

**Diaphragm Seals (or Chemical Seals)** use a flexible barrier, or diaphragm, to isolate a pressure sensor (gauge, switch, transmitter, or transducer) from adverse effects of the process fluid.

**HOW IT WORKS:**

A diaphragm seal, when properly mounted to its sensor and filled will accurately transmit process pressure to the instrument. Pressure exerted on the flexible diaphragm is transmitted hydraulically to the instrument through the fill fluid, which fills the void between the diaphragm and the instrument, (including the bourdon tube, in the case of a pressure gauge.)

**APPLICATION CONSIDERATIONS:**

The following should be considered when choosing a diaphragm seal:

1. Process Characteristics: Pressure, temperature, (see tables, this page) chemical compatibility and viscosity.
2. Seal Mounting: Connection to process (threaded, flanged, clamped, in-line) Connection to instrument (usually NPT).
3. Ambient Characteristics: Temperature, corrosive atmosphere, etc.

4. Instrument Considerations: Sufficient fluid displacement is required to drive instrument through its full range (this means, for example, you can't put a large gauge on a small seal); remote instrument placement requires a capillary connecting instrument to seal.

5. Vacuum Considerations: High vacuums (over 25" Hg vac.) or vacuums with high temperatures require special fill selection, preparation, and procedures, as well as careful diaphragm selection.

**NOTE:** Improper selection may result in system failure and possible damage or injury. *Mid-West* can provide application assistance, but final compatibility is the responsibility of the buyer. Proper selection of seal can reduce or eliminate any additional system error caused by adding a Diaphragm Seal to your instrument.

**SEAL TYPES:**

**Standard Seals (pages 2&3)** include Threaded off-line, threaded in-line, and flanged off-line types in many materials for a variety of applications:



**SPECIAL DESIGNS:** Mid-West is ready to work with you on any high-performance diaphragm seal application, (that might exceed the stated limit below) such as high vacuum, high temperature, high sterility, custom design or high static pressure with a low differential span, or high vacuum with high temperature.

**MATERIALS:**

Lower housings: 316 S.S. is standard with a large selection to suit a wide variety of applications (see table 1, page 3)  
 Diaphragms: Standard metal diaphragms are convoluted and made of 316 S.S. Many other materials are available for corrosion resistance or extra sensitivity. (see table 6, page 3)  
 Gaskets: Standard gaskets are Teflon on the process side of diaphragm (Grafoil for hi temp.), and Viton on the fill side. Other materials are available.

Maximum Temperature	Diaphragm Material	Lower Housing
650°F	Welded Metal	Metal
450°F	Teflon	Metal
300°F	Viton	Metal
140°F	n/a	Nonmetal

	Lower Housing			
	PSI	Diaphragm	Size 5 Seal	Size 6 Seal
<b>Maximum working pressure</b>	1,500	Metal, w/S.S. Bolting	(at 100°F)	
	2,500	Metal, w/Std. Bolting	(at 100°F)	
	5,000	Metal, w/Hi-Press. Bolting	(at 100°F)	
	Per flange rating	ASA Flange	(Per Flange Spec)	
	300	Non-Metalic	(at 140°F)	
<b>Min. working pressure</b>	Metal	25 PSI	10 PSI	
	Teflon	20 PSI	8" WC	
	Viton	5" WC	N/A	
<b>Vacuum Limits</b>	Metal	-21" hg	-24" hg	
	Teflon	-23" hg	-26" hg	
	Viton	-29" hg	N/A	

# DIAPHRAGM SEALS

## How To ORDER

TABLE 1  
Seal Series

TABLE 2  
Seal Size

TABLE 3  
Configuration

TABLE 4  
Instrument  
Connection

TABLE 5  
Process  
Connection

TABLE 6  
Diaphragm  
Material

TABLE 7  
Lower (process)  
Housing Material

TABLE 8  
Upper (instrument)  
Housing Material

EXAMPLE:



