Additional operating instructions

Shaft seal applications in explosive environment acc. to ATEX (guideline 94/9/EG)

For applications in machines group II, category 2 G TX und 3 G TX

This additional instructions is supplementary to the existing standard installation and maintenance instructions for shaft seals acc. AD200, AK300, A1, so far as it is necessary for applications in explosive environment.
This instructions covers only the shaft seal, for all other components the relevant instructions are to be considered.

Attention!

Please read this instructions conscientiously, all hints to be consider carefully. If there are any questions, please contact the manufacturer. All works to be done by competent persons. In any case of use or installation of materials and spare parts which are not acc. the manufacturers specifications the conformity acc. 94/9/EG is not valid also guarantee expires.

Type of operation
The shaft seals is permitted for to use in intended applications as in this instructions. In any other case as acc. the manufacturers specifications the conformity acc. 94/9/EG is not valid also guarantee expires.

Attention!

It is not allowed to operate the shaft seal in deviating conditions and above the max. permissible pressure, temperature, medium, barrier gas as in the operating instructions.

Type of operation with barrier gas

Barrier gas serves for the inertisation and cooling of the seal and additionally prevents penetration of particles. Temperature increasing by friction of the seal rings is reduced.

Supply with barrier gas is to be guaranteed by the operator of the machine. It is recommended to use a pressure control device. The use of barrier grease is not permissible.

Expected life time of shaft seal

The life time of the seal rings depends from various conditions as

- Operating pressure max. 1,5 bar abs., barrier gas pressure max. 1,8 bar abs.
- temperature
- particle content in barrier gas (particle size: ≤10µm)
- surface quality of parts (see tb.1)
- Stop and go operation
- vibrations

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Due to the operating conditions the shaft seal has to be inspected regularly.

Protection with barrier gas

Shaft seals which are planned for operation with barrier gas are equipped with a G1/2“ barrier port. Barrier gas has to be supplied continuously with a suitable pressure by the operator. We recommend a barrier gas control system. It is important to regulate the pressure and not the flow quantity.

Category 2G

Measurement has to be near to the shaft seal housing and installed conformal to ATEX. A barrier gas control device acc. to FFR1, prEN13463-6 –SIL – EN61508 is to plan.
All connections to be technically tight.

Category 3G

Measurement has to be near to the shaft seal housing and installed conformal to ATEX. Barrier gas should be inspected continuously. If the operating pressure of the machine is not continuously a barrier gas contril device as in category 2 G is recommended also.

Nitrogen (N2) is preferred as barrier gas. Also other barrier gas may me acceptable, in this case it is necessary to have the manufacturers release.

Conditions for the barrier gas:

- In case of operating in vacuum, barrier gas prevents the penetration of oxygen into the explosive area
- Barrier gas to be **free of particles > 10 µm**. If it is not, a filter is recommended.

Use of temperature control

Optionally it is possible to use a temperature control in shaft seals. In this case the housing is made with a thread for the installation of temperature control (PT100).
In case of installation EN13456-6 and EN60079-14 to be consider. A metallic contact between measuring surface and Shaft seal housing must be ensured.

Range of temperature

The shaft seals are designed specially for the planned operating temperatures. An ambient temperature of 40°C is considered. If other higher temperatures are possible the manufacturer must be informed.

Additional heat up of the sealing housing must be excluded

- Protection against solar radiation and other heat sources
- Isolation and lacquer finish or any other surface treatment of the sealing housing is permitted
- Dust has to be cleaned from the housing regularly

Running surface of the seal rings

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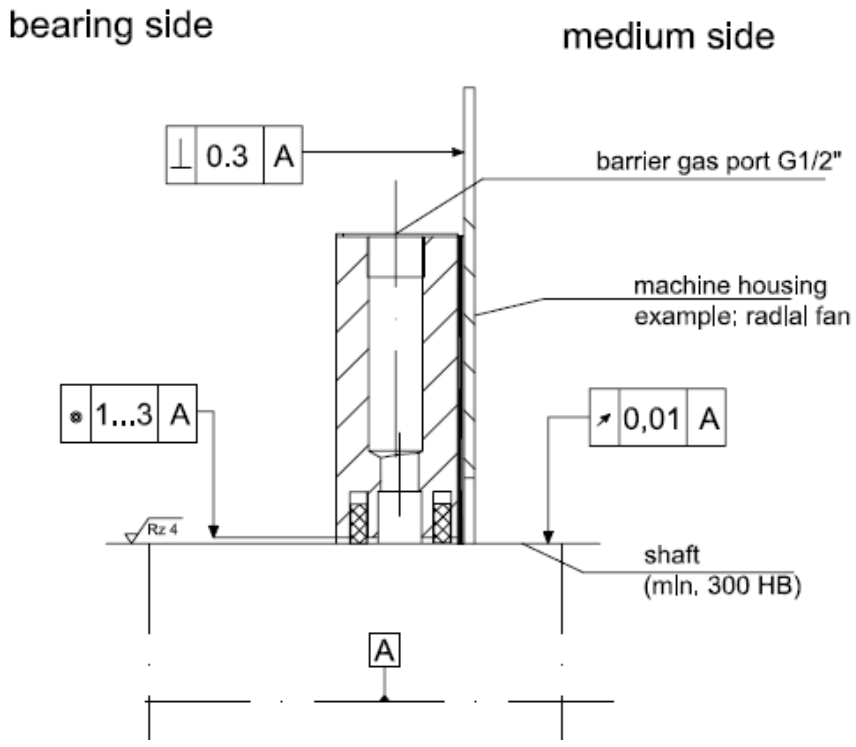
Acceptable tolerances between shaft seal and machine acc. tbl.1

