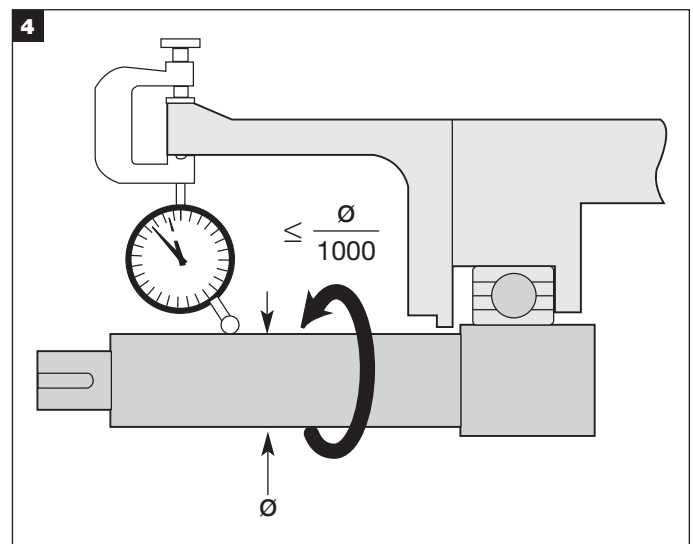
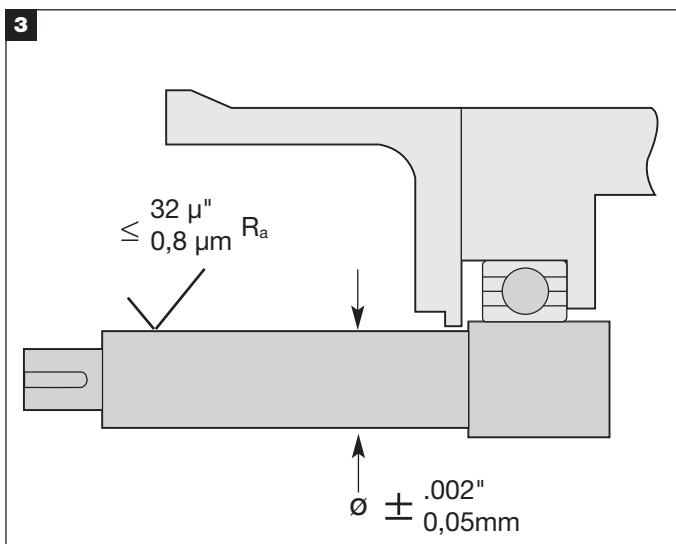
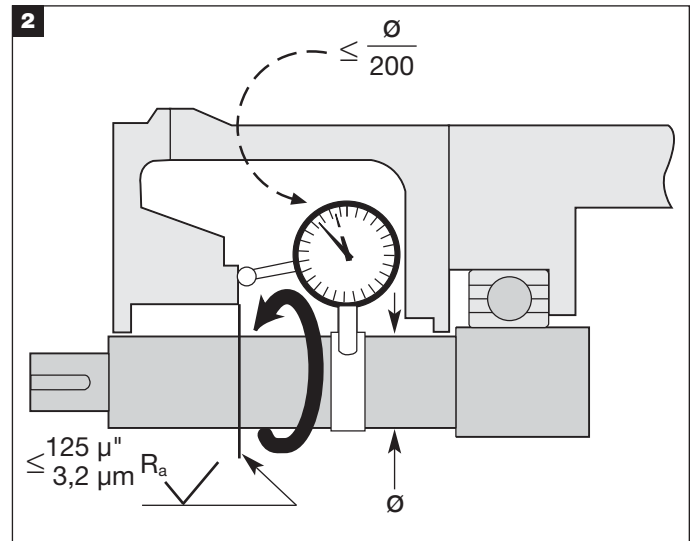
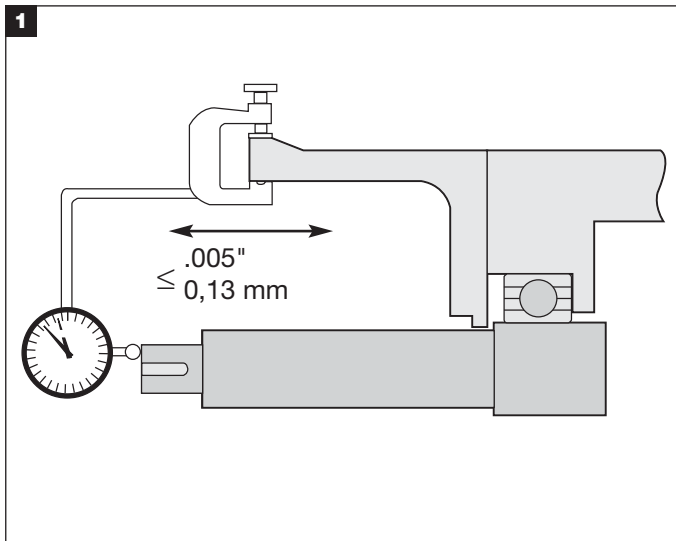


442™ Split Mechanical Seal

For Large Shaft Diameter Equipment - 12.25 in. to 18.00 in.
(310 mm to 460 mm)

EQUIPMENT PREPARATION



CAUTIONS

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.

SEAL PREPARATION

Please read these instructions and make sure you understand them before installing the seal.

Installation is easy provided the parts are handled and installed carefully. Before you remove the parts from the packaging, prepare a clean work surface and make sure your hands are clean. Any contaminants on the seal faces or splits during handling may cause seal failure. Prepare a clean work surface on which to place parts during assembly/disassembly.

Prepare the Seal for Installation

The gland and holder come assembled; the split seal faces, O-rings, holder and gland gaskets, springs and bolt tabs are packaged separately to protect against damage during shipping.

1. Disengage the socket head cap screws from the gland halves. With the gland in a horizontal position, separate the halves and place them on the clean work surface. **Check to ensure that the socket head cap screw O-ring remains in place for installation of seal on equipment.**
2. Disengage the socket head cap screws from the rotary holder halves and place the holder halves on the work surface. Check to ensure that the split O-ring halves protrude equally (protrusion of 1/4" [6.3 mm] in opposing halves). See **Seal Rebuild R12 for details.**

3. Remove the rotary and stationary seal faces from their packages and place on the clean work surface, face sides up.
4. Apply a thin film of grease to the gland gaskets and holder gaskets and seat them in their respective grooves. **Do not glue the gland or holder gaskets in place.** (See **Seal Rebuild R8 and R17 for details**).
5. Snap open the ball and socket joint of the O-rings by pulling at the seam. **NOTE:** The rotary O-ring has a smaller cross-section than the stationary O-ring. **Do not apply grease or glue to the balls and sockets of the O-rings.**
6. Install seal per **Seal Installation**.

NOTES:

The gland, rotary holder, and face halves are matched pairs; mixing components from different seals **will** result in seal failure.

Handle parts carefully. Remove greasy fingerprints from seal faces; check for misaligned face splits. These conditions may cause leakage.

Splits in all seal components should be staggered; refer to **Figure 2** throughout installation for details.

EQUIPMENT START UP

1. Rotate the shaft by hand, if possible, to ensure no metal-to-metal contact within the seal. A slight drag may be found due to the seal face to face contact but the shaft should rotate.
2. Attach appropriate environmental controls to the seal. Take all necessary precautions and follow normal safety procedures before starting the equipment.
3. Depending on how carefully the seal components were handled during installation, split seals may drip on startup. For example, greasy fingerprints on the faces or misaligned face splits may cause leakage. This type of leakage usually decreases and stops over a period of time as a face wears in or leak paths are sealed. However, leakage greater than 150 drops per minute should be investigated immediately. If leakage remains steady, check O-rings and gaskets for proper installation and check faces for chips, scratches and proper alignment.

