

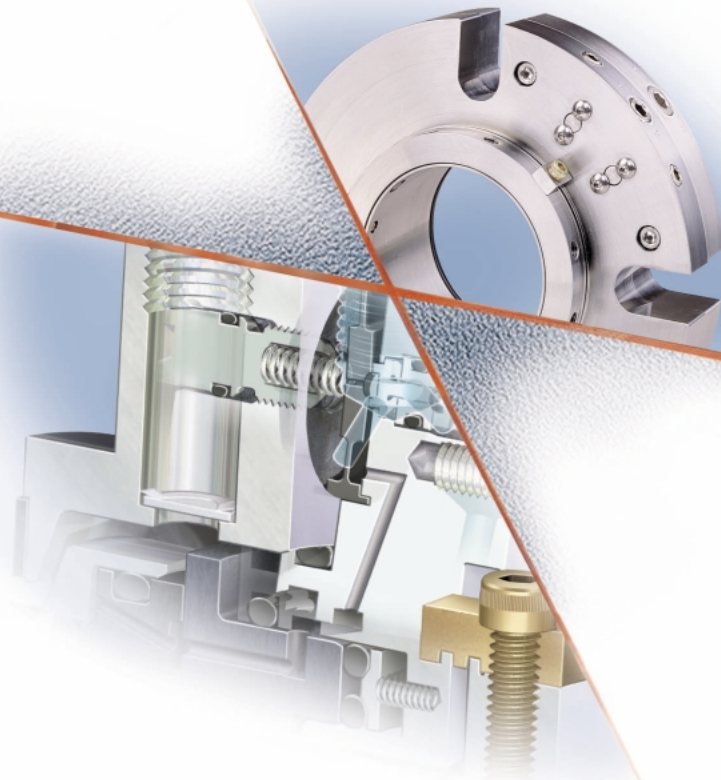
# CHESTERTON®

ISO 9001  
CERTIFIED

## 4410™ Hydrostatic Gas Seal



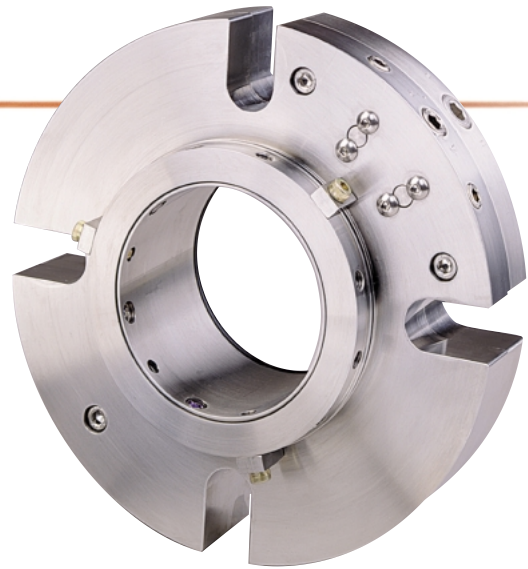
- Optimal liftoff at any speed
- Fully self regulating
- Responds to system upsets and pressure reversals
- Easily Customizable



*The gas lubricated seal of choice  
for mixers, agitators and  
specialty equipment*

# CHESTERTON®

## 4410™ Hydrostatic Gas Seal



### Dual seal functionality with single seal simplicity

The CHESTERTON® 4410 Gas Seal is designed to be the most advanced and compact zero-emission sealing device available today for sealing specialty equipment. The seal has been designed specifically to address the shortcomings of existing gas lubricated specialty seals and their applicability to mixers, agitators, reactors, extruders and other specialty equipment. The 4410 offers a comprehensive package of features that make it the zero-emission, gas lubricated seal of choice for these widely varying applications and conditions. From the co-axial, co-planar face design to the innovative, self contained pressure regulation system, the 4410 represents a quantum leap in the evolution of gas lubricated seal technology for specialty equipment.

