

# 4400™ TwinHybrid™ Gas Seal

## SEAL INSTALLATION

### Preparation

**Determine if the pump is in good condition.**

#### A. Check the shaft or sleeve.

1. Remove all burrs and sharp corners, especially in areas where the o-ring has to slide. Cover threads and slots with a thin tape to prevent cutting the o-ring. The distance from the stuffing box face to the center of the ring groove is approximately 0.16" (4 mm).
2. The shaft surface finish should be 32 microinches RA (0,8 microns) maximum. It should feel smooth if you run your fingernail down it axially.
3. **Make sure the shaft or sleeve diameter is within +/- .002" (0,05 mm) of nominal.**
4. Use a dial indicator to measure the shaft runout in the area where the seal is to be installed. **Readings should not exceed .001" (0,03 mm) TIR per inch of shaft diameter.**
5. Place the dial indicator on the shaft and alternately push and pull the shaft axially to measure end play. End play should not exceed .005" (0,12 mm) TIR.
6. Protect the sleeve o-ring by lubricating the shaft with a clean silicone based lubricant, as that provided with the seal.

#### B. Check the stuffing box.

1. The stuffing box face surface finish must be a maximum of 125 microinches RA (3,2 microns) for a gasket to seal.

2. Split case pumps will sometimes cause a step (misalignment) to occur on the stuffing box face. This step must be machined flat within 0.001" (0,03 mm).
3. Make sure the stuffing box is clean and clear along its entire length.
4. If possible, attach a base dial indicator to the shaft and rotate both the indicator and shaft slowly while reading the runout of the stuffing box face. Misalignment of the stuffing box face relative to the shaft should not exceed .002 (0,06 mm) TIR per inch of shaft diameter.

#### C. Check availability of clean dry barrier gas.

1. The seal uses gas (Nitrogen) to seal the product from the environment and lubricate the seal faces. 5 (Five) SCFH of barrier gas must be available at 30 psi (2 bar) over the maximum stuffing box pressure not to exceed 330 psi (23 bar) and filtered to a maximum particle size of 3 microns. Alternate gas can be used for barrier gas supply if it is compatible with the pumped product and the environment.

### Installation

1. Check the chemical listing to determine if the o-rings installed in this seal are compatible with the fluid being sealed.
2. **IMPORTANT: Check the rotation of the pump and the rotation arrow on the gland OD insuring both are the same direction.**

3. The 1/4 dog point set screws go into the small holes in the sleeve. Do not disengage these screws from the sleeve when positioning the seal. The cup point set screws go through the larger holes in the sleeve. Make sure all screws are engaged in the sleeve but do not protrude into the inside diameter of the seal sleeve. To reposition or remove the seal, make sure the three centering clips and socket head cap screws are engaged.
4. The centering clips have been preset at the factory. If for any reason you loosen or remove the centering clip cap screws, re-tighten each cap screw finger tight (approximately 15 inch-pounds [1,7 Nm] of torque).
5. **Make sure that the lip on the end of the gland is inside the inner centering clip groove and the lock ring lip engages the outer centering clip groove.**
6. **CAUTION:** The cup point set screws installed in the lock ring **are** hardened steel to insure that the seal maintains position with the higher axial loads associated with the use of gas seals. Slide the seal onto the shaft making sure the 1/4 dog point set screws are engaged through the seal sleeve.
7. Reassemble the pump and make necessary shaft alignments and impeller adjustments. The impeller can be reset at any time, as long as the centering clips are in place and the seal set screws are loosened while the shaft is being moved.