Please Contact Chesterton Mechanical Seal Application Engineering for assistance regarding split seals.

TABLE 1 - SCREW TORQUE VALUES

Cup Point Set Screws	15 – 17 ft-lbf	20,3 – 23,0 Nm
Socket Head Cap Screws (W)	10 ft-lbf	13,5 Nm
Socket Head Cap Screws (X)	55 ft-lbf	74 Nm
Socket Head Cap Screws (Y)	50 ft-lbf	67,7 Nm

(W, X, Y) – From Figure 1, Parts Identification Key

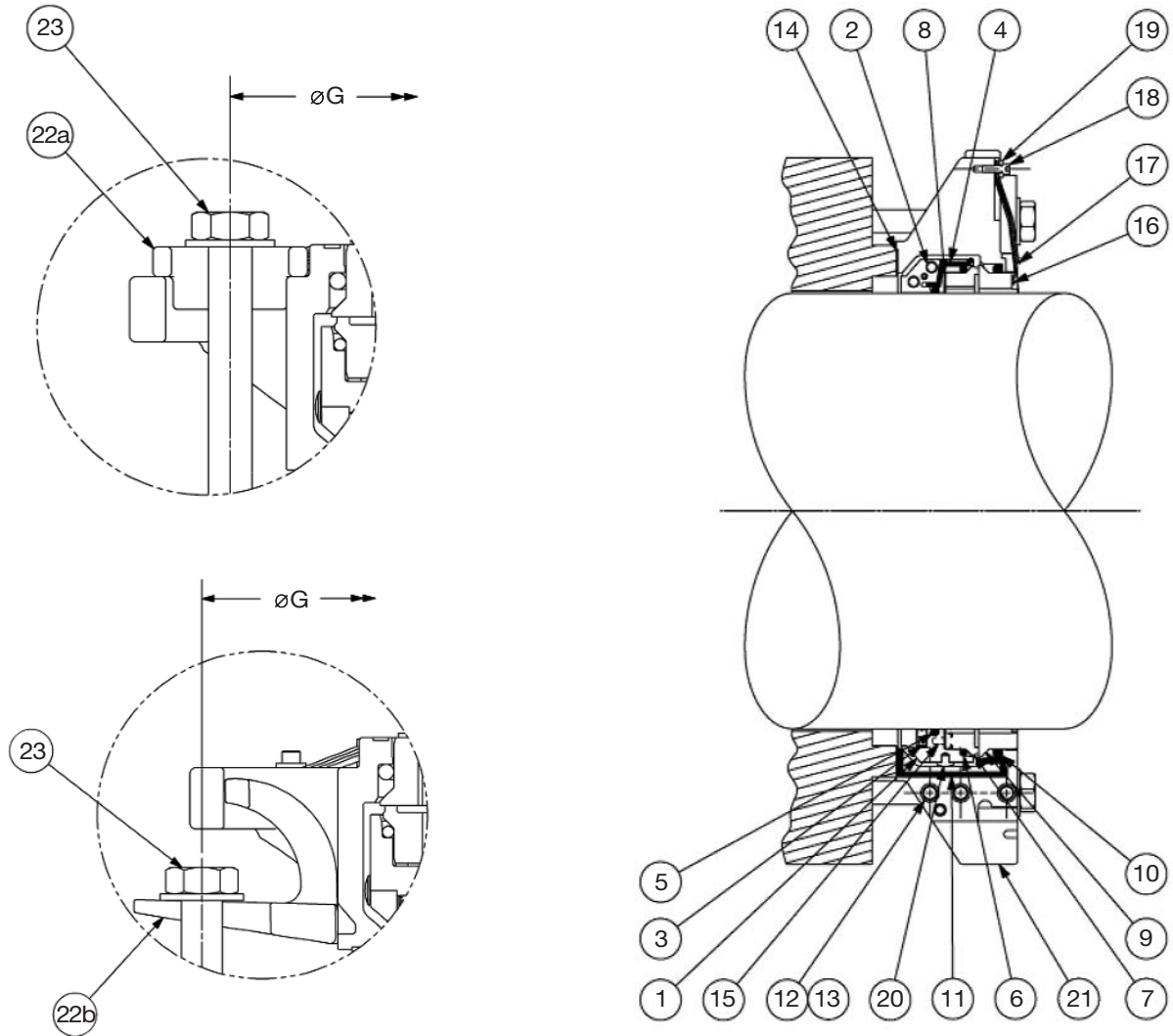
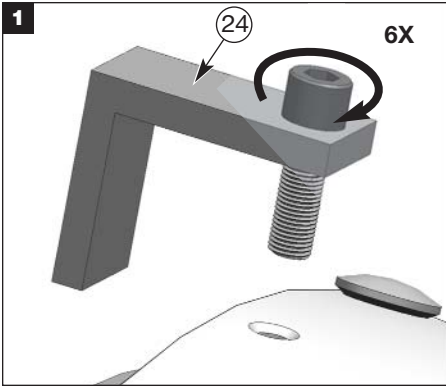


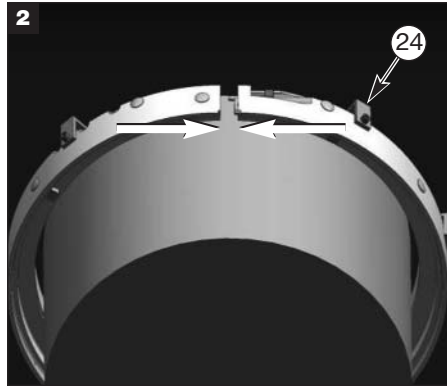
FIGURE 1

- KEY**
- | | | |
|-------------------------------|------------------------------------|---|
| 1 - Rotary Holder Assembly | 10 - Stationary O-ring | 19 - Flat Washer |
| 2 - Socket Head Cap Screw (X) | 11 - Gland Gasket | 20 - Centering Button |
| 3 - Cup Point Set Screw | 12 - Socket Head Cap Screw (Y) | 21 - Gland Assembly |
| 4 - Holder Gasket | 13 - Gland Bolt O-ring (Not shown) | 22a - Bolt Tab |
| 5 - Shaft O-ring | 14 - Stuffing Box Gasket | 22b - Bolt Tab Option |
| 6 - Rotary O-ring | 15 - Drive Lug | 23 - Stuffing Box Bolt |
| 7 - Rotary Face | 16 - Spring | 24 - Installation Spacer
(Not shown - for installation only) |
| 8 - Rotary Support Gasket | 17 - Spring, Auxiliary | |
| 9 - Stationary Face | 18 - Socket Head Cap Screw (W) | |

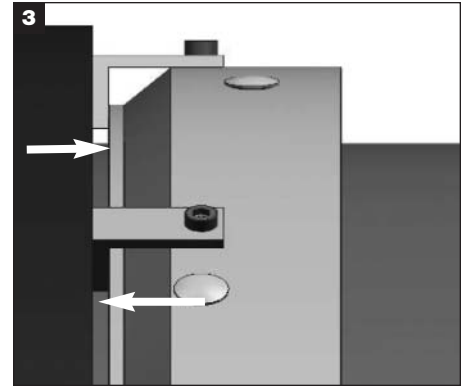
SEAL INSTALLATION



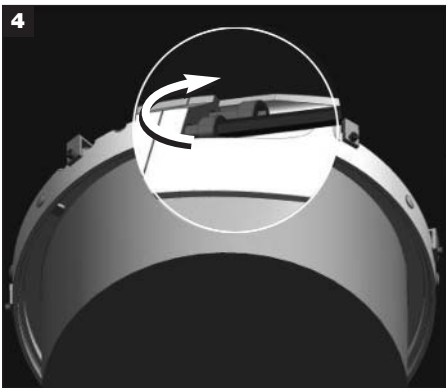
Remove seal from packaging and disassemble on clean work surface. **See Seal Preparation for details.** Install installation spacers on OD of holder halves. **Important:** Installation spacer must contact the holder face.



