Model S26 seals for remote and direct mount

2600T Series Pressure Transmitters
Engineered solutions for all applications
About this book
This book provides instructions for installing the S26 diaphragm seals equipped transmitters. Instructions covering all aspects of the transmitters, which are not related to installation of the remote seals, are included in the transmitter instruction books. Please read this manual before working with the product.
In case of additional information needs please contact ABB at the address you find at last pages of this manual or at the web site: [http://www.abb.com/pressure](http://www.abb.com/pressure).
The products described in the present manual are not intended for use in NUCLEAR-QUALIFIED environments/applications.

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As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.
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Manual Version
This Instruction manual version is 01 and it was released on February 26th 2010.
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INTRODUCTION

The S26 Series Seal System is a protective device used to isolate transmitters from the process fluid. When used without diaphragm seals, these transmitters are generally connected to process piping or process vessel by impulse lines. The process fluid leaves its enclosure, fills the impulse lines, and enters the body of the transmitter. For certain applications, it is necessary to prevent the process fluid from leaving its enclosure. The seal system provides a flexible diaphragm seal between the process fluid and a liquid filled capillary tube connected to the body of the transmitter. The diaphragm isolates the process fluid while the filled capillary tube hydraulically transmits the process pressure to the transmitter body.

Some reasons why an isolating seal is required are:

• The process fluid is highly corrosive. Remote seals offer a much wider choice of corrosion resistant materials compared to conventional transmitters.
• The process fluid has solids in suspension or is highly viscous and can clog impulse lines.
• The process fluid can solidify in impulse lines or inside the transmitter body.
• The process fluid is too hazardous to enter the control area where the transmitter is located.
• The process temperature exceeds the recommended maximum or minimum limits for the transmitter.
• The application is interface level or density measurement. Remote seals offer the required constant and equal specific gravity of the pressure transfer fluid on the high and low sides of the transmitter.
• The transmitter body must be located away from the process for easier maintenance.

The S26 series is available in a variety of seal element types. They provide process connection to ANSI, JIS or EN pipe flanges, wedge flow elements, chemical tees, and threaded pipe fittings. Extended diaphragm remote seals are suitable for connection to 2-inch, 3-inch or 4-inch flanged tank nozzles or flanged tees permit the seal diaphragm to be located flush with the inside of a tank or pipe. Sanitary and sanitary aseptic type seals meet the stringent requirements of sanitary food, dairy, pharmaceutical, and Biotech applications. All sanitary seals comply with 3A Sanitary Standard No. 74-02. These remote seal systems feature unique all welded construction (see in Figures 1 and 2). This construction assures reliable operation over a wide range of operating temperatures and pressures. It is especially important in preventing air leakages when the system is operating under vacuum conditions.

Product identification

The S26 Series Seal Systems are available with a variety of remote seal constructions identified as follows:

• S26FA and S26FE – Fixed-flange seals according to ASME and EN standards
• S26RA, S26RE and S26RI – Rotating-flange seals according to ASME, EN and JIS standards
• S26MA and S26ME – Off-line flanged seals according to ASME and EN standards
• S26WA and S26WE– Wafer remote seals according to ASME and EN standards
• S26CN – Chemical tee remote seal
• S26JN – In-line seal
• S26KN – Pulp & Paper connection seal
• S26RR – Flanged remote seal – Ring Joint construction
• S26SS – Food and sanitary seal
• S26TT – Off-Line threaded connection seal
• S26UN – Union connection remote seal
• S26PN – Remote seal for Urea service
• S26BN – Button type remote seal
• S26VN – Saddle and socket seal
The S26 Series Seal Systems are used on the following transmitters:
• 266xR / 266xD (where x means “any letter”)

Differential pressure transmitters have one or two remote seals. Single sided differential pressure transmitters have a single remote seal for tank level applications. Gauge and absolute pressure transmitters have a single remote seal. The transmitter and seal system are identified by product code numbers which are stamped on the transmitter nameplate. An example of the product code stamping is as follows:

\[
\begin{align*}
\text{266DRHGSSRAH} & \quad / \quad \text{S26WAHD5FSM2AASNNN} \\
\text{Transmitter Product Code} & \quad / \quad \text{Seal System Product Code}
\end{align*}
\]

The characters which comprise these code numbers identify specific product features. A detailed explanation of the code numbers together with physical and performance specifications for both the transmitter and seal system is provided in the product specification sheets.
INSTALLATION

Locating the transmitter and remote seal

This section provides guidelines for determining where to locate the transmitter and seals for specific applications. Proper location is an important factor in obtaining accurate measurements.

General

The transmitters with remote seals are suitable for use on the following pressure and differential pressure measurement applications:

- FLOW MEASUREMENT
- LIQUID LEVEL MEASUREMENT
- INTERFACE LEVEL MEASUREMENT
- DENSITY MEASUREMENT
- GAUGE PRESSURE MEASUREMENT
- ABSOLUTE PRESSURE MEASUREMENT

Each application has certain unique requirements which influence the selection of the transmitter and seal locations. In general the flow and gauge pressure applications allow the greatest flexibility in selection of a location. Liquid level applications impose restrictions on the relative elevations of the transmitter and seals when the tank operates under vacuum and absolute pressure applications impose similar restrictions when the lower range value is less than atmospheric pressure (nominally 14.7 psia). Transmitters with remote seals measure pressure from two sources; (1) the applied process pressure or differential pressure, and (2) the head pressure developed by the weight of the liquid column in the seal system. The head pressures are a function of transmitter and seal locations as follows:

- Two Seals – On a DP transmitter with a seal on both the high and low sides, the transmitter measures the head pressure resulting from any difference in elevation between the seals and the output change is directly proportional to the elevation difference. The head pressure has no effect on transmitter output when both seals are at the same elevation. Changing the elevation of the seals relative to the transmitter has no effect as long as the elevation of one seal relative to the other is not changed.
- One Seal – On a transmitter with one seal, the head pressure from the seal system is measured directly. Any change in the elevation of the seal causes a change in the measured head pressure and the transmitter output changes in direct proportion to the elevation change.