## SEAL INSTALLATION

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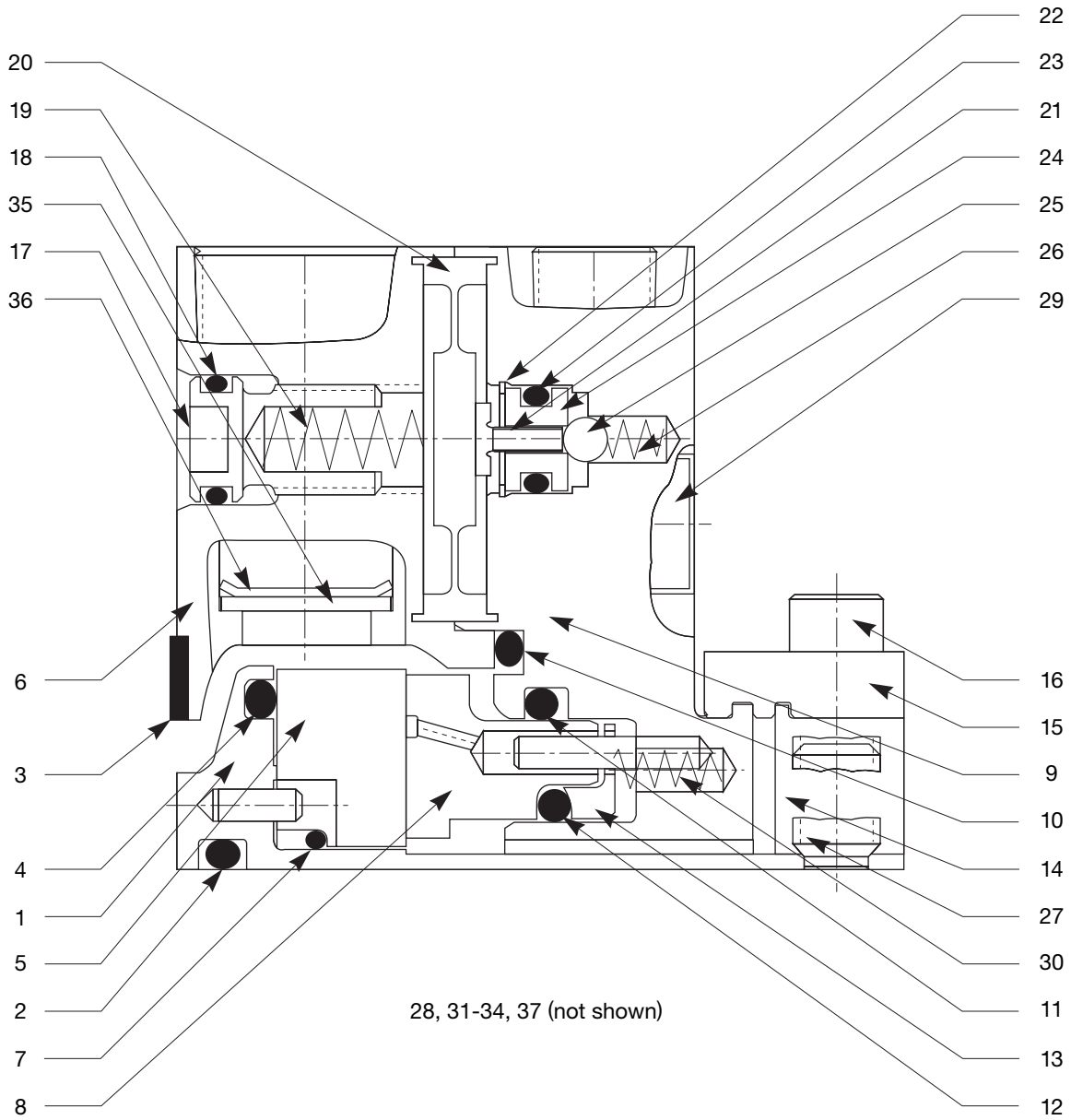
8. Orient the gas barrier supply and flush connections to the location required. The ports are plugged prior to shipping. **CAUTION:** Shipping plugs limit the dirt and contamination, which could enter the seal and cause seal malfunction. When plugs are removed ensure that dirt, liquid, and contamination do not enter the seal ports.
9. Piping connections should not be made prior to tightening the gland bolts.
10. Tighten the gland bolts evenly.  
**IMPORTANT: The gland bolts must be tightened before tightening the set screws onto the shaft.**
11. **IMPORTANT: All three 1/4 dog point set screws must be tightened FIRST.** See step 13 of the assembly instructions for location of dog point set screws. If rotation of the lock ring is required for tightening set screws, loosen or remove one centering clip. Tighten 1/4 dog point set screws finger tight. Retighten 1/4 dog point set screws evenly with the hex key provided. Once the 1/4 dog point set screws are tightened, evenly tighten the cup point set screws to the shaft with the hex key provided.
12. Remove socket head cap screws and centering clips. Retain for later use.
13. **IMPORTANT: It is important to make sure that the gland is properly centered over the sleeve.** To do this, turn the shaft by hand to make sure the seal turns freely. If you hear metal to metal contact within the seal, it is improperly centered. Replace the centering clips finger tight, loosen gland bolts, tighten clips, re-tighten gland bolts, and then remove clips. If metal to metal contact still exists, check the concentricity of the shaft to the stuffing box.
14. **THE BARRIER GAS SUPPLY AND FLUSH CONNECTIONS ARE 1/4" NPT.**
15. Determine if a flush/recirculation port is required. The flush connection is a 1/4" NPT port on the outer diameter of the adapter housing (inner gland) marked with an "F". If so, remove the shipping plug and connect the pump discharge/suction to the flush port using a recirculation line (bleed from discharge [API Plan 11] or connected to suction [API Plan 13]). This is recommended in seal applications where the barrier gas supply may be lost during operation. Plug the flush port if no connection is used. This connection may also be used to monitor stuffing box pressure by installing a connection to a gauge.
16. The barrier gas supply port is marked with a "B" on the outer diameter of the gland. Barrier gas supply is to be connected to the barrier gas supply port by removing the shipping plugs and installing a 1/4" NPT connection from the barrier gas supply manifold or system. Purge the barrier gas supply line prior to connecting to the seal port to insure it is free of contamination, dirt and liquid. Insure no burrs, restrictions or liquid legs are present in the supply line. Opposite the barrier gas supply port is a 1/4" NPT gauge port connection which may be utilized for monitoring the barrier gas pressure to the seal interface. **IMPORTANT: The barrier gas supply must be on whenever the pump is pressurized or contains product.** Full pressure barrier gas can be piped directly to the barrier supply port. The seal In-Gland Control System (IGCS) will maintain the preset differential pressure of the barrier gas at the seal interface over the product pressure in the stuffing box.  
**CAUTION: Operation without sufficient barrier gas supply can cause a loss in seal performance or failure.**
17. Take all necessary precautions and follow normal safety procedures before starting equipment.