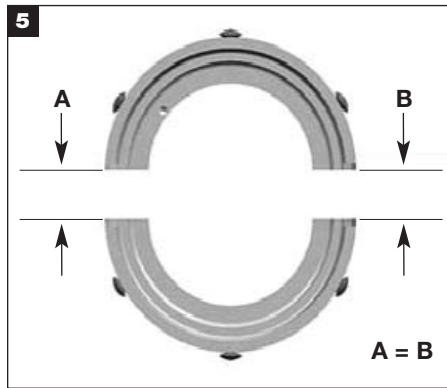
Assemble rotary holder halves on to shaft and finger-tighten holder cap screws to keep holder in place. **Note** that holder gaskets are engaged in opposing grooves (see **Seal Rebuild, R8**).



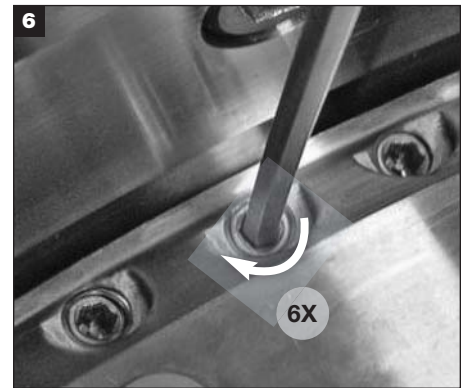
Installation spacers should seat evenly and firmly against stuffing box face and holder face.



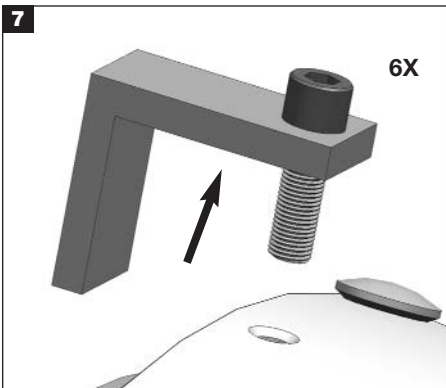
Push on holder assembly to bottom out installation spacers to stuffing box face. Use hex wrench and alternately tighten holder cap screws (see **Table 1**).



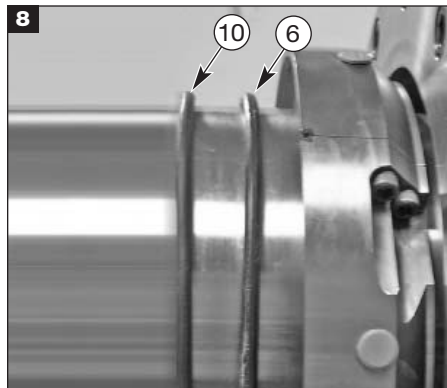
Check gaps at holder splits; gaps should be equal on both sides.



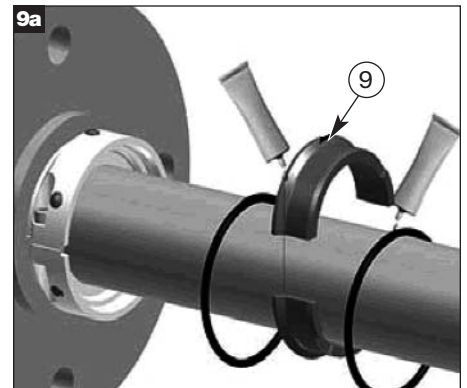
Alternately tighten 6 holder set screws (3 in each half) to shaft (see **Table 1**).



Remove all installation spacers.

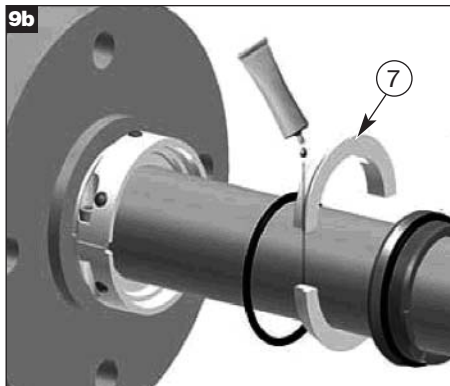


Assemble rotary O-ring and stationary O-ring around shaft. **Note:** Rotary O-ring has a thinner cross-section than stationary O-ring. **Caution: Do Not Apply Grease to Ball and Socket Joints at any time.**

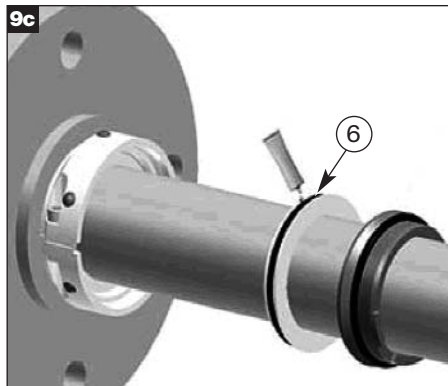


Apply a thin film of grease to ends of one stationary seal face half; assemble around shaft. Slide seal face into stationary O-ring and apply a thin film of grease to O-ring.

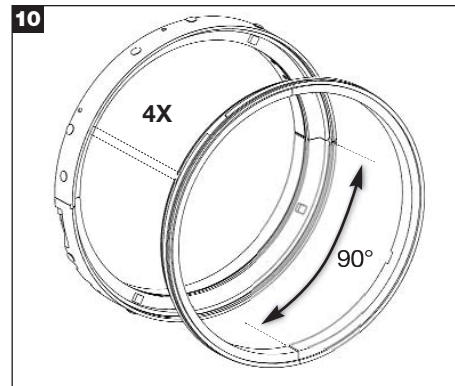
SEAL INSTALLATION



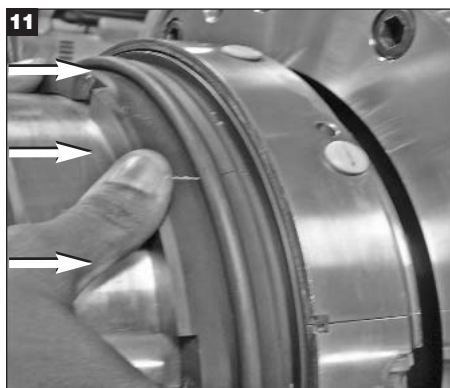
Apply a thin film of grease to ends of one rotary seal face half; assemble around shaft. Slide seal face into rotary O-ring.



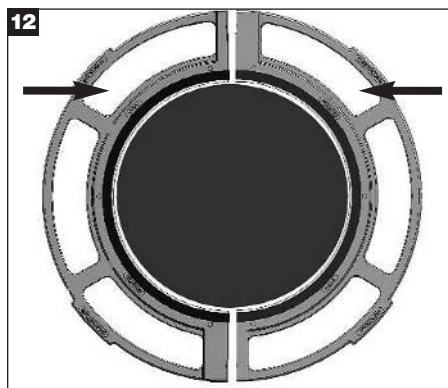
Apply a thin film of grease to rotary O-ring.



Align rotary face slots with drive lugs in rotary holder. **Note:** When properly installed splits in seal face will be 90° apart from the holder splits; O-ring joints should be 30°- 45° from holder splits (see **Figure 2**).



