

REFERENCE

CERTIFICATE

ISO 9001 : 2008
 ISO 14001 : 2004
 BS OHSAS 18001 : 2007

1 WARNING

- 1a** Diaphragm seals, also referred to as chemical seals, are used to isolate pressure gauges, switches and transmitters from clogging and/or corrosive media. Standard diaphragm seal bodies and diaphragms are made of stainless steel;
- 1b** however, a variety of materials from carbon steel to Hastelloy® C-276 are available to meet the demands of most applications. ITEC diaphragm seals can operate in pressure applications, Pressure Ranges 1 to 1000 bar, Vacuum & Compound
- 1c** Pressure Ranges and media temperature between -40°C and 371°C.

Examples of Typical Diaphragm Seal Applications

The media is **corrosive** and may damage a sensitive element such as a Bourdon tube gauge, pressure switch or transmitter diaphragm.

- 2** The **temperature** of the media may be too high for a standard gauge, switch or transmitter to operate properly.

The media is **highly viscous** or tends to **crystallize**, or **polymerize** and may clog the pressure port of a gauge, switch or transmitter.

The media is **non-homogenous** or contains **suspended matter** such as wood pulp which may clog the pressure port of a gauge, switch or transmitter.

Remote reading is required. A diaphragm seal with a capillary line will allow remote installation of a pressure instrument.

The **sanitary cleanliness level** is critical. A flush mounted or InLine Seal sanitary type diaphragm seal avoids dead space and cavities.

- 3** The media is **toxic or hazardous** and may pollute the environment. A suitably designed diaphragm seal will provide additional protection, i.e. all-welded designs.

- 4** The application requires **high over-pressure protection**. A diaphragm seal with a contoured diaphragm bed can be configured to provide over-pressure protection and protection to the instrument, exact temperature data are mandatory.

ITEC diaphragm seal systems are an excellent value and offer savings by:

- 5**
- Meeting fugitive emission requirements
 - Extending the service life of the pressure instrument
 - Reducing the cost of installation
- 6**
- Reducing or eliminating maintenance costs

General

- 7** The drawing below illustrates the operating principle of a diaphragm seal assembly. A pressure measurement instrument such as a conventional pressure gauge or electronic pressure transmitter is either mounted directly to the diaphragm seal or attached to the seal by means of a capillary or cooling element.

A diaphragm within the diaphragm seal separates the gauge/transmitter from the process medium. Any part of the diaphragm seal (i.e., diaphragm, lower housing, gaskets) which will be exposed to the process medium is selected from materials resistant to pressure, temperature and possible chemical attack by the process medium.

The diaphragm seal is also filled with a transmitting fluid or system fill fluid. Any pressure applied by the process medium to the seal diaphragm is hydraulically transmitted to the pressure element of the gauge/switch/transmitter thus generating a pressure reading.

SELECTION

When selecting a diaphragm seal assembly, the following details must be taken into consideration to ensure a safe and satisfactory operation.

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

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. ITEC cannot guarantee suitability. For information, see numerous reference guides such as corrosion table, reference books. This should also be taken into consideration, if the pressure fluid is very thick, solidifies or is full of solids.

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 an ambient temperature of about 23°C. 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. Special advanced calibration techniques can be used to ensure the best possible accuracy. At temperatures above 125°C, a cooling element or capillary is suggested to protect the pressure instrument.

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.

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.

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.

System fill fluid

ITEC offers a wide range of system filling fluids allowing temperatures from -50°C to 371°C. 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.

19 MAINTENANCE

An installation shall always be brought into service carefully to avoid surges or sudden variations in temperature. Isolating valves shall there for be opened slowly.

20 The overall safety of an installation often depends on the operating condition of the Diaphragm Seal pressure gauges it contains. It is essential that the measurements indicated by these gauges are reliable. Thus any pressure gauge whose indications appear to be abnormal shall be immediately removed, verified or re-calibrated if necessary.

Confirmation of gauge accuracy should be maintained by periodic testing. Verification and re-calibration shall be carried out by competent personnel using appropriate test equipment.

21

22