## CAUTIONS

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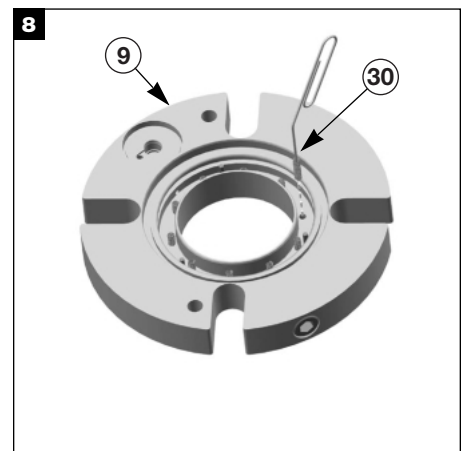
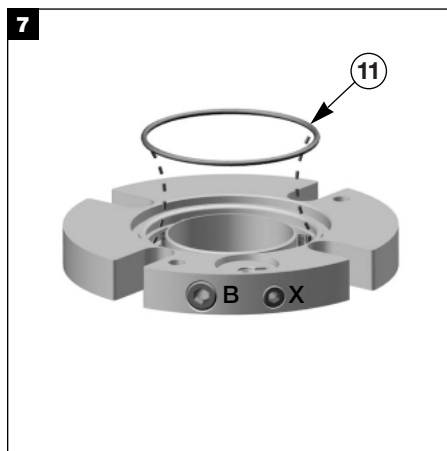
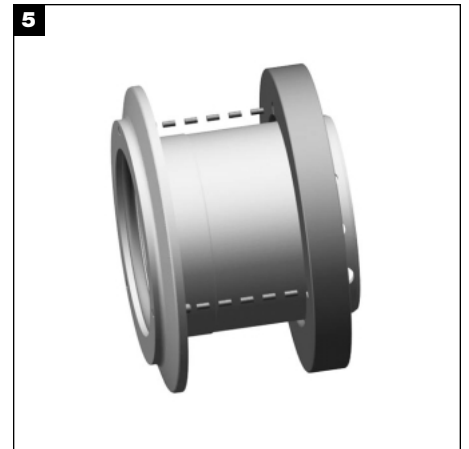
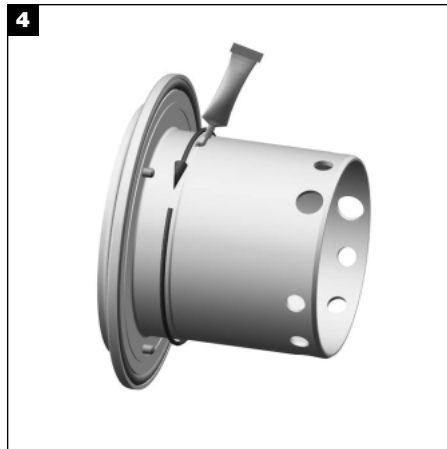
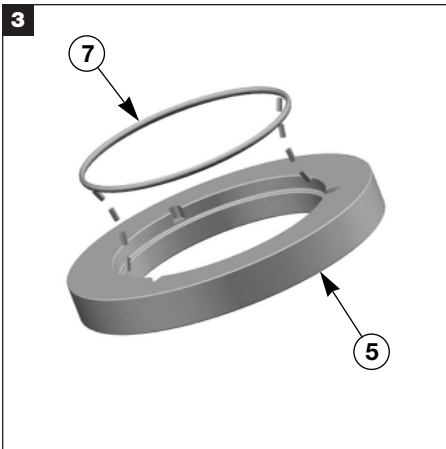
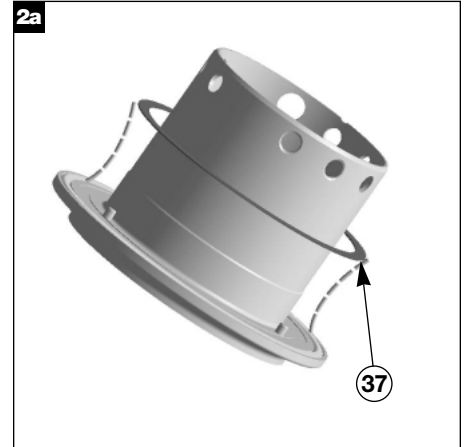
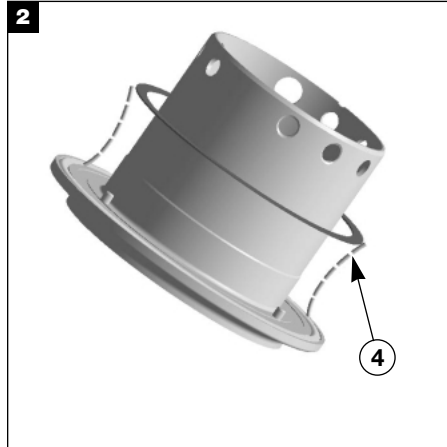
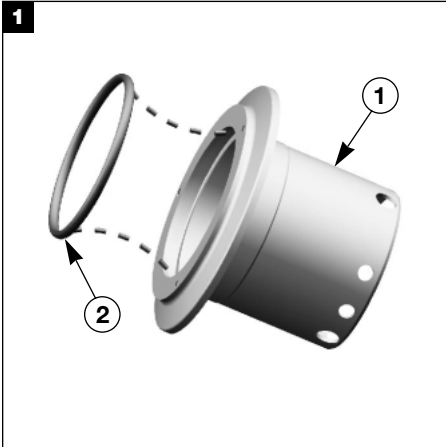
These instructions are general in nature. It is assumed that the installer is familiar with seals and certainly with the requirements of their plant for the successful use of mechanical seals. If in doubt, get assistance from someone in the plant who is familiar with seals or delay the installation until a seal representative is available. All necessary auxiliary arrangements for successful operation (heating, cooling, flushing) as well as safety devices must be employed. These decisions are to be made by the user. The chemical listing is intended as a **general** reference for this seal only. The decision to use this seal or any other Chesterton seal in a particular service is the customer's responsibility.