Press evenly on the back of the stationary seal face to engage drive lugs into rotary seal face slots. **Important:** Rotary support gaskets must fit into the rotary face slots and contact the sides of the drive lugs. When engaged correctly, the rotary face surface at the splits should feel smooth, without any step or roughness. Wipe face surfaces clean, removing all grease and fingerprints from installation. After faces are clean, slide stationary face against rotary face.

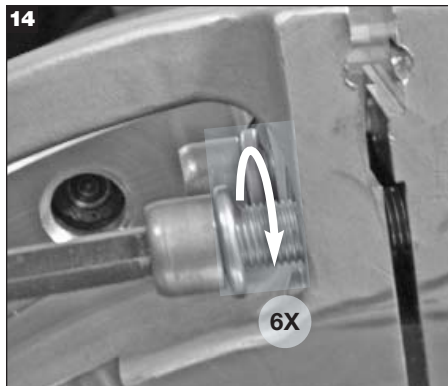


Assemble gland halves around seal components on shaft; splits in the gland halves should be 90° from splits in stationary seal face and 45° from the splits in the O-rings (see **Figure 2**). Note that the gland gaskets are engaged in opposing grooves. Finger-tighten gland socket head cap screws to hold gland halves in place (see **Seal Rebuild, R17**).

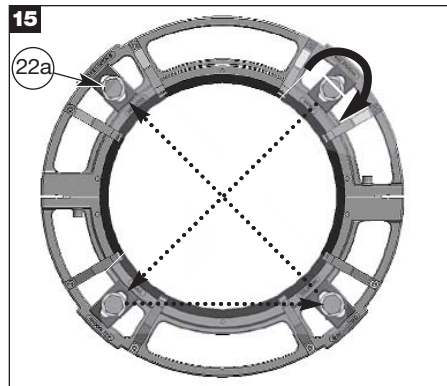


Align slots in stationary face with spring slots in gland.

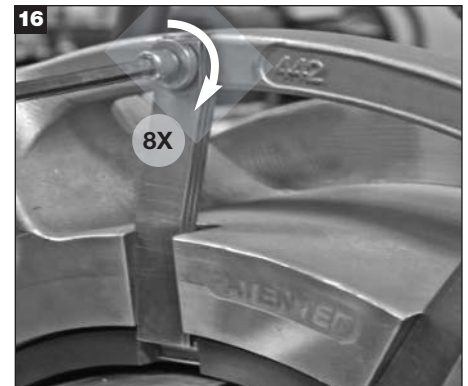
SEAL INSTALLATION



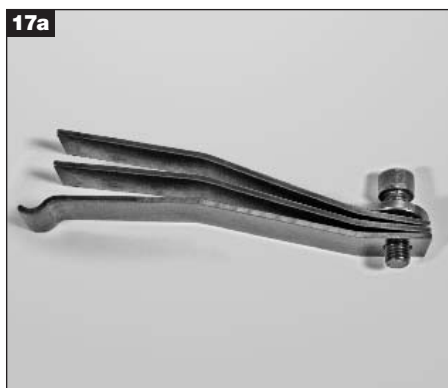
Press gland halves together and alternately hand tighten gland cap screws for even compression. Ensure that the stuffing box face gasket is installed properly and remains flat at the splits. Use torque wrench to tighten gland cap screws (see **Table 1**).



Install gland bolt tabs (see **Figure 1**) and stuffing box bolts; alternately tighten to minimum bolt torque. **Note:** Stuffing box minimum bolt torque will be dependent on application, bolt size, number of bolts and bolting pattern. **Pictured:** 4-bolt configuration with bolt tabs.



Install springs and tighten cap screws (see **Table 1**). **Pictured:** Standard 3-piece spring configuration.



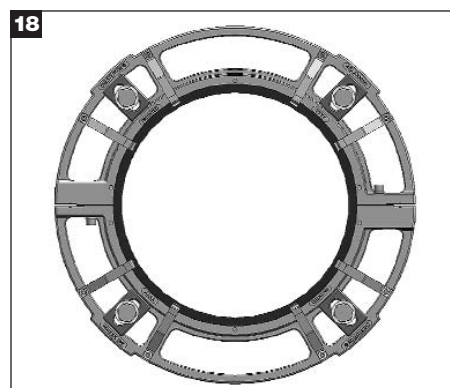
Standard 3-piece spring configuration.



Optional 2-pc spring configuration (**Application specific**; Contact Application Engineering for recommendation).



Optional 1-pc. Spring configuration for **Dry Running Applications**.



Installation Complete. See **Equipment Start Up**.

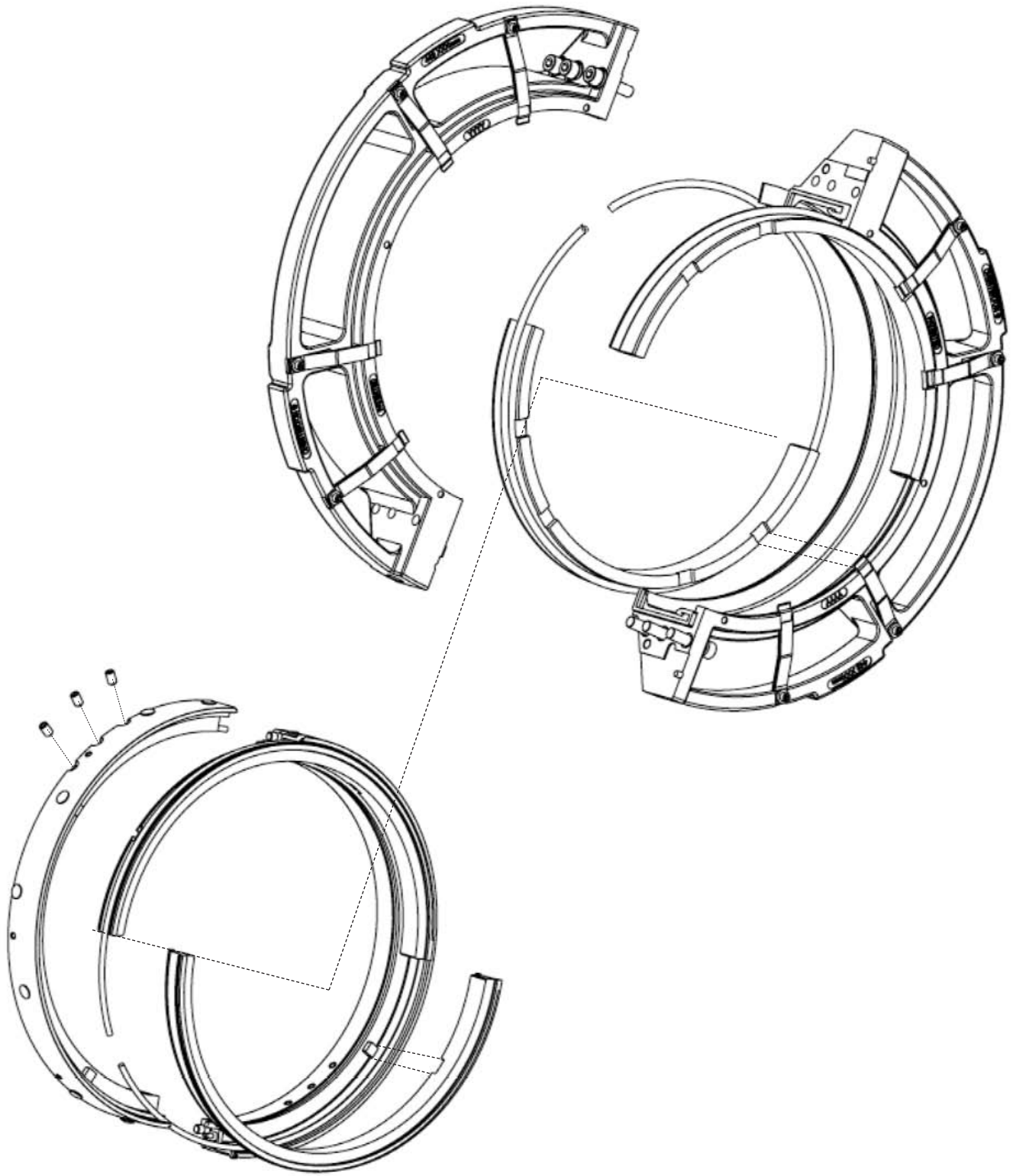


FIGURE 2
Stagger all joints such that no split lines up

DIMENSIONAL DATA (INCH AND METRIC)