#### Zero-Speed Operation

The 4410 utilizes hydrostatic gas force to unload and lubricate the faces. This mechanism is totally independent of shaft rotational speed and direction. The 4410 operates equally well and efficiently at both slow and elevated speeds, as well as in either direction of shaft rotation. Face opening and closing pressure is dynamically linked to the process via the control system. In this manner, the seal operates in a steady state. From static conditions to 5000 FPM – optimal face loading and lubrication are maintained.

#### Dynamic Pressure Regulation

Patent pending In Gland Control System (IGCS) regulates barrier gas pressure and maintains optimum differential during changing process conditions. It also allows complete control of closing forces on the faces as well as overall gas consumption. The installed 4410 can be custom-tuned to your exact process conditions in seconds for maximum performance with minimal gas consumption. This is a feature exclusive to the 4410.

#### Excellent Face Stability

State of the art design tools were utilized to optimize 4410 face geometry. The result is significantly reduced face deformation due to changing process conditions. The sealing interface on the 4410 is very stable and reliable.

#### Extremely Compact Design

The 4410 has been designed to offer maximum reliability in an extremely compact package. The unique coaxial, coplanar design of the 4410 allows it to fit in places other gas mixer and specialty seals won't. This is a true advantage which also leaves extra room for such add-ons as bearings in the seal design if necessary.

#### Custom configurations readily available

The 4410 has been designed to be "Custom-friendly". It can be easily modified to fit almost any piece of equipment. Special configurations can easily be accommodated through Chesterton's "Engineered Solutions" custom seal facility.

#### Easy installation

Cartridge design requires bolting of gland to equipment, tightening of set screws, and removal of centering clips for proper installation. Due to the patent pending control system, connection of a sufficiently pressurized, dry, filtered gas supply to the gland is all that is necessary for proper operation. The seal takes care of barrier gas pressure regulation on its own.

#### Inside type seal configuration

Process fluid is sealed at the outside diameter of the seal rings rather than the inside diameter as in many competitive designs. This desirable design feature eliminates product-entrained solids from being centrifugally forced between the faces where they can cause significant seal damage.

#### Loss Of Barrier Gas Tolerance

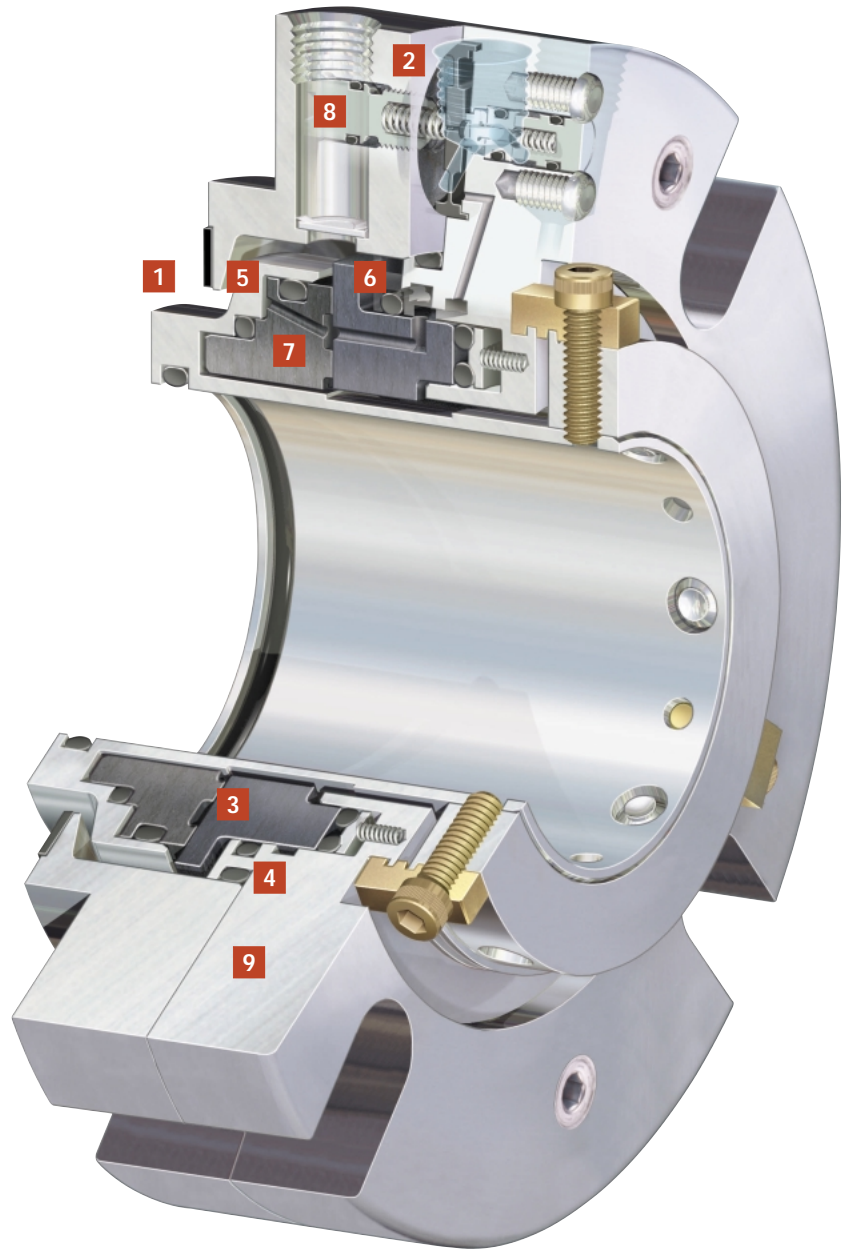
The 4410 has been engineered to revert to a liquid lubricated mode in the event of the loss of barrier gas. Face geometry features conventional, liquid lubricated balance ratios and width.