Note: when handling and/or installing the transmitter with remote seal(s), please consider that the minimum bending radius of the capillary system is 10 cm (3.9 in).

For most flow, gauge pressure, and absolute pressure installations the effect of head pressure is relatively minor and can be canceled out by adjusting zero with the transmitter and seals in their installation position while a known process pressure is applied. For liquid level installations, head pressures have a more significant impact on calibration requirements because the nature of the installation requires a substantial difference in elevation between the high and low side seals. See the Liquid Level Measurement Section for more information.

FLOW MEASUREMENT

Differential pressure transmitters with two remote seals can be used for both horizontal and vertical flow measurement installations. By mean of a Wedge Flow Element (see Figure 3). In both horizontal and vertical installations, the transmitter can be placed in any convenient location either above or below the elevation of the seal elements. The high side seal element must be located on the upstream side of the flow restriction. To ensure accurate measurements on liquid flow applications, the flow restriction must be located in a section of the pipe line which remains full under all flow conditions.

Horizontal Installation

In a horizontal installation both seal elements are at the same elevation and head pressures resulting from the filling liquid are equal on the high and low side of the transmitter. Thus, the transmitter calibration can be zero based for this installation. If the process contains suspended solids, the seal elements should be located at the top of the pipe to avoid collection of solid material on the seal diaphragm surfaces.

Vertical installation

In a vertical installation, the elevation difference between the two seals applies a differential pressure when there is no flow. When the pipe is full at no flow the initial differential is a function of the distance between the seals and the difference in density between the process liquid and the fill liquid.
LIQUID LEVEL MEASUREMENT

A differential pressure transmitter with either one or two remote seals can be used for liquid level measurement on open tanks, closed tanks operating at pressures above atmospheric and closed tanks operating under vacuum.

Measurement Reference

Liquid level measurements are based on the height of a process liquid column with respect to predefined measurement reference points on the transmitter. The transmitter has three datum lines as follows:
- Primary Datum Line – Located at the center of the seal system connection to the transmitter body.
- High Seal Datum Line – Located at the center of the high side seal diaphragm.
- Low Seal Datum line – Located at the center of the low side seal diaphragm.

Open Tank Installation

A transmitter with one remote seal can be used for open tank level measurement (see Figure 1). The seal is on the high side of the transmitter, and the seal element must be located near the bottom of the tank so that the high seal datum line is at or below the minimum level. The transmitter can be located either above or below the seal element. The low side of the transmitter must be vented to atmosphere.

Fig. 1 Level measurement of a liquid in an open tank
Closed Tank Installation – Pressure Service

• Double Seal
When a transmitter with two remote seals is used to measure level in a pressurized tank (see Figure 2a and 2b), the high pressure side seal element must be located near the bottom of the tank. The high seal datum line must be at or below the minimum level. The low side seal must be located near the top of the tank, and the low seal datum line must be at or above the maximum level.
The transmitter can be located between the seals, above both seals or below both seals on a pressure service installation. The preferred location is mid way between the seal elements (see Figure 2b). This location minimizes the required capillary length, and usually provides the most uniform distribution of ambient temperatures across the capillary length.

Fig. 2a
Level measurement of liquid in a closed tank, two seals installation and transmitter below the minimum level

Fig. 2b
Level measurement of liquid in a closed tank. Recommended installation.
• Single Seal  
When a transmitter with one seal is used to measure level in a pressurized tank, a compensating leg must be connected between the vapor space at the top of the tank and the low side of the transmitter (see Figures 3a, 3b, 4a, 4b and 5). The remote seal is on the high side of the transmitter, and the seal element must be located near the bottom of the tank so that the high seal datum line is at or below the minimum level.

If the process vapor is not readily condensable, or if the compensating leg is at a higher temperature than the tank interior, a dry leg can be used (see Figure 3a and 3b). A trap installed at the bottom of the leg minimizes the possibility of condensate collecting in the transmitter body.

When the process vapor is condensable, a wet leg is recommended. The wet leg is filled with a suitable liquid to maintain a constant pressure on the low side of the transmitter (see Figures 4a and 4b). This approach avoids the problem of process vapor condensing and collecting in the compensating leg resulting in serious measurement error. The leg can be filled with process liquid or any liquid with a low vapor pressure relative to the process. A filling tee is required at the top of the leg. The wet leg can be avoided if the transmitter can be located near the top of the tank (see Figure 5), so that condensate drains back into the tank.

Fig. 3a
Level measurement of liquid in a closed tank. Transmitter installed above the minimum level with one seal and dry leg.

Fig. 3b
Level measurement of liquid in a closed tank. Transmitter installed below the minimum level with one seal and dry leg.
Closed Tank Installation – Vacuum Service

When the transmitter is used on a tank in which the operating pressure range includes pressures below atmospheric, it is essential that the transmitter be located below the high-pressure seal datum line (see Figures 2a and 2b for two seal installations, Figures 3a, 3b, 4a and 4b for one seal installation). The recommended minimum distance between the primary datum line and the high seal datum line is 1 ft (0.3 m). Seal element location requirements for vacuum service are the same as for pressure service.

![Diagram](image)

**Fig. 4a**
Level measurement of liquid in a closed tank. Transmitter installed above the minimum level with one seal and wet leg.

**Fig. 4b**
Level measurement of liquid in a closed tank. Transmitter installed below the minimum level with one seal and wet leg.

**Fig. 5**
Level measurement of liquid in a closed tank. Transmitter installed on the top of the tank, one seal and dry leg installation.
Calibration Requirements

The location of the high side seal near the bottom of the tank and the low seal near the top of the tank provides increasing transmitter output for increasing liquid level. The actual differential pressure applied to the transmitter is up to maximum value only when the process is at its minimum level due to the elevation difference between the seals. As the tank fills, the process liquid tends to cancel the initial seal system head pressure and the measured differential pressure is therefore at the minimum value when the level reaches its maximum value.

