

# Diaphragm Seal Solutions

making your measurements work



## Badotherm

We are a Dutch family owned company, headquartered in the Netherlands, with over 50 years of experience in the field of process instrumentation. Founded back in 1957 as a production- and repair shop for thermometers, today we are a leading manufacturer of Diaphragm Seals, Pressure Gauges, Temperature Gauges, Thermowells, Instrument Valves and Manifolds. We have offices and facilities in Europe, the Middle East, India, the Far East and the Americas.

We thoroughly understand the requirements put on our products alongside the needs of our customers. Our dedication to quality is a founding principle of Badotherm.

This commitment is underscored by our ISO 9001:2008-certified Quality Management System, which challenges us to continually improve our processes and approaches in order to deliver the best possible results in the industry.



## What we do

We assemble Diaphragm Seals to pressure instruments. Diaphragm Seals are used to separate the pressure instrument from the process, to protect the vulnerable measuring element. Badotherm has over 30 years experience in mounting and filling Diaphragm Seals with pressure instruments, and specializes in the assembly with pressure transmitters. Badotherm is the preferred supplier of several leading pressure transmitter manufacturers, where most applications end in the demanding chemical and petrochemical industries.



The mounting and filling is done professionally according to stringent procedures. All communication tools for the various communication protocols are available (a.o. HART, FIELDBUS, D/E, BRAIN, Foxcom) as are the required (calibration) test equipment and tools, with a 0,01% accuracy.

## Global coverage

Being able to provide a global offering of our Diaphragm Seals has been a request of both our end user accounts as well as of some of the leading pressure transmitter manufacturers. With the opening of our Badotherm Americas office in Houston, Texas, Badotherm has now 5 Diaphragm Seal assembly centres around the world.

This enables us to service and supply our global customers of our high quality service and solutions.



With the headquarters in The Netherlands, we support each Badotherm Diaphragm Seal assembly centre with the latest equipment for Diaphragm Seal filling technology, as well as application knowledge and access to our engineering database.

The qualities of our products are monitored by our internal Diaphragm Seal auditing programme, to ensure the same high quality standards of products and services all over the world.

THE OPENING OF  
BADOTHERM AMERICAS  
PROVIDES A GLOBAL  
COVERAGE

## STATE-OF-THE-ART FILLING TECHNOLOGY COMBINED WITH SOLID INSTRUMENT APPLICATION KNOWLEDGE

### Diaphragm Seals mounted to pressure instruments

A Diaphragm Seal can be mounted to almost all pressure instruments. Mostly they are used in combination with (differential) pressure transmitters, but also in combination with Pressure Gauges and pressure switches. The use of Diaphragm Seals is recommended when the process medium:

- Is too aggressive, corrosive, toxic and/or highly viscous
- Has a (extremely) high or low temperature
- Has crystallization and/or polymerization
- Requires sanitary or other customized process connections

Diaphragm Seals are also used for liquid level measurements in pressure retaining tanks instead of 'wet legs'. Also they are used when in the process there is a chance of presence of hydrogen ions (H<sup>+</sup>) that can permeate the diaphragm. In those cases, a Diaphragm Seal with gold plating offers the required protection.

The pressure instrument is direct mounted or through a capillary line to the Diaphragm Seal. The complete volume of the Diaphragm Seal, the capillary and the measuring system, is filled under high vacuum with the appropriate fill fluid. The process pressure applied will be transferred through the diaphragm to the measuring system. The volume displacement has to be sufficient to control the sensor of the transmitter or the bourdon tube of a pressure gauge. For an accurate measurement the relation between diaphragm diameter and volume displacement is important.

### State-of-the-art filling technology

Badotherm develops their latest state-of-art filling technology fully in-house. Each of the diaphragm seal assembly centers have similar equipment and specifications, completely standardized to the latest technology. Badotherm HQ comply a stringent quality control towards the offices around the world to maintain the highest quality standard regarding to the mounting, filling and testing of Diaphragm Seals with pressure instruments.

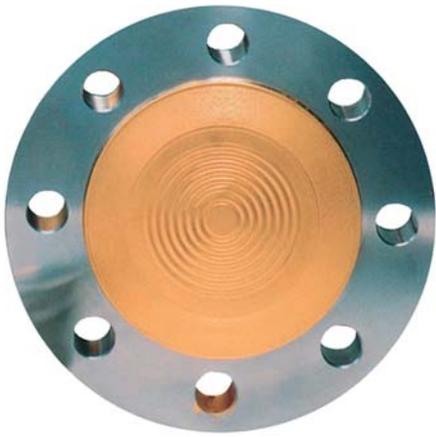
Making use of this high accuracy filling method, allowing for an optimal degassing of the fill fluids, Badotherm Diaphragm Seals have a negligible influence on the accuracy of the instrument.

The seals are filled with fluids, such as silicone based oil, glycerin, or vegetable oils. Badotherm has a wide variety filling of special inert fill fluids, such as halocarbon for chloride and oxygen applications and other special fill fluids for high temperatures (up to 420 °C / 788 °F).

### Diaphragm Seals, diaphragms and materials

There are several types of Diaphragm Seals, such as threaded and flanged executions, but also Diaphragm Seals with connections for sanitary requirements. Badotherm seals comply with the international applicable standards, such as the ASME B16.5 or the EN1092-1 (used to be DIN standard), and also JIS executions are available. Normally, the Diaphragm Seals are made from stainless steel AISI 316 (L), but often it is required that the Diaphragm Seal needs to be made of materials like Tantalum, Monel® 400, Titanium, Duplex 2205 or 2507, Hastelloy® C276 or Inconel® 825 or any other exotic material. This can be for the diaphragm material only, but also for the complete wetted parts, being in contact with the process medium. Furthermore, it is possible to plate the diaphragm with a coating (PTFE, PFA or gold). Badotherm makes standard use of a diaphragm of 75 micron thickness, allowing an increased flexibility and a higher accuracy. Badotherm capillaries are always armored and are always welded to the seal to prevent the risk of leakage and for a more robust design in the field.