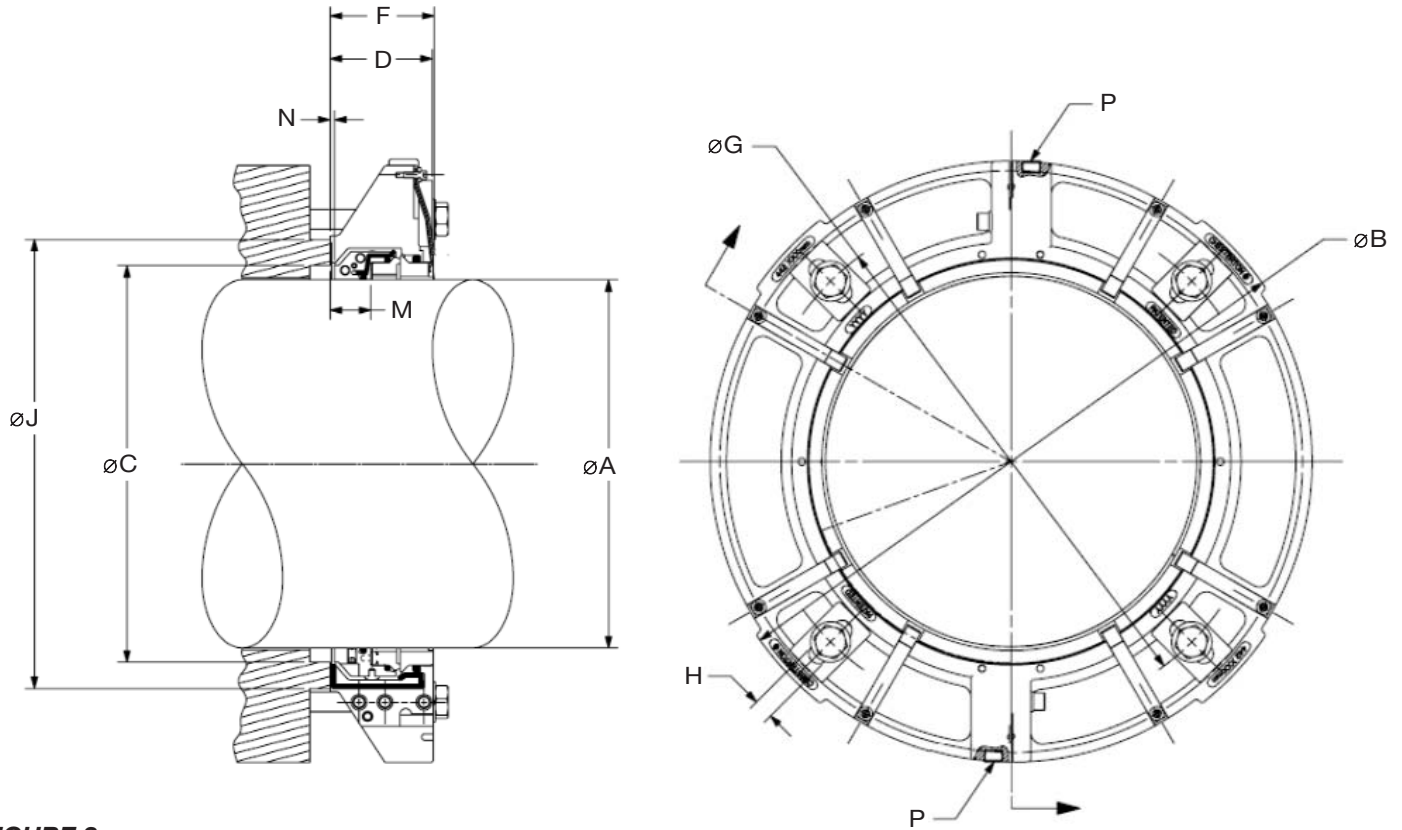


FIGURE 3

DIMENSIONAL DATA KEY

A – Shaft Size

B – Max. Gland Dia.

C – Min./Max. Stuffing Box Dia.

D – Gland Length

F – Outboard Length Required

G – Min./Max. Bolt Circle by Bolt Size

H – Min. Slot Width

J – Min. Stuffing Box Face OD

M – Holder ID Length required

N – Installation Dimension

P – NPT Size

TABLE 2 – DIMENSIONAL DATA (INCH & METRIC)

HOLDER ID SHAFT SIZE	M HOLDER ID FROM BOX		N INSTALLATION DIMENSION		P NPT SIZE
	INCH	METRIC	INCH	METRIC	
12.250" to 18.000" (310 mm to 460 mm)	1.76	44,7	0.19	4,8	1/2"

DIMENSIONAL DATA (INCH)