#### Field proven/Award Winning

The 4410 is an MSA Problem Solver Silver Award winner in Plant Services March, 1999 issue.

## Construction Details

- 1 Compact design requires minimal stuffing box depth for installation.
- 2 Dual IGCS mechanism precisely regulates barrier gas/process differential pressure as well as face separation. The dynamic link provided by the IGCS ensures reliable operation during fluctuating process conditions.
- 3 Robust, monolithic faces resist process induced deflection and maintain flatness across the operating range.
- 4 No sliding O-rings to hang-up. Balance is geometric and does not rely on "double-balanced" o-rings which may hang-up during pressure reversals.
- 5 Faces are resiliently mounted rather than pressed into metal holders. This prevents seal face deflection due to differences in thermal expansion and contraction coefficients of materials.
- 6 Compact coaxial, coplanar design effects 2 sealing interfaces in only 2 seal rings. This adds to reliability, reduces design complexity and minimizes spare parts requirements.
- 7 Pressure balance profile reduces pressure induced distortion.
- 8 IGCS fine adjustment is accessible during operation, but protected from inadvertent tampering.
- 9 Cartridge design simplifies installation and protects seal components from damage.
- No speed dependent face grooves to affect face separation. Liftoff is purely hydrostatic in either direction of rotation. Surface speed is eliminated as part of the lift-off equation.



## STANDARD MATERIALS

### Faces:

- Carbon, Silicon Carbide, Tungsten Carbide, Graphited Silicon Carbide

### Elastomers:

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

### Metal Parts Standard:

- 316SS body
- Alloy C-276 springs and drive pins
- Hardened set screws standard
- Other materials available through CHESTERTON Engineering Solutions.

\* Greene, Tweed & Co. Registered Trademark.

\*\* DuPont Registered Trademark.

\*\*\* Asahi Glass Co. Registered Trademark.

## OPERATING LIMITS

### Speed Limits:

- 5000 fpm 25 m/sec Maximum

### Temperature Limits:

- 500°F/260°C Maximum

### Pressure Limits:

- 300 psig/20 bar g†

### Suggested Uses:

- Mixers, dryers, rollers, other specialty equipment
- Any dual seal application where barrier liquid or process contamination is undesirable.

