrosion protection as described in Chapter 10 and apply enough lubricant to the working surfaces of the bearing.
- Pull the rotor against the sub-frame by using timbers placed across the shaft and press firmly into the bearing.

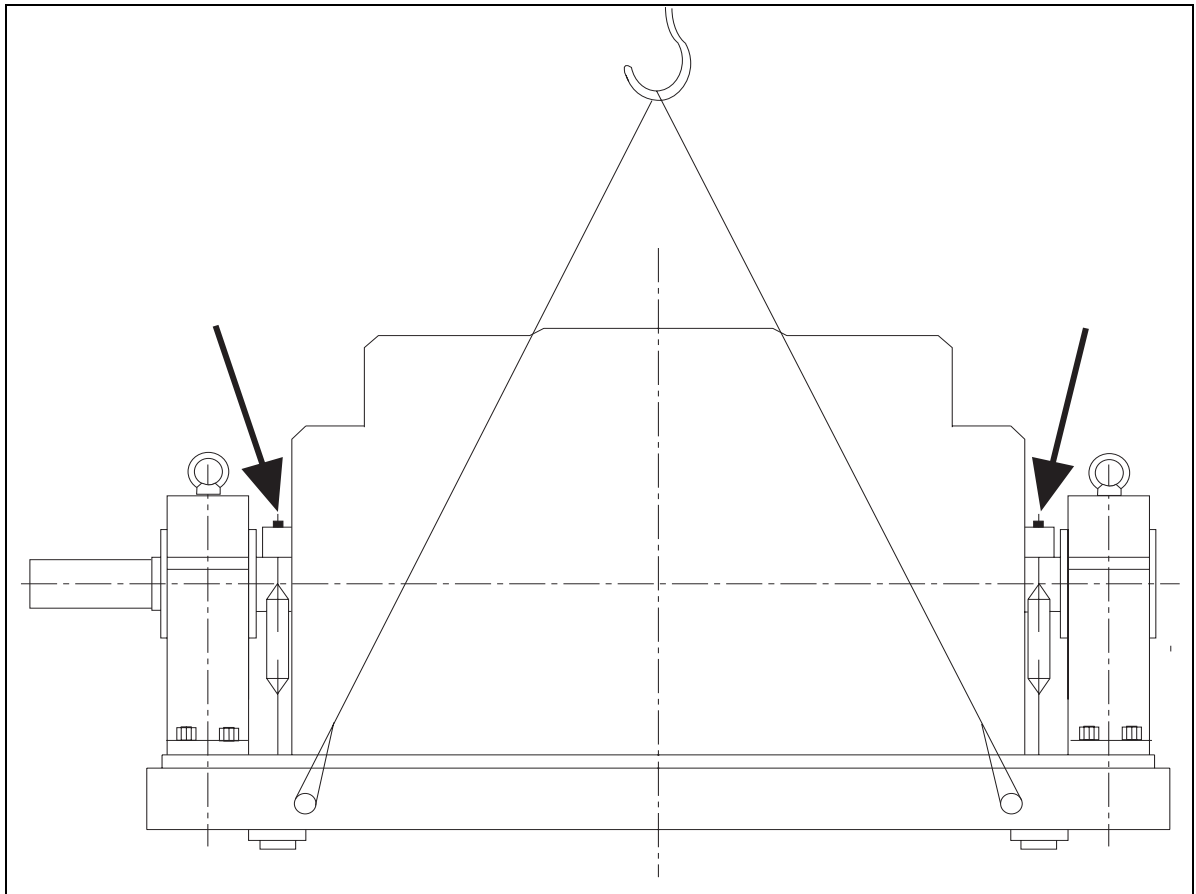


Illustration 13: Transport protection

<b>12</b>	<b>Glossary</b>
<b>Baffle</b>	With bearing types 10 and 20 the baffles are assembled externally in front of the shaft seals. The baffle, made of reinforced polyamide, protects the bearing from dust and water.
<b>Rigid labyrinth seal</b>	<p>The rigid labyrinth seal (type 20) is used with slide bearings type E with high oil throughput. It corresponds to the protective system IP44 and is made of an aluminium alloy.</p> <p>The rigid labyrinth seal is built of two halves, flanged at the housing. The labyrinths that wipe out the lubricant are arranged into two groups. The first two labyrinths, installed inside keep back most of the lubricant. Five further labyrinths protect the bearing from outside. They prevent the lubricant overflow and the ingress of impurities. The overflow lubricant is collected into a chamber between the both groups of labyrinths. Through the return bores the lubricant flows back into the bearing.</p>
<b>Spherical seating</b>	<p>The spherical seating is a special feature enabling the alignment of the shell in the housing. The shell is seated on two spherical seatings. The advantages of the spherical seating are:</p> <ul style="list-style-type: none"><li>• easy at assembly</li><li>• good heat transfer from the shell to the housing</li><li>• suitable for such applications with high thrust or journal loads.</li></ul>
<b>Dust flinger</b>	In the case of bearing types 10 and 20 a light alloy ring is clamped on the shaft in front of the shaft. This ring fits into a groove in the seal carrier or the rigid labyrinth seal, thus building a labyrinth. The labyrinth protects the shaft exit against low pressure that could otherwise "absorb" the lubricant. Low pressure occurs for instance in the case of rotating discs, such as couplings or cooling discs.
<b>Floating labyrinth seal</b>	The floating labyrinth seal (type 10) in the seal carrier is used as a shaft seal in the case of bearings type E operating under normal conditions. It prevents the lubricant and lubricant mist coming out and the ingress of impurities. The floating seal has a high capacity of resistance to wear. It is made of a high-performance, high temperature stability and electrically insulated plastic material. The floating seal consists of two halves held together by a garter spring. Both ends of the spring are hooked together. In the case of slide bearings type EM the floating seal is mounted into a two-piece seal carrier. The groove allows for radial movement of up to 1 mm. The seal is thus insensitive to shaft radial displacement or deflection. The sealing effect is produced by the baffles wiping off the lubricant from the shaft. The lubricant flows back into the bearing via oil return opening.