### TABLE 1 Seal Series

- W** - Welded metal diaphragm
- T** - Teflon diaphragm (high sensitivity, chemical resistance)
- V** - Viton diaphragm - (most sensitive, for low pressures)

### TABLE 2 Seal Size

- 5** - Standard size  
Seal dia. = 3.25" in threaded models  
Diaphragm dia. = 2.25"
- 6** - Large size - (Preferred for low pressure, hi displacement, or hi sensitivity.)  
Seal dia. = 4" in threaded models  
Diaphragm dia. = 3"
- 7** - Large size  
Seal diameter; 5.2"  
Diaphragm dia. = 4.1"

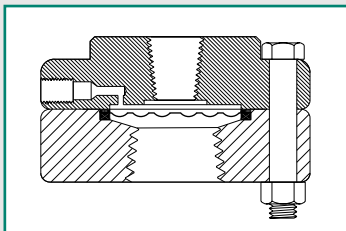
### TABLE 4 Instrument Connection

- 4** - 1/4" NPTF
- 2** - 1/2" NPTF

### TABLE 5 Process Connection

- 4** - 1/4" NPTF
- 2** - 1/2" NPTF
- 3** - 3/4" NPTF
- 1** - 1" NPTF
- F** - Flanged - specify flange size and pressure rating (e.g. 1 1/2", 150 lb) or insert "V" codes from Table A see p. 24 (e.g. V41=1 1/2" 150#)

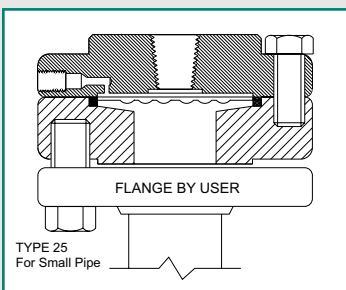
### Threaded, Off-Line



### TABLE 3 - Configuration

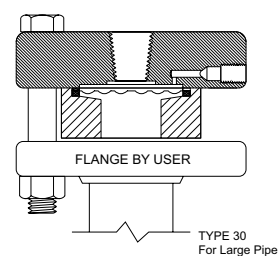
- 10** - Replaceable diaphragm - non cleanout (not available with series "W")
- 11** - Same as 10, with flush port
- 15** - Cleanout style - lower housing can be removed without losing fill. (Available with Series W, T, V)
- 16** - Same as 15, with flush port

### Flanged, Off-Line - with cleanout

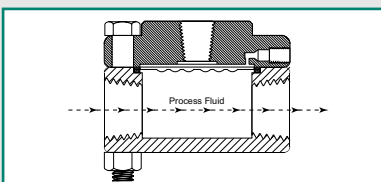


- 25** - for 1/2", 3/4" pipe size (1" in size 6)
- 26** - Same as 25, with flush port

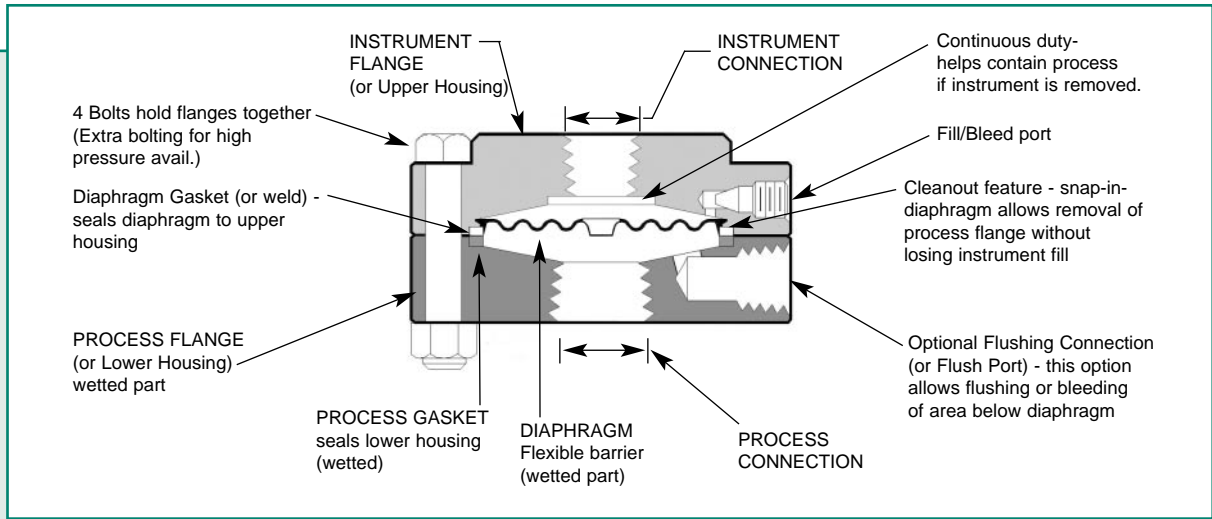
- 30** - for 1 1/2" pipe to 3" pipe size (1" in size 5)
- 31** - Same as 31, with flush port