### Target Markets:

- Chemical processing, pharmaceutical, food processing, petrochemical.

† For pressures above these limits, please consult CHESTERTON Applications Engineering Dept.

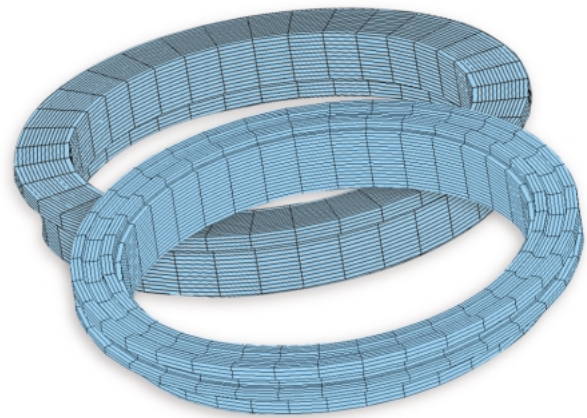
## Dynamic Pressure Regulation

Patented In Gland Control System is used to both control gas/process pressure differential at the faces as well as to control closing forces on the faces. Both systems are actively linked to a process pressure feedback source. Reaction time is instantaneous. In this method, the seal operates at a steady state regardless of process upsets or fluctuations.



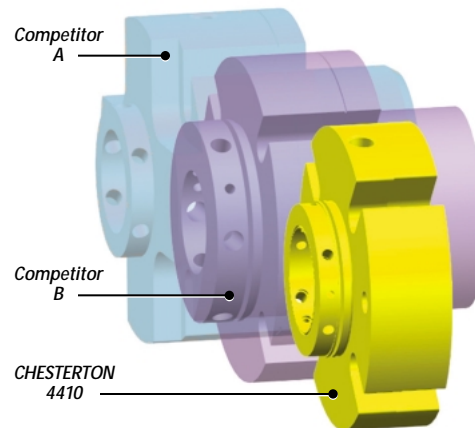
## Lift-Off at Any speed

By harnessing such precise control of the gas pressure dynamics in action at the seal faces, maximum reliability can be achieved throughout a very wide operational range. This allows the 4410 to operate equally well at near-zero and elevated speeds as well. The 4410 excels in variable speed services, and can even be applied to specialty pumps which may present operational dynamics that are less than ideal for application of gas seals which rely solely on grooves for face separation.



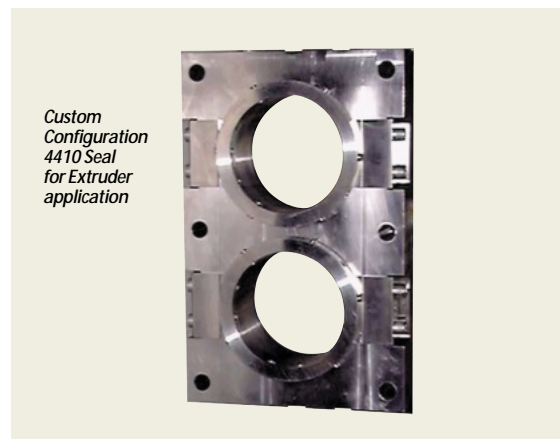
## Space Saving Envelope

The physical envelopes for existing specialty and "slow speed" gas seals are shown at right, in comparison to the extremely compact design of the CHESTERTON 4410. Besides the obvious fitting and installation benefits, this also makes gas sealing technology available to a wider range of applications since the economic hurdle of equipment modification costs for seal installation has been removed. The compact design is also an indication of the overall advance in gas seal technology the 4410 represents.