Note also that the maximum differential is applied from the low side because the low seal has the higher elevation. To accommodate the head pressure conditions imposed by a liquid level installation, the transmitter zero must be adjusted to elevate the output. This cancels the effect of the low side head pressure and provides zero percent output for the minimum level condition. For example, the range values for a level installation might be -120 to -5 inches of water. This indicates that the level change (span) is 115 inches of water; the differential at minimum level is -120 and at maximum level is -5 inches of water. The minus sign indicates positive differential pressures applied to the low side of the transmitter.

Determination of the span and range values for a specific installation must take into account the level change, elevation difference between the seals, height of the process liquid above the high seal datum line at minimum level, and the specific gravity of the process liquid and the fill liquid in the seal system.

INTERFACE LEVEL MEASUREMENT

A differential pressure transmitter with two remote seals can be used to measure interface level (see Figure 6). The high side seal element must be located near the bottom of the tank. The high seal datum line must be at or below the lowest interface elevation. The low side seal must be located near the top of the tank, and the low seal datum line must be at or above the highest interface elevation. The minimum level of liquid in the tank must be above the low seal element under all interface conditions. The transmitter can be located between the seals, above both seals or below both seals when the tank is open or operating under positive pressure. The preferred location for 266DLH the transmitter is directly mounted on the bottom connection (see Figure 7). This location enables the user to eliminate the capillary and consequently allows a more accurate measurement. If the operating pressure range includes pressures below atmospheric, the transmitter must be located below the high side seal (refer to the vacuum service information in Liquid Level Measurement Section).

DENSITY MEASUREMENT

A differential pressure transmitter with two remote seals can be used to measure liquid density or specific gravity (see Figure 7). The high side seal element must be located near the bottom of the tank, and the low side seal must be located near the top of the tank. The minimum level of liquid in the tank must be above the low seal element under all density conditions. The transmitter can be located between the seals, above both seals or below both seals when the tank is open or operating under positive pressure. The preferred location is mid way between the seal elements. This location minimizes the required capillary length, and usually provides the most uniform distribution of ambient temperatures across the capillary length. If the operating pressure range includes pressures below atmospheric, the transmitter must be located below the high side seal (refer to the vacuum service information in Liquid Level Measurement Section).
GAUGE PRESSURE MEASUREMENT
A gauge pressure transmitter with a remote seal can be used for measurement of pressure in either a process pipe or tank (see Figure 8). Locate the remote seal in the side or top of the pipe to avoid collection of sediment on the seal diaphragm.

Pressure Service
When the operating pressure range has a minimum value above atmospheric pressure (0 psig), the transmitter can be placed in any convenient location, either at the same elevation as the remote seal, above or below the seal.

Vacuum Service
When the operating process pressure range includes pressures below atmospheric, it is essential that the transmitter be located below the elevation of the seal element to ensure that the pressure in the transmitter body is always greater than 0 psia. The recommended minimum distance between the transmitter datum line and the seal datum line is 0.3m (1ft).

ABSOLUTE PRESSURE MEASUREMENT
An absolute pressure transmitter with a remote seal can be used for measurement of absolute pressure in either a process pipe or tank (see Figure 8). Locate the seal element in the side or top of the pipe to avoid collection of sediment on the seal diaphragm. When the operating absolute pressure range has a minimum value above atmospheric pressure (nominally 14.7 psia), the transmitter can be placed in any convenient location, either at the same elevation as the remote seal, above the seal, or below the seal. When the pressure range includes pressures below atmospheric, the transmitter datum line must be below the elevation of the seal element to ensure that the pressure in the transmitter body is always greater than 0 psia. The recommended minimum distance between the transmitter datum line and the seal datum line is 0.3m (1ft).
MOUNTING THE TRANSMITTER
The transmitter with remote seals can be mounted on a 60 mm (2 in.) horizontal or vertical pipe using the optional pipe mounting bracket available with all 2600T series transmitters. Refer to all the documents listed on page 3 “Supplementary documentation” for mounting information.

CONNECTING THE REMOTE SEALS
Wafer Remote Seal (S26WA and S26WE)
The wafer remote seal is designed to be clamped between two ASME (S26WA) or EN raised face flanges (S26WE). The diaphragm side of the seal faces the process flange and a back-up flange is used on the other side of the seal. The S26WA wafer seals can be used with: ANSI CL150, CL300, CL600, CL900 or CL1500 flanges whereas the S26WE with EN DN 10-40, DN64-160. For mounting dimensions for the wafer remote seal please see Figure 12. The required back-up flange can be supplied by the user, or it can be obtained as an option with the seal system. Bolts, nuts, and a flange gasket must be supplied by the user.

Note. In case of DP style transmitter with one remote seal, please refer to "Liquid Level Measurement" Section.

Model S26WA (manufactured according to ASME B16.5) is characterized by a maximum working pressure up to 41.37 MPa (413.7 bar or 6000 psi).
Model S26WE (manufactured according to EN 1092-1) can have different pressure limits because of the relevant forms:
- Form B1 up to 40 MPa (400 bar or 5800 psi)
- Form D up to 16 MPa (160 bar or 2320 psi)
- Form E up to 10 MPa (100 bar or 1450 psi)

Connect the seal element as follows:
1. Remove protective covering from seal.
2. Install a gasket between the process flange and the seal element gasket surface.
3. Clamp the seal between two flanges (see Figure 12). Be sure that the gasket is properly positioned between the process flange and the seal element gasket surface.
4. Tighten bolts firmly and uniformly in accordance with standard industrial flange bolting practices.

Fig. 9 Wafer / Pancake style remote seal
For any other detailed information regarding S26Wx seals such as vacuum service recommendations, process temperature limits, gasket seat finish, temperature effects and configuration, please refer to product datasheet.
Chemical Tee Remote Seal (S26CN)
The chemical tee remote seal is designed to connect to a 1630L Wedge Flow Element or to any process fitting with appropriate mating surfaces. Chemical tee elements cannot be connected to a standard ASME or EN pipe flange. Please note that the pressure limit for a transmitter with this remote seal is determined by the seal flange. Maximum working pressure for the flange is 2 MPa (20 bar or 290 psi).
The gaskets required to connect the seal are available with the seal element system and can be manufactured either in PTFE or in graphite. Their relevant process temperature limits are listed in the product datasheet.
The eight cap screws required to connect each seal are supplied with the wedge flow element. These gaskets and bolts have been specifically selected to meet the sealing and pressure rating requirements of the chemical tee element. Substitution of these supplied elements with other selected by the user is not recommended.