TABLE 3

A	B	C		D	F	G												H	J
		MIN	MAX			STANDARD TAB						BOLT TAB OPTION							
						5/8"		3/4"		7/8"		5/8"		3/4"		7/8"			
						MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
12.250	23.05	13.71	14.71	4.48	4.50	16.87	20.04	17.00	19.91	17.12	19.79	19.83	24.08	19.96	23.96	20.08	23.83	0.85	15.83
12.500	23.44	14.10	15.10	4.48	4.50	17.27	20.43	17.39	20.31	17.52	20.18	20.23	24.48	20.35	24.35	20.48	24.23	0.85	16.23
12.750	23.84	14.50	15.50	4.48	4.50	17.66	20.83	17.79	20.70	17.91	20.58	20.62	24.87	20.75	24.74	20.87	24.62	0.85	16.62
13.000	23.84	14.50	15.50	4.48	4.50	17.66	20.83	17.79	20.70	17.91	20.58	20.62	24.87	20.75	24.74	20.87	24.62	0.85	16.62
13.250	24.23	14.89	15.89	4.48	4.50	18.05	21.22	18.18	21.10	18.30	20.97	21.01	25.26	21.14	25.14	21.26	25.01	0.85	17.02
13.500	24.62	15.28	16.28	4.48	4.50	18.45	21.61	18.57	21.49	18.70	21.36	21.41	25.66	21.53	25.53	21.66	25.41	0.85	17.41
13.750	24.62	15.28	16.28	4.48	4.50	18.45	21.61	18.57	21.49	18.70	21.36	21.41	25.66	21.53	25.53	21.66	25.41	0.85	17.41
14.000	25.02	15.68	16.68	4.48	4.50	18.84	22.01	18.97	21.88	19.09	21.76	21.80	26.05	21.93	25.93	22.05	25.80	0.85	17.80
14.250	25.41	16.07	17.07	4.48	4.50	19.24	22.40	19.36	22.28	19.49	22.15	22.20	26.44	22.32	26.32	22.45	26.19	0.85	18.20
14.500	25.41	16.07	17.07	4.48	4.50	19.24	22.40	19.36	22.28	19.49	22.15	22.20	26.44	22.32	26.32	22.45	26.19	0.85	18.20
14.750	25.81	16.47	17.47	4.48	4.50	19.63	22.80	19.75	22.67	19.88	22.55	22.59	26.84	22.71	26.71	22.84	26.59	0.85	18.59
15.000	25.81	16.47	17.47	4.48	4.50	19.63	22.80	19.75	22.67	19.88	22.55	22.59	26.84	22.71	26.71	22.84	26.59	0.85	18.59
15.250	26.20	16.86	17.86	4.48	4.50	20.02	23.19	20.15	23.06	20.27	22.94	22.98	27.23	23.11	27.11	23.23	26.98	0.85	18.98
15.500	26.59	17.25	18.25	4.48	4.50	20.42	23.58	20.54	23.46	20.67	23.33	23.38	27.63	23.50	27.50	23.63	27.38	0.85	19.38
15.750	26.59	17.25	18.25	4.48	4.50	20.42	23.58	20.54	23.46	20.67	23.33	23.38	27.63	23.50	27.50	23.63	27.38	0.85	19.38
16.000	26.99	17.65	18.65	4.48	4.50	20.81	23.98	20.94	23.85	21.06	23.73	23.77	28.02	23.90	27.89	24.02	27.77	0.85	19.77
16.250	27.38	18.04	19.04	4.48	4.50	21.20	24.37	21.33	24.25	21.45	24.12	24.16	28.41	24.29	28.29	24.41	28.16	0.85	20.17
16.500	27.38	18.04	19.04	4.48	4.50	21.20	24.37	21.33	24.25	21.45	24.12	24.16	28.41	24.29	28.29	24.41	28.16	0.85	20.17
16.750	27.77	18.43	19.43	4.48	4.50	21.60	24.76	21.72	24.64	21.85	24.51	24.56	28.81	24.68	28.68	24.81	28.56	0.85	20.56
17.000	27.77	18.43	19.43	4.48	4.50	21.60	24.76	21.72	24.64	21.85	24.51	24.56	28.81	24.68	28.68	24.81	28.56	0.85	20.56
17.250	28.17	18.83	19.83	4.48	4.50	21.99	25.16	22.12	25.03	22.24	24.91	24.95	29.20	25.08	29.07	25.20	28.95	0.85	20.95
17.500	28.56	19.22	20.22	4.48	4.50	22.39	25.55	22.51	25.43	22.64	25.30	25.35	29.59	25.47	29.47	25.60	29.34	0.85	21.35
17.750	28.56	19.22	20.22	4.48	4.50	22.39	25.55	22.51	25.43	22.64	25.30	25.35	29.59	25.47	29.47	25.60	29.34	0.85	21.35
18.000	28.96	19.62	20.62	4.48	4.50	22.78	25.95	22.90	25.82	23.03	25.70	25.74	29.99	25.86	29.86	25.99	29.74	0.85	21.74

DIMENSIONAL DATA (METRIC)

TABLE 4

A	B	C		D	F	G												H	J
		MIN	MAX			STANDARD TAB						BOLT TAB OPTION							
						12 mm		16 mm		20 mm		12 mm		16 mm		20 mm			
						MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
310	585,5	348,2	373,6	113,8	114,3	424,7	512,9	428,7	508,9	432,7	504,9	499,9	615,6	503,9	611,6	507,9	607,6	21,5	402,2
315	595,5	358,2	383,6	113,8	114,3	434,7	522,9	438,7	518,9	442,7	514,9	509,9	625,6	513,9	621,6	517,9	617,6	21,5	412,2
320	595,5	358,2	383,6	113,8	114,3	434,7	522,9	438,7	518,9	442,7	514,9	509,9	625,6	513,9	621,6	517,9	617,6	21,5	412,2
325	605,5	368,2	393,6	113,8	114,3	444,7	532,9	448,7	528,9	452,7	524,9	519,9	635,6	523,9	631,6	527,9	627,6	21,5	422,2
330	605,5	368,2	393,6	113,8	114,3	444,7	532,9	448,7	528,9	452,7	524,9	519,9	635,6	523,9	631,6	527,9	627,6	21,5	422,2
335	615,5	378,2	403,6	113,8	114,3	454,7	542,9	458,7	538,9	462,7	534,9	529,9	645,6	533,9	641,6	537,9	637,6	21,5	432,2
340	615,5	378,2	403,6	113,8	114,3	454,7	542,9	458,7	538,9	462,7	534,9	529,9	645,6	533,9	641,6	537,9	637,6	21,5	432,2
345	625,5	388,2	413,6	113,8	114,3	464,7	552,9	468,7	548,9	472,7	544,9	539,9	655,6	543,9	651,6	547,9	647,6	21,5	442,2
350	625,5	388,2	413,6	113,8	114,3	464,7	552,9	468,7	548,9	472,7	544,9	539,9	655,6	543,9	651,6	547,9	647,6	21,5	442,2
355	635,5	398,2	423,6	113,8	114,3	474,7	562,9	478,7	558,9	482,7	554,9	549,9	665,6	553,9	661,6	557,9	657,6	21,5	452,2
360	635,5	398,2	423,6	113,8	114,3	474,7	562,9	478,7	558,9	482,7	554,9	549,9	665,6	553,9	661,6	557,9	657,6	21,5	452,2
365	645,5	408,2	433,6	113,8	114,3	484,7	572,9	488,7	568,9	492,7	564,9	559,9	675,6	563,9	671,6	567,9	667,6	21,5	462,2
370	645,5	408,2	433,6	113,8	114,3	484,7	572,9	488,7	568,9	492,7	564,9	559,9	675,6	563,9	671,6	567,9	667,6	21,5	462,2
375	655,5	418,2	443,6	113,8	114,3	494,7	582,9	498,7	578,9	502,7	574,9	569,9	685,6	573,9	681,6	577,9	677,6	21,5	472,2
380	655,5	418,2	443,6	113,8	114,3	494,7	582,9	498,7	578,9	502,7	574,9	569,9	685,6	573,9	681,6	577,9	677,6	21,5	472,2
385	665,5	428,2	453,6	113,8	114,3	504,7	592,9	508,7	588,9	512,7	584,9	579,9	695,6	583,9	691,6	587,9	687,6	21,5	482,2
390	665,5	428,2	453,6	113,8	114,3	504,7	592,9	508,7	588,9	512,7	584,9	579,9	695,6	583,9	691,6	587,9	687,6	21,5	482,2
395	675,5	438,2	463,6	113,8	114,3	514,7	602,9	518,7	598,9	522,7	594,9	589,9	705,6	593,9	701,6	597,9	697,6	21,5	492,2
400	675,5	438,2	463,6	113,8	114,3	514,7	602,9	518,7	598,9	522,7	594,9	589,9	705,6	593,9	701,6	597,9	697,6	21,5	492,2
405	685,5	448,2	473,6	113,8	114,3	524,7	612,9	528,7	608,9	532,7	604,9	599,9	715,6	603,9	711,6	607,9	707,6	21,5	502,2
410	685,5	448,2	473,6	113,8	114,3	524,7	612,9	528,7	608,9	532,7	604,9	599,9	715,6	603,9	711,6	607,9	707,6	21,5	502,2
415	695,5	458,2	483,6	113,8	114,3	534,7	622,9	538,7	618,9	542,7	614,9	609,9	725,6	613,9	721,6	617,9	717,6	21,5	512,2
420	695,5	458,2	483,6	113,8	114,3	534,7	622,9	538,7	618,9	542,7	614,9	609,9	725,6	613,9	721,6	617,9	717,6	21,5	512,2
425	705,5	468,2	493,6	113,8	114,3	544,7	632,9	548,7	628,9	552,7	624,9	619,9	735,6	623,9	731,6	627,9	727,6	21,5	522,2
430	705,5	468,2	493,6	113,8	114,3	544,7	632,9	548,7	628,9	552,7	624,9	619,9	735,6	623,9	731,6	627,9	727,6	21,5	522,2
435	715,5	478,2	503,6	113,8	114,3	554,7	642,9	558,7	638,9	562,7	634,9	629,9	745,6	633,9	741,6	637,9	737,6	21,5	532,2
440	715,5	478,2	503,6	113,8	114,3	554,7	642,9	558,7	638,9	562,7	634,9	629,9	745,6	633,9	741,6	637,9	737,6	21,5	532,2
445	725,5	488,2	513,6	113,8	114,3	564,7	652,9	568,7	648,9	572,7	644,9	639,9	755,6	643,9	751,6	647,9	747,6	21,5	542,2
450	725,5	488,2	513,6	113,8	114,3	564,7	652,9	568,7	648,9	572,7	644,9	639,9	755,6	643,9	751,6	647,9	747,6	21,5	542,2
455	735,5	498,2	523,6	113,8	114,3	574,7	662,9	578,7	658,9	582,7	654,9	649,9	765,6	653,9	761,6	657,9	757,6	21,5	552,2
460	735,5	498,2	523,6	113,8	114,3	574,7	662,9	578,7	658,9	582,7	654,9	649,9	765,6	653,9	761,6	657,9	757,6	21,5	552,2