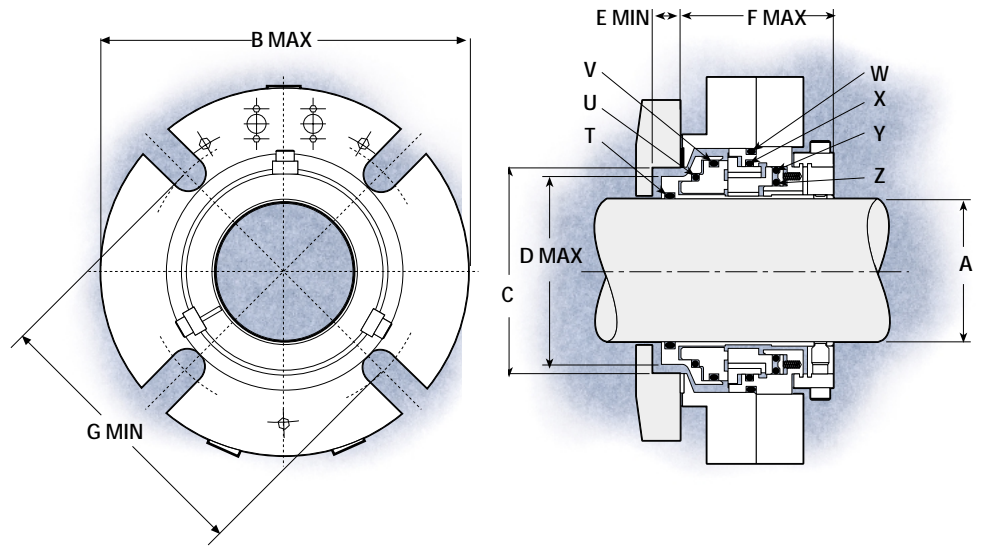


## Custom Configurations Available

By minimizing the size of the seal itself, more room is left for add-ons to the seal design that may require more space to incorporate. Specialty equipment and applications may pose the requirement for bearings, cooling jackets, and other devices as part of the seal itself. Chesterton engineers have left space for a wide array of extras to be incorporated into the 4410 as a custom design. The 4410 is fully customizable through Chesterton's Engineered Solutions division. The most innovative adaptation to date: two seals housed in one gland for a custom extruder application.



# CHESTERTON® 4410™ Hydrostatic Gas Seal Specifications



## 4410 LARGE DIMENSIONAL DATA (Inch)

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		IB SEAL DIAMETER	SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE			SLOT WIDTH	O-RINGS						
											SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
												T	SUPPORT			OD	W
A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	G MIN			H	T	U	V	W	X	Y	Z
							1/2"	5/8"	3/4"								
2.625	7.10	3.60	4.16	3.45	0.40	2.80	5.25	5.37	-	0.69	-231	-236	-241	-244	-241	-239	-235
2.750	7.22	3.73	4.29	3.58	0.40	2.80	5.38	5.50	-	0.69	-232	-237	-242	-245	-242	-240	-236
2.875	7.35	3.85	4.41	3.70	0.40	2.80	5.49	5.62	-	0.69	-233	-238	-243	-246	-243	-241	-237
3.000	7.47	3.98	4.57	3.83	0.40	2.80	5.69	5.81	-	0.69	-234	-239	-244	-247	-244	-242	-238
3.125	7.60	4.10	4.68	3.95	0.40	2.80	5.80	5.92	-	0.69	-235	-240	-245	-248	-245	-243	-239
3.250	7.72	4.23	4.82	4.08	0.40	2.80	5.94	6.06	-	0.69	-236	-241	-246	-249	-246	-244	-240
3.375	7.85	4.35	4.93	4.20	0.40	2.80	6.04	6.17	6.29	0.81	-237	-242	-247	-250	-247	-245	-241
3.500	7.97	4.48	5.07	4.33	0.40	2.80	6.18	6.31	6.43	0.81	-238	-243	-248	-251	-248	-246	-242
3.625	8.10	4.60	5.19	4.45	0.40	2.80	6.29	6.42	6.54	0.81	-239	-244	-249	-252	-249	-247	-243
3.750	8.22	4.73	5.30	4.58	0.40	2.80	6.38	6.51	6.63	0.81	-240	-245	-250	-253	-250	-248	-244
3.875	8.35	4.85	5.41	4.70	0.40	2.80	6.50	6.62	6.75	0.81	-241	-246	-251	-254	-251	-249	-245
4.000	8.47	4.98	5.57	4.83	0.40	2.80	6.68	6.81	6.93	0.81	-242	-247	-252	-255	-252	-250	-246
4.125	8.60	5.10	5.69	4.95	0.40	2.80	6.79	6.92	7.04	0.81	-243	-248	-253	-256	-253	-251	-247
4.250	8.72	5.23	5.82	5.08	0.40	2.80	6.93	7.05	7.18	0.81	-244	-249	-254	-257	-254	-252	-248
4.375	8.85	5.35	5.94	5.20	0.40	2.80	7.05	7.18	7.30	0.81	-245	-250	-255	-258	-255	-253	-249
4.500	8.97	5.48	6.07	5.33	0.40	2.80	7.18	7.30	7.43	0.81	-246	-251	-256	-259	-256	-254	-250
4.625	9.10	5.60	6.19	5.45	0.40	2.80	7.30	7.43	7.55	0.81	-247	-252	-257	-259	-257	-255	-251
4.750	9.22	5.73	6.33	5.58	0.40	2.80	7.46	7.59	7.71	0.81	-248	-253	-258	-260	-258	-256	-252