NOTE: If the transmitter is a DP with one remote seal for liquid level measurement, refer to Section “Connecting the Low Side Compensating Leg on DP with One Seal” before connecting the seal.

Connect the seal as follows:
1. Remove protective covering from seal.
2. Place the gasket on sealing surface and insert seal into connection opening.
3. Insert 8 cap screws and finger tighten each screw.
4. Following a diagonal sequence, tighten each cap screw to a torque of 12.4 Nm.

If you experience a large Zero shift due to temperature change or erratic output:
1. Take the chemical tee seals and mount them face up several feet above the transmitter.
2. Wait an hour.
3. With your thumbs at the"9 o'clock and 3 o'clock" positions on a single diaphragm, lightly apply thumb pressure alternating right thumb/left thumb. As you press with the right, the left side of the diaphragm should rise evenly.
   If it does not rise then there is a lack of fill. Replace the seal.
   If it rises and then snaps (like an oil can) then the diaphragm has been stressed. Replace the seal.
4. Lightly tap the diaphragms with the flat part of your fingernail. A dull thud is heard when fill is behind the diaphragm.
   If there is air present, the sound will be "Tinny". Replace the seal.

![Diagram of Chemical Tee remote seal](Fig. 11 Chemical Tee remote seal)

This kind of diaphragm seal has been designed to be connected to ABB Wedge primary element model WRC.

For any other detailed information regarding S26CN seal such as vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.
Rotating flange diaphragm seals – flush and extended (S26RA, S26RE and S26RJ)

The extended and flush diaphragm remote seal is designed to connect to flanged pipe fitting, according to ASME B16.5 (S26WA), EN 1092-1 (S26WE) or JIS B 2220 standards (S26RJ).

For liquid level measurement installations the seal connects to a flanged tank nozzle, compliant to the relevant standard. The sealing is provided by a selectable smooth or serrated gasket seat surface finish.

The mounting flange is of rotating type and can be supplied on carbon steel or in stainless steel AISI 316.

Fig. 12 Flush rotating-flange seals (flushing ring as an option)

Fig. 13 Extended rotating-flange seals

<table>
<thead>
<tr>
<th>Size / Rating</th>
<th>A (dia) flush diaphragm</th>
<th>B (dia)</th>
<th>C (dia)</th>
<th>D (dia)</th>
<th>E (dia)</th>
<th>F</th>
<th>G</th>
<th>Nº of holes</th>
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<td>A50 Class 10K</td>
<td>60 (2.36)</td>
<td>96 (3.78)</td>
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<td>24 (0.94)</td>
<td>9.5 (0.37)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Size / Rating</td>
<td>Dimensions mm (in) for S26RA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>extended diamagnet</td>
<td>flush diaphragm</td>
<td>flushing ring int. dia</td>
<td>B (dia)</td>
<td>C (dia)</td>
<td>D (dia)</td>
<td>E (dia)</td>
<td>F</td>
</tr>
<tr>
<td>2 in. ASME CL 150</td>
<td>21.6 (0.85)</td>
<td>76 (3.0)</td>
<td>94 (3.7)</td>
<td>102 (4.0)</td>
<td>125 (4.92)</td>
<td>165 (6.5)</td>
<td>178.6 (7.02)</td>
<td>21 (0.83)</td>
</tr>
<tr>
<td>2 in. ASME CL 300</td>
<td>21.6 (0.85)</td>
<td>76 (3.0)</td>
<td>94 (3.7)</td>
<td>102 (4.0)</td>
<td>125 (4.92)</td>
<td>165 (6.5)</td>
<td>178.6 (7.02)</td>
<td>21 (0.83)</td>
</tr>
<tr>
<td>2 in. ASME CL 600</td>
<td>21.6 (0.85)</td>
<td>76 (3.0)</td>
<td>94 (3.7)</td>
<td>102 (4.0)</td>
<td>125 (4.92)</td>
<td>165 (6.5)</td>
<td>178.6 (7.02)</td>
<td>21 (0.83)</td>
</tr>
<tr>
<td>2 in. ASME CL 900</td>
<td>21.6 (0.85)</td>
<td>76 (3.0)</td>
<td>94 (3.7)</td>
<td>102 (4.0)</td>
<td>125 (4.92)</td>
<td>165 (6.5)</td>
<td>178.6 (7.02)</td>
<td>21 (0.83)</td>
</tr>
</tbody>
</table>

For any other detailed information regarding S26Rx seals such as pressure limits, vacuum service recommendations, gaskets characteristics, process temperature limits, temperature effects and configuration, please refer to product datasheet.
Flanged Remote Seal – Ring Joint (S26RR)

The flanged flush diaphragm remote seal – ring joint is designed to connect to ASME flanged pipe fitting. On the 1 in. seal the process flange and nuts are supplied by the user. On the 1-1/2 in. and 2 in. seals the process flange, bolts and nuts are supplied by the user. A user-supplied gasket must be installed between the process pipe flange and the lower housing of each seal.

These seals are available with a flushing connection in the lower housing. The connection provides a 1/4 in. NPT port into the cavity around the seal diaphragm to permit flushing to remove trapped solids, when necessary. The flushing connection also provides a means of checking calibration without disconnecting the element. A gate or ball valve installed in the process line near the seal connection allows the process to be isolated and calibration pressure can then be applied via the flushing connection. Use of a gate or ball type valve avoids restricting the process line during normal operation.

Connect the seal as follows:
1. Install a gasket between the process flange and the seal element gasket surface.
2. Bolt the seal to the process flange.
3. Tighten bolts (nuts on 1 in. seal) firmly and uniformly in accordance with standard industrial flange bolting practices.
4. If the seal has a flushing connection, connect a flushing line with appropriate valving to the 1/4 in. connection.