# PARTS IDENTIFICATION

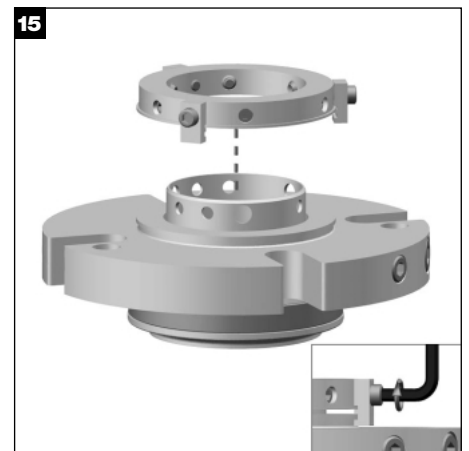
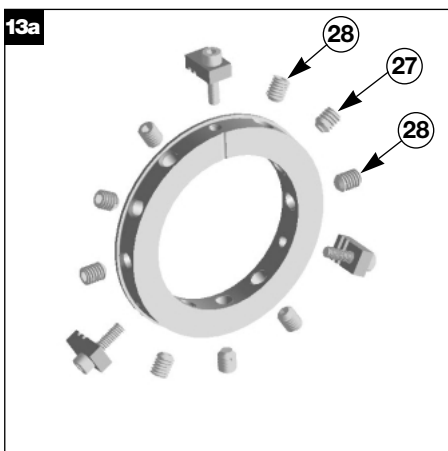
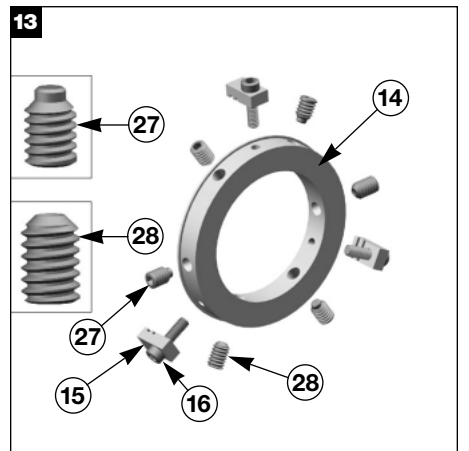
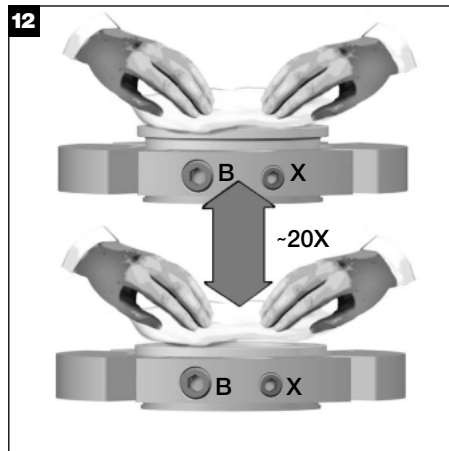
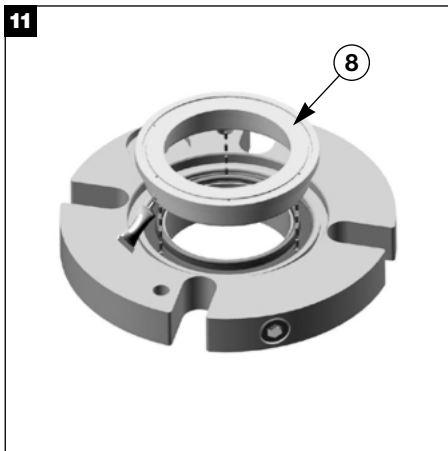
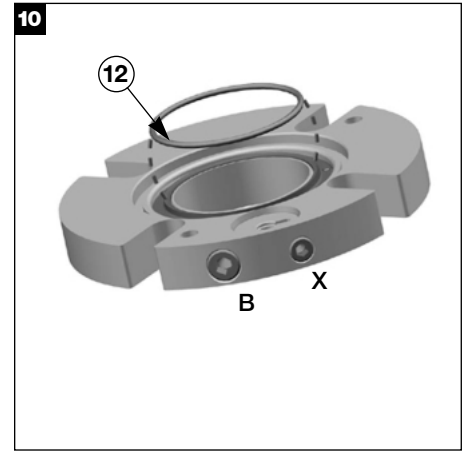
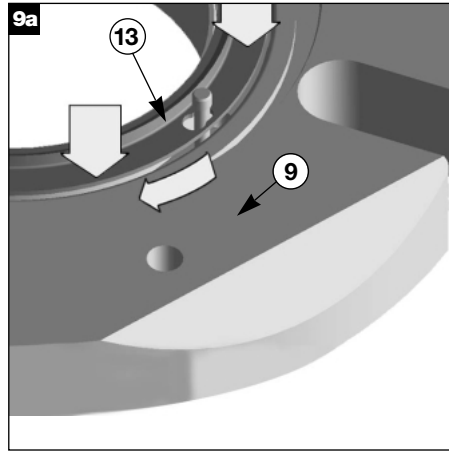
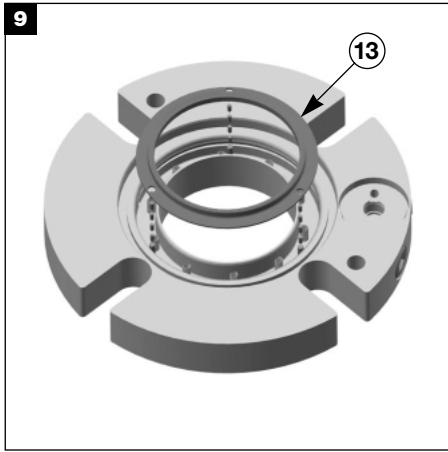