## 4410 EXTRA LARGE DIMENSIONAL DATA (Inch)

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		IB SEAL DIAMETER	SB DEPTH	OB LENGTH	BOLT CIRCLE* BY BOLT SIZE			SLOT WIDTH	O-RINGS						
											SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
												T	U			V	W
A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	G MIN			H	T	U	V	W	X	Y	Z
							7/8"	1"	1-1/8"								
5.000	11.15	6.32	7.55	6.12	0.60	4.00	9.17	9.30	9.42	*	-353	-361	-363	-263	-364	-362	-360
5.250	11.40	6.57	7.80	6.37	0.60	4.00	9.42	9.55	9.67	*	-355	-362	-364	-264	-365	-363	-361
5.500	11.65	6.82	8.05	6.62	0.60	4.00	9.67	9.80	9.92	*	-357	-363	-365	-265	-366	-364	-362
5.750	11.90	7.07	8.30	6.87	0.60	4.00	9.92	10.05	10.17	*	-359	-364	-366	-266	-367	-365	-363
6.000	12.15	7.32	8.55	7.12	0.60	4.00	10.17	10.30	10.42	*	-361	-365	-367	-267	-368	-366	-364
6.250	12.40	7.57	8.80	7.37	0.60	4.00	10.42	10.55	10.67	*	-362	-366	-368	-268	-369	-367	-365
6.500	12.65	7.82	9.05	7.62	0.60	4.00	10.67	10.80	10.92	*	-363	-367	-369	-269	-370	-368	-366
6.750	12.90	8.07	9.30	7.87	0.60	4.00	10.92	11.05	11.17	*	-364	-368	-370	-270	-371	-369	-367
7.000	13.15	8.32	9.55	8.12	0.60	4.00	11.17	11.30	11.42	*	-365	-369	-371	-271	-372	-370	-368
7.250	13.40	8.57	9.80	8.37	0.60	4.00	11.42	11.55	11.67	*	-366	-370	-372	-272	-373	-371	-369
7.500	13.65	8.82	10.05	8.62	0.60	4.00	11.67	11.80	11.92	*	-367	-371	-373	-273	-374	-372	-370
7.750	13.90	9.07	10.30	8.87	0.60	4.00	11.92	12.05	12.17	*	-368	-372	-374	-274	-375	-373	-371
8.000	14.15	9.32	10.55	9.12	0.60	4.00	12.17	12.30	12.42	*	-369	-373	-375	-275	-376	-374	-372