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For any other detailed information regarding S26RR seal such as pressure limits, vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.
Fixed flange diaphragm seals – flush (S26FA, S26FE)

These flush diaphragm seal are designed to connect to flanged pipe fitting, according to ASME or EN standards. For liquid level measurement installations, the seal connects to a flanged tank nozzle, compliant to relevant standard. The sealing is provided by a selectable gasket seat surface finish. The “fixed” mounting flange is integral with the seal.

For any other detailed information regarding S26Fx seals such as pressure limits, vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.
### Size / Rating

<table>
<thead>
<tr>
<th>Size / Rating</th>
<th>Dimensions mm (in) for S26FA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (dia)</td>
</tr>
<tr>
<td></td>
<td>B (dia)</td>
</tr>
<tr>
<td></td>
<td>std.</td>
</tr>
</tbody>
</table>

### Size / Rating

<table>
<thead>
<tr>
<th>Size / Rating</th>
<th>Dimensions mm (in) for S26FE Form E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (dia)</td>
</tr>
<tr>
<td></td>
<td>B (dia)</td>
</tr>
<tr>
<td></td>
<td>std.</td>
</tr>
</tbody>
</table>
Off-line Threaded Connection Seal (S26TT)

The off-line threaded remote seal connects directly to a process pipe via the NPT connection in the lower housing. Connections for 1/4, 1/2, 3/4, 1, and 1-1/2 in. process piping are available. In addition to the process connection, mechanical support for the weight of the seal may be required, especially for the 1/4 and 1/2-inch pipe sizes. These elements are available with a flushing connection in the lower housing. The connection provides a 1/4 in. NPT port into the cavity around the seal diaphragm to permit flushing to remove trapped solids, when necessary. The flushing connection also provides a means of checking calibration without disconnecting the element. A gate or ball valve installed in the process line near the seal element connection allows the process to be isolated and calibration pressure can then be applied via the flushing connection. Use of a gate or ball type valve avoids restricting the process line during normal operation, not a gasket.

Connect the seal element to the process pipe at the NPT connection in the end of the lower housing. If the element has a flushing connection, connect a flushing line with appropriate valving to the 1/4 in. NPT connection in the side of the lower housing.

Note that this diaphragm seal features two flushing connections.

<table>
<thead>
<tr>
<th>Size (thread)</th>
<th>Dimensions mm (in) for S26TT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 in. NPT</td>
<td>109.2 (4.3)</td>
</tr>
<tr>
<td>1/2 in. NPT</td>
<td>109.2 (4.3)</td>
</tr>
<tr>
<td>3/4 in. NPT</td>
<td>109.2 (4.3)</td>
</tr>
<tr>
<td>1 in. NPT</td>
<td>109.2 (4.3)</td>
</tr>
<tr>
<td>1-1/2 in. NPT</td>
<td>109.2 (4.3)</td>
</tr>
</tbody>
</table>

S26TT can be supplied with different kinds of bolts: stainless steel AISI 316, carbon steel or alloy steel (NACE compliant)

For any other detailed information regarding S26TT seals such as pressure limits, vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.
Off-Line Flanged Connection Remote Seal (S26MA, S26ME)
Available with ASME (S26MA) and EN (S26ME) flanged process connection, the Off-line model matches small process connections. Recommended for clean process fluid measurements. These elements are available with a flushing connection in the lower housing, selectable on request.

![Diagram of Off-line flanged diaphragm seal](image)

**Fig. 17 Off-line flanged diaphragm seal**

Note that this diaphragm seal features two flushing connections.

<table>
<thead>
<tr>
<th>Size / Rating</th>
<th>Dimensions mm (in) for S26MA and S26ME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (dia)</td>
</tr>
<tr>
<td>1/2 in. ASME CL 150</td>
<td>110 (4.33)</td>
</tr>
<tr>
<td>1/2 in. ASME CL 300</td>
<td>110 (4.33)</td>
</tr>
<tr>
<td>1 in. ASME CL 150</td>
<td>110 (4.33)</td>
</tr>
<tr>
<td>1 in. ASME CL 300</td>
<td>124 (4.88)</td>
</tr>
<tr>
<td>1-1/2 in. ASME CL 150</td>
<td>127 (5)</td>
</tr>
<tr>
<td>1-1/2 in. ASME CL 300</td>
<td>155 (6.1)</td>
</tr>
<tr>
<td>DN 25 EN PN 16-40</td>
<td>85 (3.34)</td>
</tr>
<tr>
<td>DN 40 EN PN 16-40</td>
<td>150 (5.9)</td>
</tr>
</tbody>
</table>

For any other detailed information regarding S26Mx seals such as pressure limits, vacuum service recommendations, process temperature limits, bolts, gasket seat finishing, temperature effects and configuration, please refer to product datasheet.
Remote Seal for Urea Service (S26PN)
This specialized remote seal is manufactured from materials which match the aggressively corrosive conditions when Urea is present in the process.
The urea grade wetted materials ensure stable performances even in high temperature / high vacuum conditions.

Fig. 18  Urea service extended seals with ASME flange.

For any other detailed information regarding S26PN seal such as pressure limits, vacuum service recommendations, process temperature limits, bolts, temperature effects and configuration, please refer to product datasheet.
**Button Type Remote Seal (S26BN)**

This remote seal is designed to connect to a process via the NPT threaded connection or to match pipe fitting with an interface suitable for the provided mating flange. The button seals, thanks to their accurate design, are projected to carry out accurate measurements with medium/high calibrated span (2 MPa - 20 bar - 290 psi approx or greater).

The button type remote seal is to be used only for gauge pressure.

This type of connection is especially suitable for plastic and resins production processes.

For any other detailed information regarding S26BN seals such as pressure limits, vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.

