

Diaphragm Seals Selection Guidelines

When selecting a diaphragm seal assembly, the following details must be taken into consideration to ensure a safe and satisfactory operation. For specific technical assistance regarding temperature effects, volumetric compatibility, etc., contact the WIKA customer service department or send a completed diaphragm seal specification sheet (page 315) to the factory for analysis.

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|-------------------------------|----------------------------------|
| 1. Process composition | 6. System fill fluid |
| 2. Temperature | 7. Mounting position |
| 3. Pressure range | 8. Response time |
| 4. Pressure instrument | 9. Seal and gauge matches |
| 5. Process connection | |

1. Process composition

Since the diaphragm and lower housing of the diaphragm seal will be exposed to the process medium, it is critical to select materials for these components which will be compatible with this medium. Tables are available to assist in the selection of these materials (see Pressure Gauge Section), however the customer is the ultimate source for specifying suitable materials. WIKA cannot guarantee suitability. For information, see numerous reference guides such as corrosion table reference books. If the pressure fluid is very thick, solidifies, or is full of solids this should also be taken into consideration.

2. Temperature

Each diaphragm seal measurement system (diaphragm seal, pressure instrument, and cooling element or capillary, if applicable) is filled with an amount of fill fluid at ambient temperature of about 70°F. This temperature is referred to as the system fill temperature. The fill fluid will expand or contract according to temperature changes. This in turn causes the pressure in the sensing element to rise or fall, thus adding zero shifting effects to the instrument output. To reduce this effect, the temperatures of the process and the environment should be specified when selecting a diaphragm seal system (see Diaphragm Seal Specification Sheet). Special advanced calibration techniques can be used to ensure the best possible accuracy. At temperatures above 212°F a cooling element or capillary is suggested to protect the pressure instrument.

3. Pressure range

The displacement volume on the diaphragm seal required to "drive" each diaphragm seal measurement system (diaphragm seal, pressure instrument and capillary, if applicable) must be greater than the displacement volume needed to move the pressure sensing element. Normally, the lower the pressure range, the larger the diaphragm is required to "drive" the system. Conversely, for higher pressure ranges smaller diaphragms are sufficient. Pressure transmitters also follow the general rule of the lower the pressure, the larger the diaphragm required.

4. Pressure instrument

As mentioned above (Item 3 Pressure range) the diaphragm seal must supply sufficient displacement volume to enable the pressure instrument to reach full scale. As a general rule, smaller size gauges are better suited to low pressure applications since less displacement volume is required on the part of the diaphragm seal to drive the pressure instrument.

5. Process connection

The process connection is specified by the customer. Most process connections are threaded, flanged, or clamped; however, additional connections are available. Teflon[®] coating and lining is only available in flanged connections, since tapered NPT threads strip off the Teflon[®] during installation. However, solid Teflon[®] threaded connections are available with NPT threads.

6. System fill fluid

WIKA offers a wide range of system filling fluids allowing temperatures from -130°F to 752°F. Chemical compatibility of the system fill fluid with the process fluid must be carefully considered in the event of a leak. In food processing applications a nontoxic fluid should be selected. Special fill fluids are also available for oxidizing media such as oxygen and chlorine.

7. Mounting position

Mounting position is important for diaphragm seal systems which include a capillary. The level difference between the diaphragm seal and the pressure instrument causes a hydrostatic pressure to act on the sensing element:

- a. For gauges mounted above the level of the diaphragm seal, the pointer on the dial of the gauge will be lower than the zero point.
- b. For gauges mounted below the level of the diaphragm seal, the pointer on the dial of the gauge will be higher than the zero point.

The diaphragm seal system can be calibrated to compensate for the effect caused by the hydrostatic pressure, if the level difference is known in advance (see Diaphragm Seal Specification Sheet for assistance).

8. Response time

Response time, i.e., the time it takes the pressure instrument to indicate 90% of the value of a sudden pressure variation, is especially important for instrument/diaphragm seal assemblies which include a capillary. Response time increases significantly in systems with long capillaries. In applications requiring long capillaries, response times can be reduced by using larger diameter capillary tubing and reducing the viscosity of the system fill fluid. Be advised that increasing the inner diameter of the capillary increases the temperature influence of the measuring system. Consult factory if detailed information is needed.

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