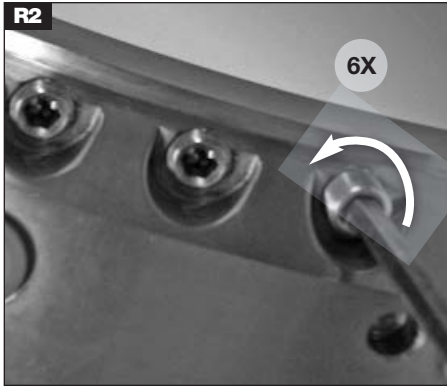
SEAL REBUILD

1. Only the gland, rotary holder and springs are reused.
Caution: The gland, holder and face halves are matched pairs; do not mix halves from different seals since this will cause seal failure.
2. The following tools, in addition to wrenches supplied with seal, will be required for rebuild:
 - Blunt, thin lever (screwdriver shown) for removal of centering buttons
 - Rubber tipped mallet or hammer (replace centering buttons)
 - Cleaning solvent (clean elastomer/gasket surfaces)
3. Disassemble the seal, noting the condition of the parts, including elastomer surfaces. Analyze the cause of failure and correct the problem, if possible, before reinstalling the seal.
4. Clean all elastomer and gasket surfaces with cleaning solvent.

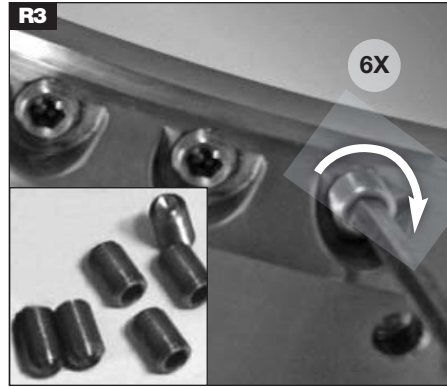


Place seal parts on work surface.

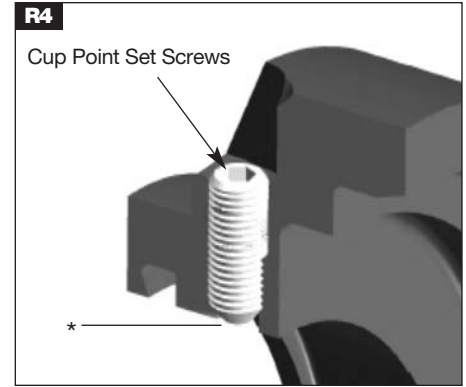
SEAL REBUILD



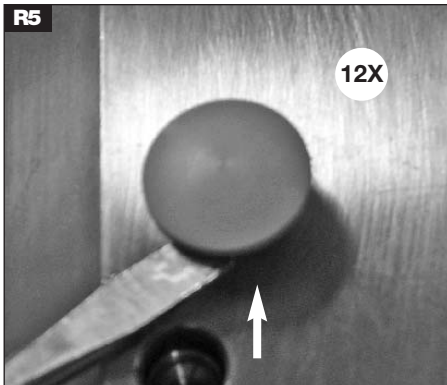
Remove used cup point set screws (6 places) from rotary holder.



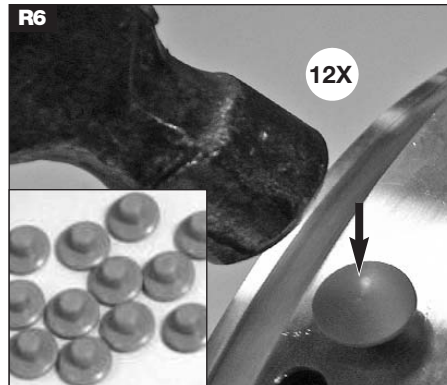
Lubricate and install new cup point set screws (6 places) in rotary holder.



Prior to installing the holder on the shaft/sleeve, check to ensure the cup point set screws are not protruding beyond the inside surface* of the holder.



Remove old centering buttons from OD of rotary holder.

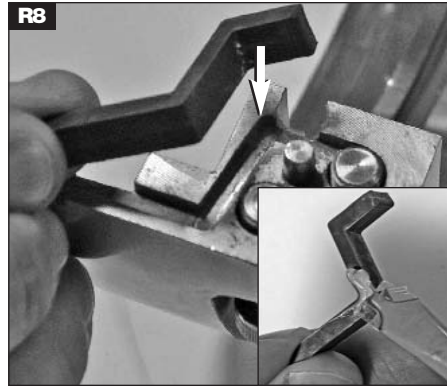


Install new centering buttons on OD of rotary holder. Make sure buttons are fully seated without deforming the exposed heads.

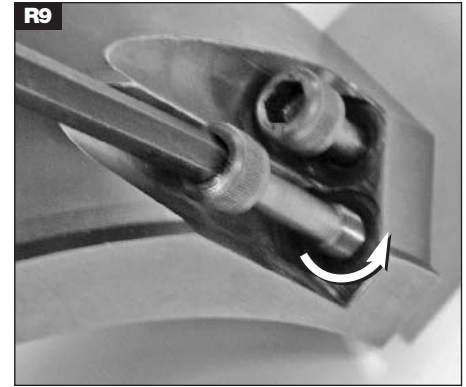
SEAL REBUILD



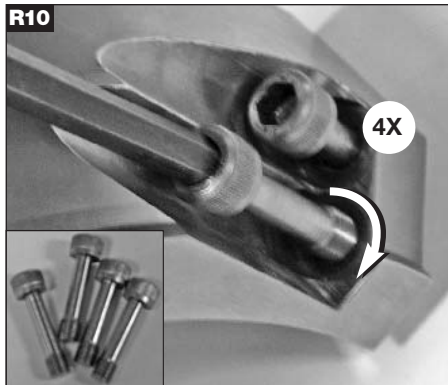
R7
Remove old holder gaskets from holder halves grooves. Clean grooves with cleaning solvent.