### Gold-coating for hydrogen protection

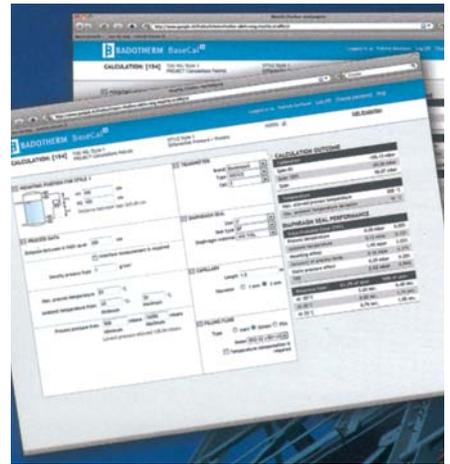
Hydrogen is nature's simplest and smallest atomic element. But despite its minuscule size, it can have a significant and unwelcome impact on chemical processes.

Hydrogen atoms can permeate the molecular structure of a seal's diaphragm. In order to prevent this, we have developed the most sophisticated gold-coated Diaphragm Seals on the market. In fact, we're one of the few manufacturers to use a 24crt 40µm gold-coating on our seals. We also offer a wide range of gold-coatings to meet various customer and market demands.



### High Temperature Diaphragm Seal (HTDS) for pressure measurement up to 600 °C / 1112 °F

Higher pressure and temperatures are known to improve overall process efficiency. They also pose a challenge when it comes to monitoring. To continue accurate measuring under extreme circumstances, we have developed a Diaphragm Seal that withstands temperatures of up to 600 °C. This patented ground-breaking Diaphragm Seal lets you successfully control your chemical processes in conditions where other seals would fail.



### BaseCal: Diaphragm Seal performance calculation tool

Installing a Diaphragm Seal to a pressure transmitter affects that transmitter's performance. BaseCal is our proprietary web-based performance calculation tool that helps you select the best Diaphragm Seal application for your process, taking every factor into account. It calculates the total installed performance of the Diaphragm Seal application - including the transmitter - so you know exactly what's going on in your entire system. With BaseCal you can easily change variables and conditions, allowing you to simulate and analyse the effects of various situations. Register for free on [www.basecal.com](http://www.basecal.com).



BADOTHERM  
SPECIFIC  
SOLUTIONS FOR  
DIAPHRAGM SEAL  
MEASUREMENTS



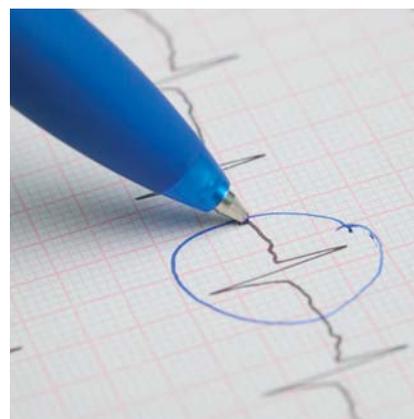
### Low gauge pressure measurement

Low pressures can be difficult to measure. That's why we have developed a specialized innovative method with a Diaphragm Seal and transmitter application called Low Gauge Pressure (LGP) measurement for low pressure monitoring. This Diaphragm Seal is capable of measuring pressure up to 20 times lower than other conventional Diaphragm Seals - down to 5 mbar / 2"H<sub>2</sub>O. A typical low pressure application is nitrogen blanketing which prevents process gasses from escaping to atmosphere. But measuring and controlling the low pressure in a corrosive environment can be a challenging endeavour. By using the LGP Diaphragm Seals you achieve better process control, and this means considerable savings in nitrogen consumption.



### Diaphragm Seal renewal - repair service

All of our applications meet the highest quality standards. But even the best products have a limited lifespan. Should your instrument's performance ultimately start deteriorating, we offer a comprehensive repair & maintenance service for pressure transmitters with damaged Diaphragm Seals. A key advantage of Diaphragm Seals is the fact they can be renewed, without replacing the entire pressure instrument. The substitute seal will function just as a new instrument, but without the higher costs and longer downtime associated with buying a whole new transmitter.



### Process simulation for critical applications

Diaphragm Seals are all about accuracy. All Diaphragm Seal applications are standard calibrated at room temperature. However, in the extremes of process measurement even the smallest deviation in seals may become noticeable. With our unique process simulation testing facility we can eliminate the smallest deviations by simulating various process conditions. This enables us to set each instrument we produce to its specific intended application. This additional testing is typically recommended for critical applications with a span below 100 mbar / 40"H<sub>2</sub>O, absolute pressures, and/or process temperatures above 150°C / 300°F.

MAKING YOUR  
MEASUREMENTS  
WORK WITH  
DIAPHRAGM SEALS



## About Badotherm

We are a European manufacturer of mechanical process instruments with a worldwide distribution network. We have regional Diaphragm Seal assembly facilities in Europe, the Middle East, India, the Far East and the Americas. We design, engineer and manufacture Diaphragm Seals, Pressure Gauges, Temperature Gauges and Thermowells, Instrument Valves and Manifolds. Next to our product offering, we develop tailor-made solutions for challenging conditions in the field of Diaphragm Seal measurements. Headquartered in the Netherlands, we employ over 225 people in seven different countries.



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