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**Fig. 19** 3-1/4 in. flange extended – type 91

**Fig. 20** 3-1/4 in. flange extended – type 91 modified
Fig. 21  1-1/2 in. threaded union type 92 or 92 modified

Fig. 22  Bracket – type 89

Fig. 23  Universal – type 90
Union Connection Remote Seals (S26UN)
The union connection remote seals are used exclusively for pressure measurement. The seal is available without a weld bushing, with an optional weld bushing, or with an optional chemical tee flange. An O-ring is used to seal the process connection. The O-ring material can be silicone rubber for temperatures up to 350°F (177°C) or Teflon TFE for temperatures up to 400°F (204°C). Note that the operating temperature limit for the seal can be lower than the O-ring temperature limit because of fill fluid limitations (refer to the fill fluid parameter table in the Specification Sheet). Connect the seal as described in the applicable following section.

Seal without Weld Bushing
The seal without a weld bushing, see Figure 23, must be connected to a user supplied fitting having mating surface dimensions as shown in the figure. Connect the seal as follows:
1. Lubricate the sealing O-ring with Silicone gasket grease.
2. Mount the O-ring on the end of the seal.
3. Insert seal into mating fitting and tighten the union connection nut to press the O-ring against the fitting surface.

![Fig. 24 Union connection remote seal – basic version](image)

Seal with Weld Bushing
The remote seal with a weld bushing includes a bushing which provides the mating surface for the seal element. The bushing must be welded to the process piping or vessel before installing the seal. Use the following procedure:
1. Weld bushing to pipe or vessel in accordance with standard industrial practices.
2. Remove protective covering from seal.
3. Lubricate the sealing O-ring with silicone gasket grease.
5. Insert element into mating fitting and tighten the union connection nut to press the O-ring against the fitting surface.

![Fig. 25 Union connection remote seal with weld bushing](image)
Seal with Chemical Tee Flange

The union connection seal with a chemical tee flange is designed to connect to any process fitting which accepts a chemical tee seal element (refer to Chemical Tee Seal for more information). The union seal connects to the chemical tee flange which serves as an adapter to permit connection of the union seal to a chemical tee type fitting.

In addition to the o-ring required on the remote seal, this option requires a gasket to seal the chemical tee flange at its connection to the process fitting. This gasket is included when the chemical tee flange option is specified. The gasket material is PTFE with silica filler and the maximum operating temperature is 400°F (204°C). Note that the seal operating temperature limit can be lower than this gasket temperature limit if the remote seal o-ring is silicone rubber with a 350°F (177°C) rating, or if the fill fluid has a lower temperature limit (refer to the fill fluid parameter table in the Specification Sheet). The eight cap screws required to connect the flange are supplied with the mating process fitting. The gasket and bolts have been specifically selected to meet the sealing and pressure rating requirements of the chemical tee flange.

Substitution of user supplied bolts and gaskets is not recommended.

Connect the seal element using the following procedure:

1. Connect the chemical tee flange as follows:
   - Place the gasket on the flange sealing surface and insert flange into the process fitting.
   - Insert 8 cap screws and finger tighten each screw.
   - Following a diagonal sequence, tighten each cap screw to a torque of 12.4 Nm (110 inch-lbs).

2. Connect the union seal to the chemical tee flange as follows:
   - Remove protective covering from seal.
   - Lubricate the sealing O-ring with Silicone gasket grease.
   - Mount the O-ring on the end of the seal.
   - Insert the seal into the chemical tee flange and tighten the union connection nut to seal the O-ring against its mating surface.

![Fig. 26 Union connection remote seal with Chemical Tee flange](image)

NOTE: The pressure limit for a transmitter with this seal is determined by the chemical tee flange. Maximum working pressure for the flange is 2000 KPa (300 psi).

For any other detailed information regarding S26UN seals such as pressure limits, vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.
Food and Sanitary Remote Seal (S26SS)
Sanitary diaphragm seals have been specifically developed for food, sanitary, chemical and pharmaceutical applications, complying with the stringent 3-A requirements. Available with different process fittings (Triclamp, Cherry Burrell, Union Nut and Sanitary), this model highlights ABB’s commitment to satisfy users needs approaching even the most demanding processes successfully.

Cherry Burrell Aseptic
The sanitary aseptic remote seal is designed to connect to a 4in sanitary fitting: either an aseptic tank spud or a 4in Cherry Burrell aseptic ferrule. The tank spud, gaskets and V-band clamp are available option with the seal element. NOTE: The tank spud or ferrule required for connection of this seal element must be welded to the process vessel prior to connecting the element, following recommended welding and pressure testing procedure. Weld the Cherry Burrell ferrule to the process vessel in accordance with manufacturers’ recommendations. Connect the sanitary aseptic seal to the tank spud or ferrule as follows:

1. Remove protective covering from seal.
2. Install two O-rings on the periphery of the seal and an O-ring under each steam connection fitting.
3. Insert the seal into the tank spud or ferrule and place the steam connection cap against the back of the element.
4. Position the clamp ring as shown and tighten to seal the O-rings against the spud.
5. Connect the inlet and outlet steam lines to the 1/8 NPT steam connections in the cap. Steam temperature must not exceed 149°C (300°F); pressure must not exceed 358.5 KPa (52psi).

Fig. 27 4 in. sanitary seal
**Sanitary Seal with Flush Diaphragm**

The sanitary remote seal with flush diaphragm is designed to connect to a 4-inch sanitary tank spud. The tank spud and process O-ring, made of Buna or Viton, are available with the seal. Connect the seal as follows:

1. Remove protective covering from seal and install the process O-ring.
2. Insert the seal into the tank spud.
3. Position the clamp ring as shown and tighten to seal the O-ring against the spud.

![Fig. 28 Sanitary seal with flush diaphragm](image)

**Sanitary Seal with Extended Diaphragm**

The sanitary remote seal with extended diaphragm is designed to connect to a 4-inch sanitary tank spud with an extended neck (2, 4 or 6 inches). The tank spud, an Ethylene Propylene process O-ring and V-Band clamp ring are available with the seal. Connect the seal as follows:

1. Weld the tank spud into the process vessel. Be sure to orient the spud so that the drain hole is at the lowest point.
2. Remove protective covering from seal and install the O-ring.
3. Insert the seal into the tank spud.
4. Position the clamp ring over the joint between the seal and spud and tighten the clamp.