KEY		
1 – Sleeve Assembly	14 – Lock Ring	27 – Dog Point Set Screw
2 – Sleeve O-ring	15 – Centering Clip	28 – Cup Point Set Screw
3 – Gasket	16 – Socket Head Cap Screw	29 – Gland Screws
4 – Rotary O-ring	17 – Adjusting Screw	30 – Spring
5 – Rotary Seal Ring	18 – Screw O-ring	31 – 1/4" Pipe Plug
6 – Adapter	19 – IB Spring	32 – 1/8" Pipe Plug
7 – Rotary Cushion O-ring	20 – Diaphragm	33 – 3/8" Pipe Plug
8 – Stationary Seal Ring	21 – Actuator	34 – Cap Plug
9 – Gland	22 – Snap Ring	35 – Filter Disk
10 – Inter Gland O-ring	23 – Seat O-ring	36 – Retaining Clip
11 – OD Stationary O-ring	24 – Seat	37 – Support Gasket
12 – ID Stationary O-ring	25 – Ball	
13 – Pusher Plate	26 – OB Spring	

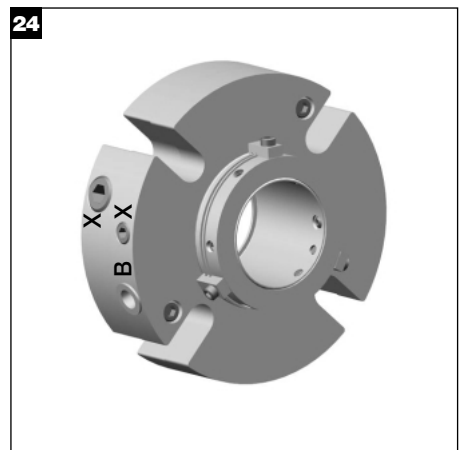
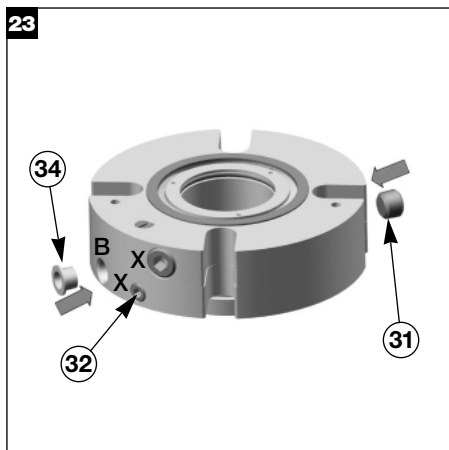
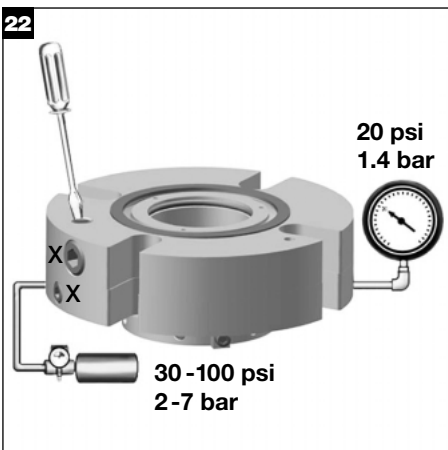
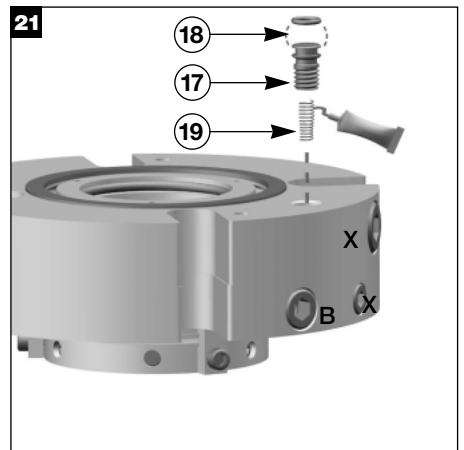
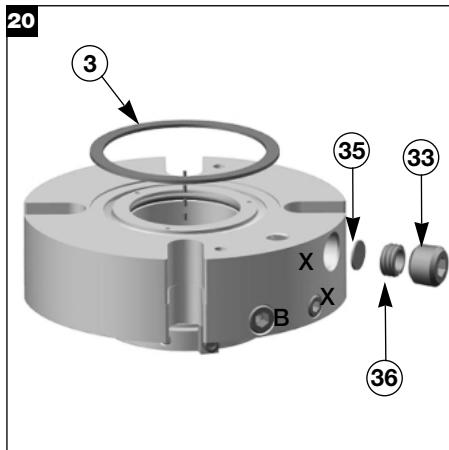
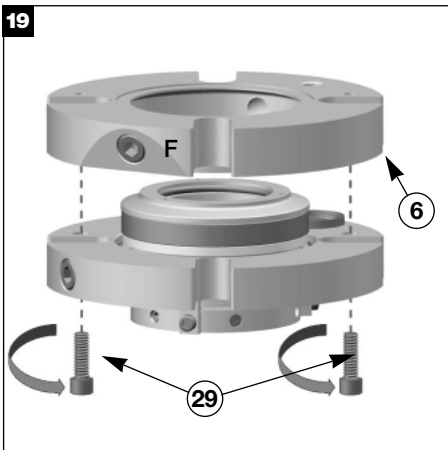
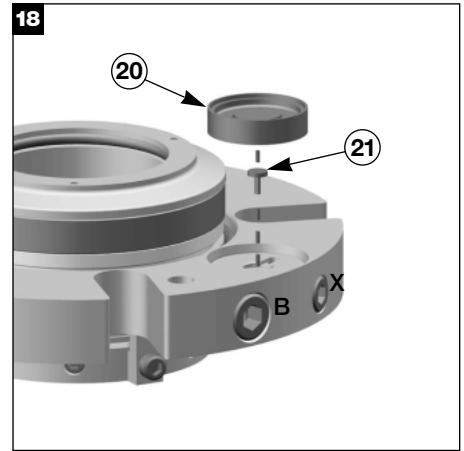
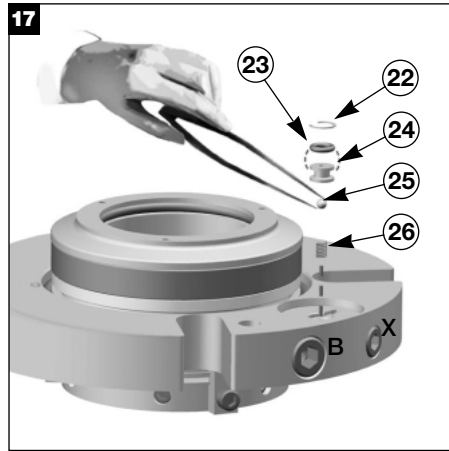
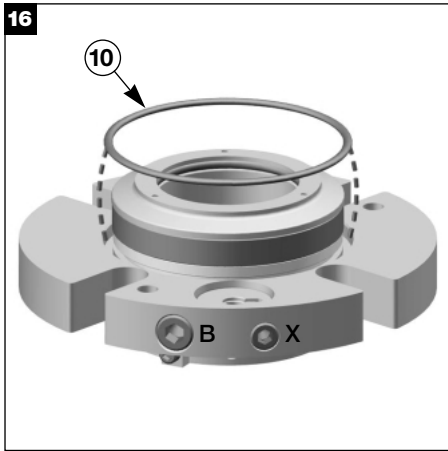
# SEAL ASSEMBLY