### In-Line, Flow-Thru - with cleanout



- 35** - Threaded (shown) - for 1/4" to 1" pipe
- 40** - Socket Weld - for 1/4" to 1" pipe
- 45** - Saddle Weld - for 1" to 8" pipe
- 50** - Butt Weld - for 1" to 12" pipe



**TABLE 6**  
Diaphragm Material (wetted)

MOST COMMON

- S** - 316 S.S.
- T** - Teflon
- \* **V** - Viton
- D** - Carpenter 20
- \* **F** - 304 S.S.
- G** - Hastelloy B
- H** - Hastelloy C
- J** - Titanium
- L** - 316LSS, teflon coated
- M** - Monel
- N** - Nickel
- U** - Tantalum
- X** - Gold Plated Diaphragm
- \* **Y** - Inconel

\* Size 5 only.

**TABLE 7**  
Lower Housing Material (wetted)

MOST COMMON

- S** - 316 S.S.
- T** - Teflon
- \* **L** - Teflon lined
- Z** - PVC
- B** - Brass
- C** - Steel
- D** - Carpenter 20
- F** - 304 S.S.
- G** - Hastelloy B
- H** - Hastelloy C-276
- J** - Titanium
- K** - Kynar
- M** - Monel
- N** - Nickel
- P** - Polypropylene
- U** - Tantalum
- UL** - Tantalum Lined
- W** - CPVC
- Y** - Inconel

\* Available only on types 25 & 30, 1" and larger.

**TABLE 8**  
Upper Housing Material (including bolts)

- C** - Carbon Steel (standard)
- S** - 316 Stainless
- F** - 304 Stainless

- OPTIONS:**
- Hi Pressure bolting
  - Non-Stick Teflon coating on metal diaphragm
  - Socket weld connections
  - High temp. gasketing
  - Stainless steel bolting (reduces pressure rating up to 50%)
  - Capillary Lines

**Fill Fluids** Fill Fluids should be chosen with care. The fluid must be compatible with the process medium in case the diaphragm is ruptured. Compatibility of fill fluid with process is the user's responsibility.

FLUID	TEMPERATURE LIMITS	VISCOSITY, CS, 77° F	NOTES
Silicone, DC 200	-50 to 450° F	20	our standard fill
Silicone, DC 704	+50 to 600° F	44	Hi-temp fill
Silicone, DC 710	+30 to 700° F	500	Hi-temp fill
Neobee M-20	-4 to 320° F	10	food grade
Glycerin	+30 to 300° F	1110	for food; not recomm. for capillary
Halocarbon	-40 to 400° F	6	inert, for use with oxidizers (must not contact Al, Mg)

*Other fills available: consult factory.*

*not to be used with strong oxidizers, such as chlorine, oxygen, etc.*

Credits: Viton, Teflon, Kynar, TM DuPont, Inc.; Carpenter 20 - TM Carpenter Steel Co.; Inconel, Monel - TM Huntington Alloys, Inc.; Hastelloy - TM Cabot Corp.; Halocarbon - TM Halocarbon Corp.