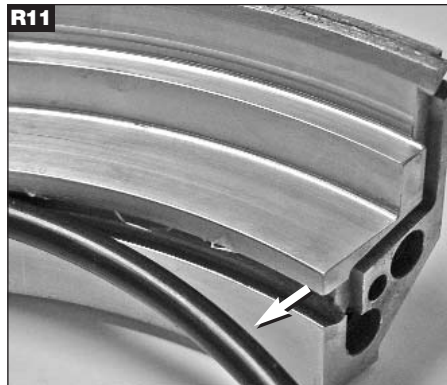
R8
Apply a thin film of grease to new holder gaskets and install in grooves in holder halves.



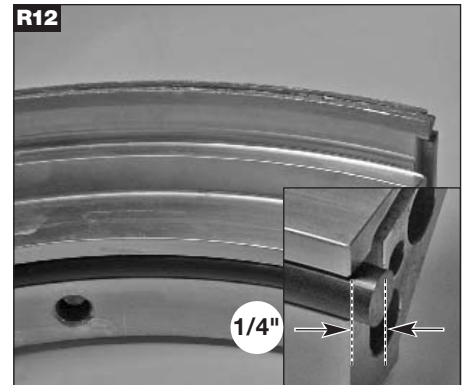
R9
Remove old socket head cap screws from holder halves.



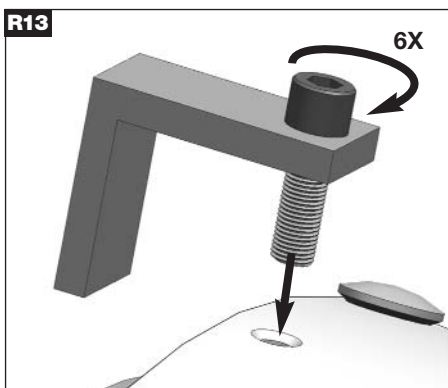
R10
Lubricate threads and install new socket head cap screws in holder half.



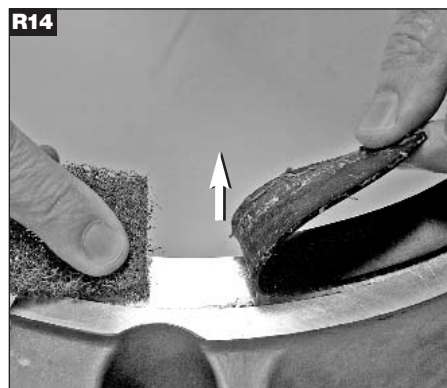
R11
Remove old shaft O-ring from holder halves. Clean O-ring groove with cleaning solvent.



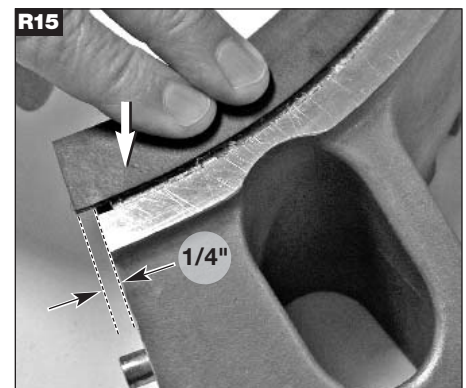
R12
Apply a thin coat film of grease to new 2-piece shaft O-ring and install in holder halves such that there is equal protrusion of 1/4" (6,3 mm) in opposing halves.



R13
Install Installation Spacers on OD of holder halves.

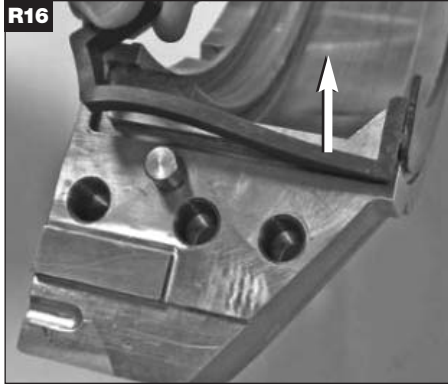


R14
Remove old stuffing box gasket from gland face and remove adhesive residue with cleaning solvent.

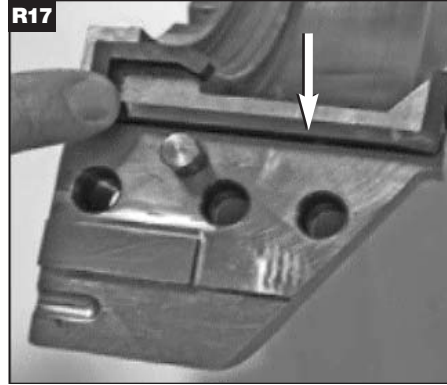


R15
After peeling off the protective backing, seat the gasket halves in gland recess, overlapping gland splits 1/4" (6,3 mm) in opposing halves. **Caution:** Do not wrinkle gasket during installation.

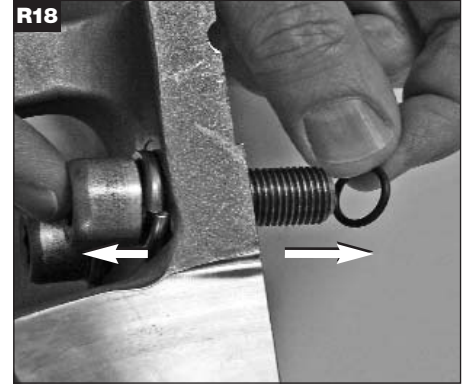
SEAL REBUILD



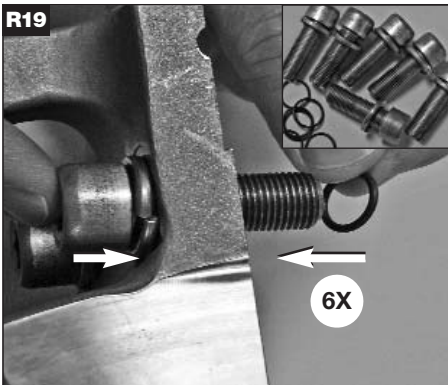
Remove old gland gaskets from gland grooves. Clean grooves with cleaning solvent.



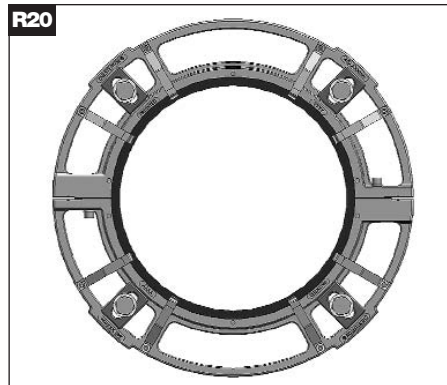
Lubricate and install new socket head cap screws in gland halves and install O-rings on ends of screws.



Remove old gland socket head cap screws and retaining O-rings.



Lubricate and install new socket head cap screws in gland halves and install O-rings on screws.



Seal components are ready for Installation. Proceed to **Seal Installation**.

442 SPLIT MECHANICAL SEAL OPERATING PARAMETERS†

TABLE 5

PRESSURE CAPABILITIES (INCH and METRIC)

SIZE RANGE	SHAFT SPEED RPM	FACE MATERIAL COMBINATION			
		CARBON/RSC		RSC/RSC	
		Psig	bar g	Psig	bar g
12.250" to 18.000" (310 mm to 460 mm)	750	115	8	115	8

RSC - Reaction bonded silicon carbide.

† Consult Chesterton Application Engineering for applications exceeding published operating parameters and for additional seal sizes. Higher limits can be achieved depending on the applications. Minimum operating pressure/vacuum may be required depending on operating speed.

OPERATING LIMITS

SPEED:

- To 3000 fpm (15 mps)

TEMPERATURE:

- To 250 °F (120 °C)



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