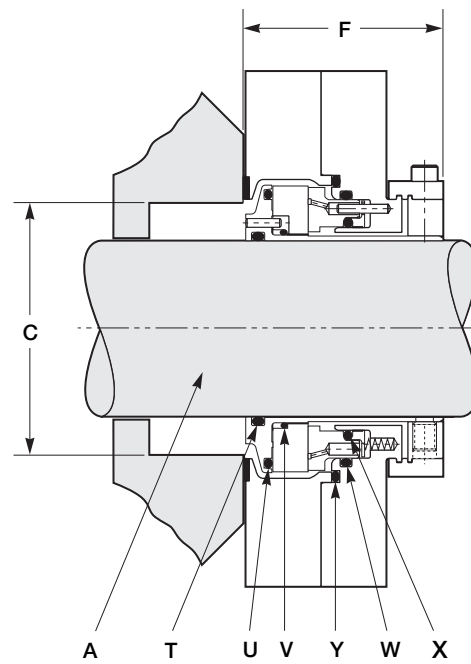
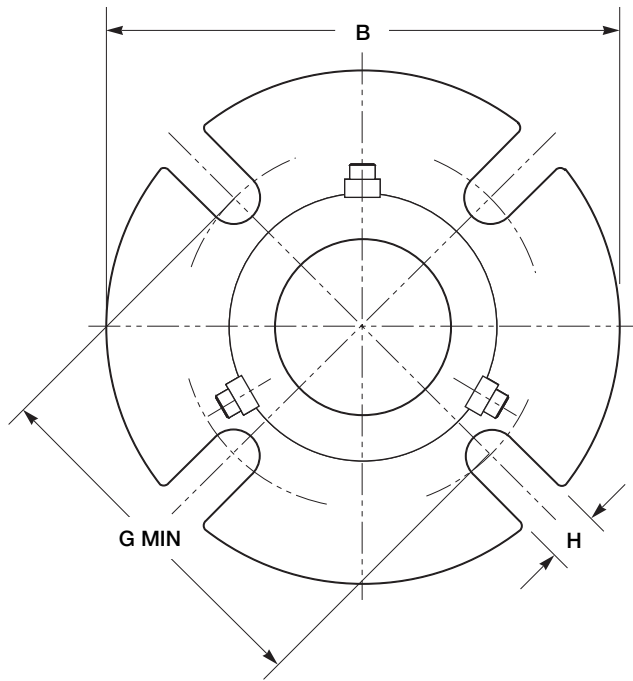
# SEAL ASSEMBLY



# SEAL ASSEMBLY



# 4400 DIMENSIONAL DATA (INCH)



DASH NO.	SHAFT SIZE	GLAND OD	STUFFING BOX BORE	OB LENGTH	BOLT CIRCLE BY BOLT SIZE				SLOT WIDTH	O-RINGS						
					G MIN					H	SHAFT T	ROTARY U	CUSHION V	STAT. OD W	STAT. ID X	GLAND ADPT. Y
					3/8"	1/2"	5/8"	3/4"								
		MAX	MAX	MAX												
-8	1.000	4.000	2.03	2.125	2.86			.44	-120	-134	-024	-134	-124	-139		
-9	1.125	4.000	2.06	2.125	2.99			.44	-122	-136	-026	-136	-126	-141		
-10	1.250	4.000	2.29	2.125	3.11			.44	-124	-138	-028	-138	-128	-143		
-11	1.375	4.360	2.45	2.125	3.24	3.36		.57	-126	-140	-029	-140	-130	-145		
-12	1.500	4.485	2.65	2.125	3.36	3.49		.57	-128	-142	-030	-142	-132	-147		
-13	1.625	4.985	2.71	2.125	3.49	3.61		.57	-130	-144	-031	-144	-134	-149		
-14	1.750	5.485	2.83	2.125	3.61	3.74		.57	-132	-146	-032	-146	-136	-150		
-15	1.875	5.485	2.96	2.125	3.74	3.86		.57	-134	-148	-033	-148	-138	-151		
-16	2.000	5.485	3.21	2.125	3.97	4.10		.57	-136	-150	-034	-150	-140	-152		
-17	2.125	5.985	3.46	2.125	4.22	4.34	4.47	.69	-138	-151	-035	-151	-142	-152		
-18	2.250	5.985	3.58	2.125	4.35	4.48	4.60	.69	-140	-151	-036	-152	-144	-153		
-19	2.375	5.985	3.61	2.125	4.41	4.53	4.66	.69	-142	-152	-037	-152	-146	-153		
-20	2.500	6.485	3.83	2.125	4.59	4.72	4.84	.69	-144	-152	-038	-153	-148	-154		
-21	2.625	6.445	4.06	2.227	4.85	4.98	5.10	.69	-146	-153	-040	-154	-151	-155		
-11 OS	1.375	5.385	3.27	2.125	3.98	4.11		.44	-126	-140	-029	-140	-130	-150		
-14 OS	1.750	6.635	3.90	2.125	5.36	5.48	5.61	.57	-132	-146	-032	-146	-136	-153		
-15 OS	1.875	5.985	3.96	2.125	4.86	4.98	5.11	.57	-134	-148	-033	-148	-138	-153		
-17 OS	2.125	6.985	4.40	2.125	5.74	5.86	5.99	.69	-138	-151	-035	-151	-142	-154		
-20 OS	2.500	7.76	5.40	2.125	6.49	6.61	6.74	.69	-144	-152	-038	-153	-148	-157		
-21 OS	2.625	6.98	4.92	2.227	5.73	5.86	5.98	.69	-146	-153	-040	-154	-151	-157		
-22	2.750	7.71	4.46	2.500		5.37	5.50	.69	-232	-242	-151	-242	-235	-246		
-23	2.875	7.83	4.59	2.500		5.47	5.60	.69	-233	-243	-151	-243	-236	-247		
-24	3.000	7.94	4.71	2.500		5.60	5.73	.69	-234	-244	-152	-244	-237	-248		
-25	3.125	7.99	4.84	2.500		5.75	5.87	.69	-235	-245	-152	-245	-238	-249		
-26	3.250	8.19	4.96	2.500		5.87	6.01	.69	-236	-246	-153	-246	-239	-250		
-27	3.375	8.31	5.09	2.500		5.97	6.10	6.22	.81	-237	-247	-153	-247	-240	-251	
-28	3.500	8.44	5.21	2.500		6.14	6.25	6.38	.81	-238	-248	-154	-248	-241	-252	
-29	3.625	8.49	5.34	2.500		6.27	6.38	6.52	.81	-239	-249	-154	-249	-242	-253	