NOTE: \* Bolt Circle manufactured to Customer Specifications

# CHESTERTON®

## 4410™ Hydrostatic Gas Seal Specifications

### 4410 LARGE DIMENSIONAL DATA (Metric)

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		IB SEAL DIAMETER	SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE			SLOT WIDTH	O-RINGS						
											SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
												SUPPORT	OD			W	X
A	B	C	C	D	E	F	G MIN			H	T	U	V	W	X	Y	Z
	MAX	MIN	MAX	MAX	MIN	MAX	12 mm	16 mm	20 mm								
65 mm	180	91	106	88	10	71	133	136	-	18	-230	-236	-241	-244	-241	-239	-235
70 mm	183	95	109	91	10	71	137	140	-	18	-232	-237	-242	-245	-242	-240	-236
75 mm	190	101	116	97	10	71	144	148	-	18	-234	-239	-244	-247	-244	-242	-238
80 mm	196	107	122	104	10	71	151	154	-	18	-235	-241	-246	-249	-246	-244	-240
85 mm	199	111	125	107	10	71	153	157	160	21	-237	-242	-247	-250	-247	-245	-241
90 mm	206	117	132	113	10	71	160	163	166	21	-238	-244	-249	-252	-249	-247	-243
95 mm	209	120	135	116	10	71	162	165	168	21	-240	-245	-250	-253	-250	-248	-244
100 mm	215	126	141	123	10	71	170	173	176	21	-241	-247	-252	-255	-252	-50	-246
110 mm	225	136	151	132	10	71	179	182	186	21	-245	-250	-255	-258	-255	-253	-249
120 mm	234	145	161	142	10	71	189	193	196	21	-248	-253	-258	-260	-258	-256	-252

### 4410 EXTRA LARGE DIMENSIONAL DATA (Metric)

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		IB SEAL DIAMETER	SB DEPTH	OB LENGTH	BOLT CIRCLE* BY BOLT SIZE			SLOT WIDTH	O-RINGS						
											SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
												SUPPORT	OD			W	X
A	B	C	C	D	E	F	G MIN			H	T	U	V	W	X	Y	Z
	MAX	MIN	MAX	MAX	MIN	MAX	22 mm	24 mm	28 mm								
125 mm	283	160	192	155	15	102	233	236	239	*	-352	-361	-363	-263	-364	-362	-360
130 mm	289	167	198	162	15	102	239	242	246	*	-354	-362	-364	-264	-365	-363	-361
135 mm	296	173	204	168	15	102	246	249	252	*	-356	-363	-365	-265	-366	-364	-362
140 mm	296	173	204	168	15	102	246	249	252	*	-357	-363	-365	-265	-366	-364	-362
145 mm	302	179	211	174	15	102	252	255	258	*	-359	-364	-366	-266	-367	-365	-363
150 mm	309	186	217	181	15	102	258	261	265	*	-361	-365	-367	-267	-368	-366	-364
155 mm	315	192	224	187	15	102	265	268	271	*	-361	-366	-368	-268	-369	-367	-365
160 mm	321	199	230	193	15	102	271	274	277	*	-362	-367	-369	-269	-370	-368	-366
165 mm	321	199	230	193	15	102	271	274	277	*	-363	-367	-369	-269	-370	-368	-366
170 mm	328	205	236	200	15	102	277	281	284	*	-364	-368	-370	-270	-371	-369	-367
175 mm	334	211	243	206	15	102	284	287	290	*	-365	-369	-371	-271	-372	-370	-368
180 mm	340	218	249	212	15	102	290	293	296	*	-366	-370	-372	-272	-373	-371	-369
185 mm	347	224	255	219	15	102	296	300	303	*	-366	-371	-373	-273	-374	-372	-370
190 mm	347	224	255	219	15	102	296	300	303	*	-367	-371	-373	-273	-374	-372	-370
195 mm	353	230	262	225	15	102	303	306	309	*	-368	-372	-374	-274	-375	-373	-371
200 mm	359	237	268	232	15	102	309	312	315	*	-369	-373	-375	-275	-376	-374	-372

NOTE: \* Bolt Circle manufactured to Customer Specifications

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