NOTE: The tank spud required for connection of this seal element must be welded to the process vessel prior to connecting the seal, following a recommended welding and pressure testing procedure.

![Fig. 29 Sanitary seal with extended diaphragm](image)
Union Nut and Triclamp remote seal

The Union Nut and Triclamp seals are designed for connection by Union Nut according to DIN 11851 - F50 or F80 and 2in, 3in, 4in Triclamp sanitary fittings. A variety of gaskets and clamp rings for the seals are available.

Note: this kind of diaphragm seal does not comply with the stringent 3A standard requirements. Therefore, it is not covered by the relevant certification.

| Dimensions mm (in) for S26SS Union Nut to DIN 11851 |
|---|---|---|---|
| Size | A (dia) | B (dia) | C (dia) | D |
| F50 | 42 (1.65) | 78 (3.07) | 92 (3.62) | 22 (0.87) |
| F80 | 72 (2.83) | 128 (4.43) | 127 (4.98) | 29 (1.14) |

| Dimensions mm (in) for S26SS Triclamp |
|---|---|---|---|
| Size | A (dia) | B (dia) |
| 2 in. | 56.3 (2.2) | 64 (2.5) |
| 3 in. | 83 (3.26) | 93 (3.66) |
| 4 in. | 110.3 (4.34) | 119 (4.68) |
Cherry Burrell seal

The Cherry Burrell seals are designed for connection to 2in, 3in or 4in Cherry Burrell I-Line sanitary fittings. A 4in. V-band clamp is optionally available for the 4in. variant.

![Fig. 32 Cherry Burrell sanitary seal](image)

<table>
<thead>
<tr>
<th>Size</th>
<th>A (dia)</th>
<th>B (dia)</th>
<th>C (dia)</th>
<th>D (dia)</th>
<th>E (dia)</th>
<th>F (dia)</th>
<th>G (dia)</th>
<th>H (dia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in.</td>
<td>67 (2.64)</td>
<td>56 (2.2)</td>
<td>42 (1.65)</td>
<td>57 (2.24)</td>
<td>3.2 (0.13)</td>
<td>6.5 (0.26)</td>
<td>12.5 (0.49)</td>
<td>3 (0.12)</td>
</tr>
<tr>
<td>3 in.</td>
<td>98.4 (3.87)</td>
<td>81 (3.19)</td>
<td>72.42 (2.85)</td>
<td>83.8 (3.3)</td>
<td>2.4 (0.09)</td>
<td>7.9 (0.31)</td>
<td>15 (0.59)</td>
<td>3 (0.12)</td>
</tr>
<tr>
<td>4 in.</td>
<td>124 (4.88)</td>
<td>111.25 (4.38)</td>
<td>72.42 (2.85)</td>
<td>109.3 (4.3)</td>
<td>2.4 (0.09)</td>
<td>7.9 (0.31)</td>
<td>15 (0.59)</td>
<td>3 (0.12)</td>
</tr>
</tbody>
</table>

Beverage bolted seal

This seal has been designed to be suited for specific applications in beverage processes. The sanitary bolted seal is available only for gauge and absolute transmitters with direct-mount seal construction. Spud process fitting is available on request.

![Fig. 33 Beverage bolted seal for 266HDH and 266NDH transmitters](image)

Note: this kind of diaphragm seal does not comply with the stringent 3A standard requirements. Therefore, it is not covered by the relevant certification.

For any other detailed information regarding S26SS seals such as pressure limits, vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.
NOTE (3-A requirements)
All sanitary S26SS remote diaphragm seals and other associated direct mount sanitary diaphragm seals must be mounted in such a way as to allow for drainage of all process fluids. Tank spud fittings must be mounted with the leak detection hole located at the bottom for proper drainage by gravity. Sanitary applications must be performed so that all welding surface are smooth in order to prevent dirt from lodging inside surface irregularities.

3-A seals are equipped with a specific label (see below) indicating the temperature range and gasket characteristics.

<table>
<thead>
<tr>
<th>Fitting connection / Size</th>
<th>Dimensions mm (in) for S26VN – saddle type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (dia)</td>
</tr>
<tr>
<td>Saddle 2 in.</td>
<td>55 (2.17)</td>
</tr>
<tr>
<td>Saddle 2-1/2 in.</td>
<td>76 (3.0)</td>
</tr>
<tr>
<td>Saddle 3 in.</td>
<td>76 (3.0)</td>
</tr>
<tr>
<td>Saddle 4 in.</td>
<td>76 (3.0)</td>
</tr>
<tr>
<td>Saddle 5 in.</td>
<td>76 (3.0)</td>
</tr>
<tr>
<td>Saddle 6 in.</td>
<td>76 (3.0)</td>
</tr>
</tbody>
</table>

Saddle and socket diaphragm seal (S26VN)
The saddle and socket seal are the best solution when the diaphragm needs to be as closest as possible to the process media. These are typically installed by welding to the process pipes with fluid at high viscosity. Saddle and socket process connection fittings are available as option selection, available only in AISI 316 L ss.
For any other detailed information regarding S26VN seals such as pressure limits, vacuum service recommendations, process temperature limits, temperature effects and configuration, please refer to product datasheet.
In-line diaphragm seal (S26JN)

In line seals are suitable for measuring the pressure of fluids in pipes. The pressure measuring diaphragm forms the pipe wall making this type of seal suitable for measuring the pressure of flowing fluids particularly those that are highly viscous or contain solids. This particular diaphragm seal is available only on direct-mount gauge and absolute pressure transmitters.

