

DIAPHRAGM SEALS

INTRODUCTION

REOTEMP 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.

Diaphragm seals are useful to:

- 1.) *Protect the sensor* from the process media (corrosive, abrasive, viscous, or crystallizing media)
- 2.) *Protect the process* from the sensor (sanitary process requiring clean-out, or high purity media).

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. REOTEMP 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 (pp 22-23): include Threaded off-line, threaded in-line, and flanged off-line types in many materials for a variety of applications:

Sanitary Seals (pg 28): are designed for food, pharmaceutical and other sanitary applications. Available to fit most standard piping systems, including "Tri-clamp", "I" line, and others. For straight-thru and in-line sanitary seals with no crevices, see our lit #ILS.

Mini-Seals (pg 27): are designed for low-displacement applications where size or economy are considerations.



SPECIAL DESIGNS: REOTEMP 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.

Temperature Limits

Maximum Temperature	Diaphragm Material	Lower Housing
650°F	Welded metal	Metal
450°F	Teflon	Metal
300°F	Viton	Metal
140°F	-	Nonmetal

Pressure Limits

Maximum working pressure	psi	Lower Housing	
		metal, with ss bolting	(at 100°F)
	1,500	metal, std bolting	(at 100°F)
	2,500	metal, hi-press bolting	(at 100°F)
	5,000	ASA flange	(per flange spec)
	per flange rating	non-metallic	(at 140°F)
	300		
Min. working Pressure	Diaphragm	size 5 seal	size 6 seal
		Metal	10 psi
	Metal	25 psi	8" W.C.
	Teflon	20 psi	n/a
	Viton	5" W.C.	
Vacuum Limits	Diaphragm	-21" Hg	-24" Hg
		Teflon	-23" Hg
	Metal	-29" Hg	-26" Hg
	Teflon		n/a
	Viton		

MATERIALS: Lower housings: 316SS standard, with a large selection to suit a wide variety of applications (see Table 1, pg. 23)

Diaphragms: Standard metal diaphragms are convoluted and made of 316SS. Many other materials are available, for corrosion resistance or extra sensitivity. (See Table 6, pg. 23)

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.

DIAPHRAGM SEALS

How To ORDER

TABLE 1
Seal Series

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

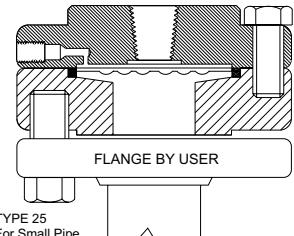
4 - 1/4" NPTF	F - Flanged - specify flange size and pressure rating (e.g. 1 1/2", 150 lb)
2 - 1/2" NPTF	or insert "V" codes from Table A see p. 24 (e.g. V41=1 1/2" 150#)
3 - 3/4" NPTF	
1 - 1" NPTF	

Threaded, Off-Line

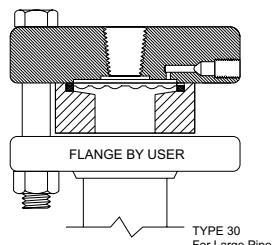
TABLE 3 - Configuration

- 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

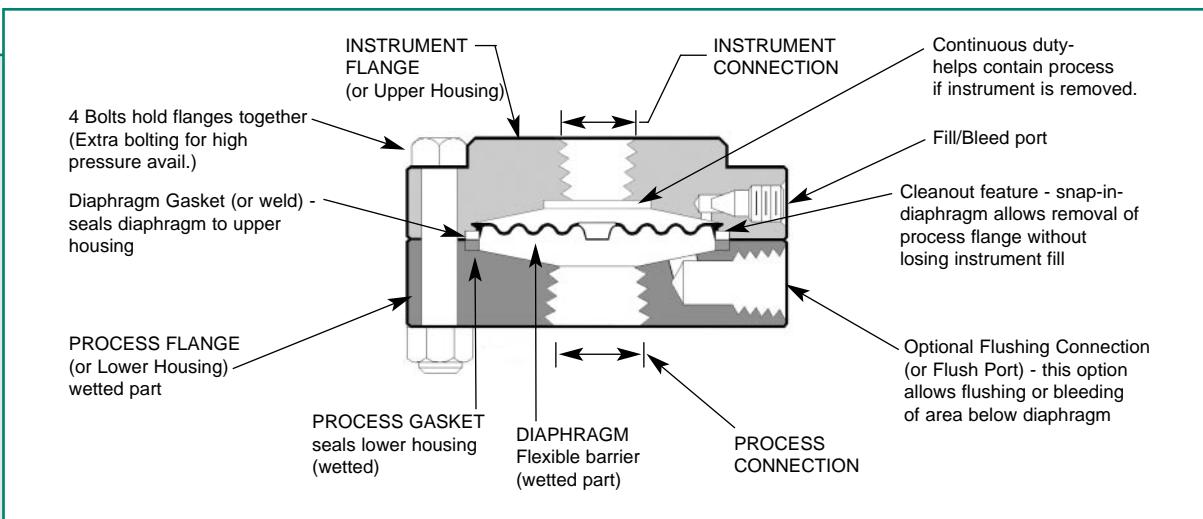


- 25** - for 1/2", 3/4" pipe size (1" in size 6)
- 26** - Same as 25, with flush port
- 30** - for 1 1/2" pipe to 3" pipe size (1" in size 5)
- 31** - Same as 31, with flush port



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