## 4400 DIMENSIONAL DATA (METRIC)

SEAL SIZE.	SHAFT SIZE	GLAND OD	STUFFING BOX BORE	OB LENGTH	BOLT CIRCLE BY BOLT SIZE				SLOT WIDTH	O-RINGS					
										SHAFT	ROTARY	CUSHION	STAT. OD	STAT. ID	GLAND ADPT.
										T	U	V	W	X	Y
	A	B	C	F	G MIN				H						
		MAX	MAX	MAX	10 mm	12 mm	16 mm	20 mm							
25mm	25	102	52	54	73				11	-120	-134	-024	-134	-124	-139
28mm	28	102	52	54	76				11	-122	-136	-026	-136	-126	-141
30mm	30	102	58	54	80				11	-123	-138	-028	-138	-128	-143
32mm	32	111	62	54	83	85			14	-124	-140	-029	-140	-130	-145
35mm	35	111	62	54	83	85			14	-126	-140	-029	-140	-130	-145
38mm	38	114	67	54	86	88			14	-128	-142	-030	-142	-132	-147
40mm	40	127	69	54	89	91			14	-129	-144	-031	-144	-134	-149
43mm	43	139	72	54	92	94			14	-131	-146	-032	-146	-136	-150
45mm	45	139	75	54	95	97			14	-133	-148	-033	-148	-138	-151
48mm	48	139	82	54	101	103			14	-134	-150	-034	-150	-140	-152
50mm	50	139	82	54	101	103			14	-136	-150	-034	-150	-140	-152
55mm	55	152	91	54	111	113	117		18	-139	-151	-036	-152	-144	-153
60mm	60	152	92	54	112	114	118		18	-142	-152	-037	-152	-146	-153
65mm	65	164	103	57	123	125	129		18	-145	-153	-040	-154	-151	-155
70mm	70	196	113	64		135	139		18	-232	-242	-151	-242	-235	-246
75mm	75	202	119	64		141	145		18	-234	-243	-152	-243	-236	-247
80mm	80	208	125	64		149	152		18	-236	-244	-153	-244	-237	-248
85mm	85	211	129	64		151	155	159	21	-237	-245	-153	-245	-238	-249
90mm	90	216	135	64		158	162	166	21	-239	-246	-154	-246	-239	-250

### STANDARD MATERIALS

#### FACES:

- Carbon Stationary Seal Ring
- Sintered Silicon Carbide Rotary Seal Ring

#### ELASTOMERS:

- Fluorocarbon, EPR, Chemraz\*, Kalrez\*\*, Atlas\*\*\*

#### METAL PARTS:

- 316SS body
- Alloy C-276 springs and drive pins
- Hardened set screws standard

### OPERATING LIMITS

#### SPEED LIMITS:

- 5000 fpm (25 m/s) Maximum
- 250 fpm (1.3 m/s) Minimum

#### TEMPERATURE LIMITS:

- 500°F (260°C) Max (elastomers)

#### PRESSURE LIMITS: ††

- Vacuum to 300 psig (20 bar g) 1.000" (25 mm) through 2.625" (65 mm)
- Vacuum to 250 psig (17 bar g) 2.750" (70 mm) through 3.625" (90 mm)

† Other materials available through CHESTERTON Application Engineering.  
 †† Consult CHESTERTON Application Engineering for applications beyond these limits.

#### KEY (drawings & charts)

A – Shaft Size	G – Minimum Bolt Circle by Bolt Size	V – Rotary Cushion O-Ring
B – Maximum Gland Diameter	H – Slot Width	W – Stationary Seal O-Ring (OD)
C – Stuffing Box Inside Diameter	T – Shaft O-Ring	X – Stationary Seal O-Ring (ID)
F – Outboard Seal Length	U – Rotary Seal O-Ring	Y – Gland Adapter

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\*Greene, Tweed & Co. registered trademark

\*\*DuPont registered trademark

\*\*\*Asahi Glass registered trademark

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