Fig. 36 In-line diaphragm seal

<table>
<thead>
<tr>
<th>Dimensions mm (in) for S26JN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size / Rating</td>
</tr>
<tr>
<td>1 in. / DN 25</td>
</tr>
<tr>
<td>1-1/2 in. / DN 40</td>
</tr>
<tr>
<td>2 in. / DN 50</td>
</tr>
<tr>
<td>3 in. / DN 80</td>
</tr>
</tbody>
</table>
Pulp and Paper diaphragm seals (S26KN)

Models 266HDH, 266NDH, 266GDH and 266ADH integrate a direct mount seal on the positive side, having the negative side reference at atmospheric or vacuum pressure, respectively for gauge or absolute measurements.

The integral seal is available in 1in and 1-1/2in diaphragm sizes specifically designed for pulp & paper industry applications, providing a flush diaphragm to the process; this solution ensures the measure reliability avoiding all problems of crystallization/polymerization, typical of pulps having viscosity as in the paper mill.

Use of proper procedures and fixtures avoid the risks of personal injury or plant damage.

The recommended minimum radius of curvature of the tank is 0.91 m (3 feet).

Allowed fill fluids are Silicone Oil DC200™ and mineral oil Marcol 82™

1 in. and 1-1/2 in. size with 1 in. and 1-1/2 in. NPT threaded connection

This particular process connection can withstand a maximum working pressure of 345bar (5000psi). The wetted parts are available in AISI 316L, Hastelloy C276™ and Diaflex (anti-abrasion diaphragm treatment).

Fig. 37  1 in. and 1-1/2 in. NPT threaded connection

1 in. and 1-1/2 in. size with G 1 in. B and G 1-1/2 in. B threaded connection

This particular process connection can withstand a maximum working pressure of 600bar (8700psi). The wetted parts are available in AISI 316L, Hastelloy C276™ and Diaflex (anti-abrasion diaphragm treatment).

Fig. 38  1 in. B and G 1-1/2 in. B threaded connection
1 in. and 1-1/2 in. size to spud with 1 or 2 screw(s) fixing
Consider that this kind of pulp and paper sealing with gasket seal can withstand a maximum working pressure of:
30bar (435psi) in case of 1 screw fixing
50bar (725psi) in case of 2 screws fixing
The wetted parts are available in AISI 316L, Hastelloy C276™ and Diaflex (anti-abrasion diaphragm treatment).
While installing, please use the appropriate Viton™ gasket.

![Fig. 40 1 in. and 1-1/2 in. size to spud](image)

1 in. G with ball valve connection
This special connection allows easy instrument mounting on ball valves which are extensively used in industry since they are easy to install and repair. They offer user the opportunity of avoiding complete plant shutdown. Consider that this particular process connection can withstand a maximum working pressure of 40bar (580psi).
The wetted parts are available only in Hastelloy C276™.

![Fig. 41 Ball Valve connection](image)

1-1/2 in. sealing connection to threaded spud (M44 x1.5)
Consider that this particular process connection can withstand a maximum working pressure of 50bar (725psi).
While installing, please use the appropriate PTFE gasket.
The wetted parts are available in AISI 316L, Hastelloy C276™ and Diaflex (anti-abrasion diaphragm treatment).

![Fig. 42 Threaded connection to spud](image)
Welding Procedure for Sanitary and Pulp&Paper spuds

1. Using appropriate size hole saw, cut a hole in the process vessel to accept the spud. The hole should couple with the spud perfectly.
2. Remove the weld spud from the transmitter and secondly the PTFE gasket from the weld spud (if any).
3. Position the weld spud in the vessel hole and start welding. For this important phase, please look at and follow the welding sequence (Figure 43).
4. Cool each section properly before proceeding to the next section.
5. Use between 100 and 150 amps. and adjust the amperage, if needed, for spud penetration.
6. After the weld spud has cooled, install the Teflon gasket into the weld spud. Ensure the gasket is properly positioned within the weld spud; improper placement can cause a process leak.
7. Position the transmitter into the spud and engage the threads. Rotate the transmitter and thread it completely.
8. Tighten the transmitter or, if in case of pulp and paper cylindrical spud, install the needed bolt(s).

NOTE: users should install spuds carefully.

Please follow the notes below:
- Position inside gasket (if any) perfectly in order to avoid process leaks.
- Improper installation may result in spud distortion.
- Excessive heat will distort the spud.
- Allow adequate cooling between welding and the following operations.
- Weld the spud properly on tank or vessel walls in order to avoid personal injury or plant damage.

Sanitary Spuds (3A recommendations)
Use of proper procedures and fixtures permits the flanges to be welded to the maximum wall thickness.

The recommended minimum radius of curvature of the tank is 0.91 m (3 feet).

The spud has to be welded so that the welding surface remains smooth and without irregularities where dirt can lodge. The spud leak detection hole has to be positioned at the bottom of the spud.

For sanitary spud welding procedure, please refer to figure 43.
CONNECTING LOW SIDE COMPENSATION LEG ON A DP WITH ONE SEAL

Differential pressure transmitters with a single remote seal element are used for liquid level installations. The seal element is connected using the procedure applicable to the type of seal element. The connection requirements for the low side depends on whether the tank is open to atmosphere or closed (pressurized or evacuated). Make the low side connection as described below.

Open Tank Installation
The low side of the transmitter must be vented to atmosphere for open tank installations. Be sure there are no plastic shipping plugs or other restrictions in the low side flange ports. Connect the seal element using the procedure applicable to the element type. Refer to the Connecting the Remote Seals section.

Closed Tank Installation
Before connecting the seal element to the tank fitting, determine whether a wet or dry compensating leg is required on the low side of the transmitter. Refer to the Locating the Transmitter and Remote Seals section.

The transmitter is shipped with the vent/drain plug located near the top of the low side flange. In this position the valve permits venting of entrapped gas (normally air) when a wet (liquid filled) compensating leg is required. If a dry leg is required, remove the bolts and rotate the low-side flange 180° so that the vent/drain screw is positioned at the bottom of the flange to permit draining of condensate from the primary cavity. Re-tighten the bolts to a torque of 20 ft-lb.

After properly locating the vent/drain screw, connect the low side to the compensating leg, and connect the seal element using the procedure applicable to the element type. Refer to the Connecting the Remote Seals section.
Note
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