shaft seal type	surface quality of running surface	concentricity of runnig surface	hardness of running surface	fitting in the area of shaft seal	deviation of the angle between housing and running surface	concentricity between housing and running surface
	max. Rz [µm]	max. [µm]	min. [HB]		max. (mm)	max. (mm)
AD200 Ex	0,8 / 4	10	300	h6	0,3	3
AKA300Ex	0,8 / 4	10	300	h6	0,3	1
A1Ex	0,8 / 4	10	300	H6	0,3	1

Tbl.1



Sketch Tbl. 1

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Shaft vibrations to be controlled and documented with ATEX conform device and components. High shaft vibrations may cause rise in temperature and excessive wear.

Storage, assembly disassembly, maintenance and disturbance treatment

1. Generally

-In case of any work at the shaft seal it is to guarantee that no explosive atmosphere is existing or may develop

-dust has to be cleaned from surfaces on the shaft seal housing and the near area

-EN1127-1, is to consider

The proceeding for the assembly, disassembly, repair is to be inferred from the standard operating and maintenance instructions to the series AD200 and/or AKA300.

Storage and transport of the rotary shaft seal:
Seal construction units do not vibrate, throw, push, or to fall leave. Store drying up to the assembly in the transportation packing and dust free. If defective parts or damages are recognizable, the rotary shaft seal is to be examined in an appropriate way, since this is otherwise useless. Defective seals or seal parts may not be inserted.

The manufacturer and also the operator of the equipment, into which the rotary shaft seal is built, must guarantee when assembling/repair that excluding original sealing rings are used. If defective parts or damages are recognizable, the rotary shaft seal is to be examined in an appropriate way, since this is otherwise useless. Defective seals or seal parts may not be inserted.

2. Preparation for the assembly

The seal parts are on damages to exchange deformations and outbreaks by transport or storage to examine if necessary. If defective parts or damages are recognizable, the rotary shaft seal is to be examined in an appropriate way, since this is otherwise useless. Defective seals or seal parts may not be inserted.

3. Assembly

When assembling of the secondary seals (by manufacturer of machine) is to be respected sufficiently metallic cross sections to the potential equalization between seal housings and equipment rear wall. The electrical resistance may not exceed1 GΩ . If this cannot be ensured it is to use a ground strap. Parting line and fixing bolts must be tightened with the torques specified in table 2. Liquid screw locking is permitted only if the potential equalization is guaranteed by ground straps. If defective parts or damages are recognizable, the rotary shaft seal is to be examined in an appropriate way, since this is otherwise useless. Defective seals or seal parts may not be inserted.

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Thread	M6	M8	M10	M12	M16
class of strength	A4-70	A4-70	A4-70	A4-70	A4-70
nut torque $M_{A\ dry}$	7 Nm	16Nm	31Nm	53Nm	129Nm

Table 2: torques

4. Disassembly

Safety references to work on the rotary shaft seal:
Before work on the rotary shaft seal (assembly, disassembly and repair)
-In case of any work at the shaft seal it is to guarantee that no explosive atmosphere is existing or may develop

-dust has to be cleaned from surfaces on the shaft seal housing and the near area

-EN1127-1, is to consider

The proceeding for the assembly, disassembly, repair is to be inferred from the standard operating manual to the series WD200 and/or WKA300.

5. Inspection

Additional the following points are to be particularly considered with regular inspections (intervals are from the operator to specify).

Examination of the barrier gas pressure (permissible values see technical documentation). Remove possibly existing dust deposits on the seal

With use of temperature sensors: Examination of the temperature in the seal (permissible values see technical documentation).

Temperature sensors for function, damage and strain relief of the cable run examine? Examine and if necessary clean possibly upstream filters depending upon solid content of the barrier gas for permeability

6. Maintenance and repair

The shaft seal components are to be examined for damages (tears, outbreaks, perceptible intake scoring) and if necessary exchange.

During repair of the shaft seal components must be achieved again in table 1 or the parameter indicated in the special design.

In principle sealing rings are to be exchanged with regularly taking place maintenance work (specified by the equipment manufacturer). The marking of the spare sealing rings must agree with the last revision conditions of the associated technical documentation. When operator changes the operating conditions (pressures, temperatures, wave/wave case diameter etc..) this is to be communicated to the manufacturer.

7. Disturbance treatment

In case of an incident, which was caused by the rotary shaft seal (e.g. check gas loss), as well as by exceeding of the values permissible for the rotary shaft seal (see technical documentation), to examine is the seal in each case

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to open (references in chapter 4 disassembly consider) and check. The components are to examine on damages (references see chapter 6 maintenance and repair). In particular the sealing rings are to examine on outbreaks flakings and inadmissibly high wear of the inside diameter.

8. Marking

The installed sealing rings are individually bored after the operating parameters. For replacement the ident No. is required or the order number is to be indicated, which are laid on for identification on the construction units.