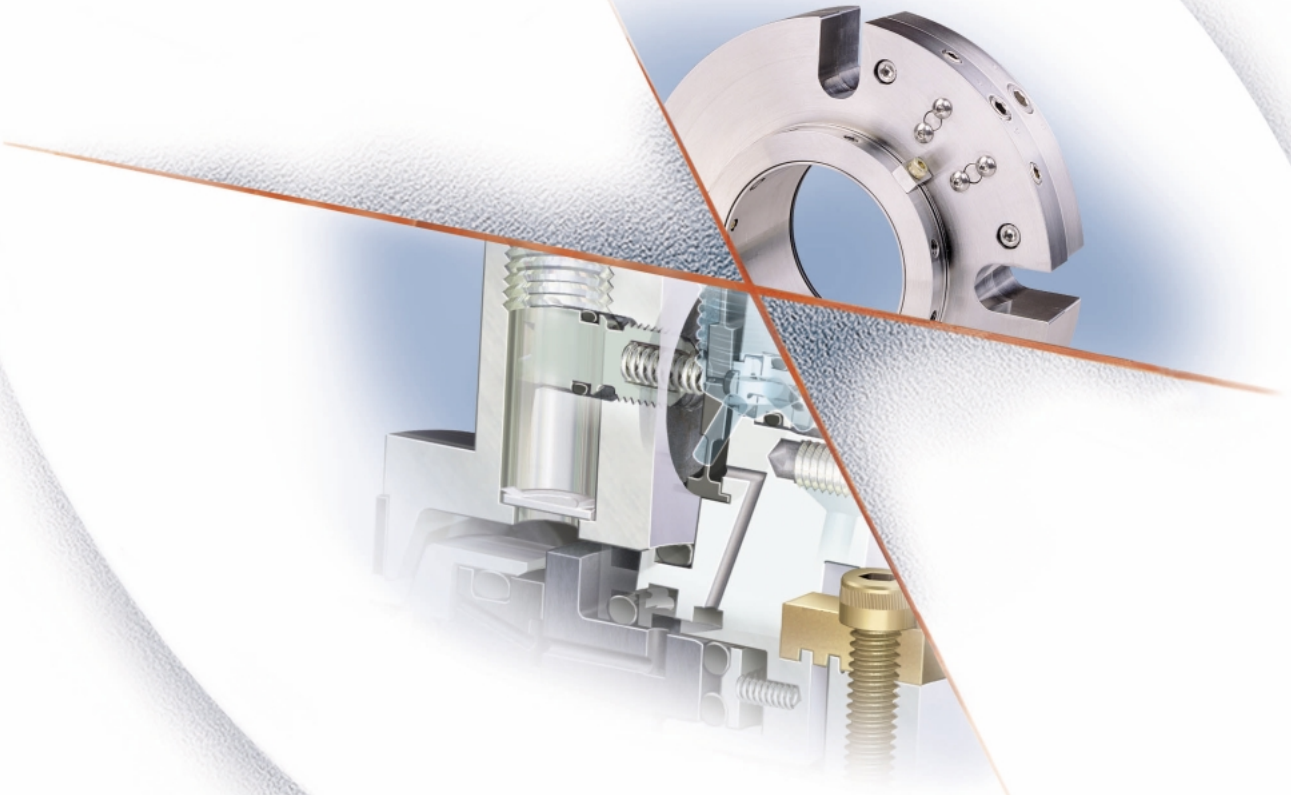
CHESTERTON®

ISO 9001
CERTIFIED

4410™ TwinHydrostatic™ Gas Seal

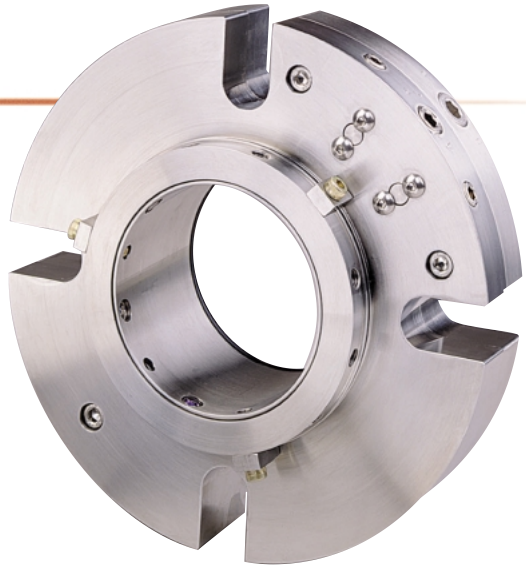
- Zero fugitive emissions
- Bidirectional and low-speed capability
- Fully self regulating
- Responds to system upsets and pressure reversals
- Easily customizable housings



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

CHESTERTON®

4410™ TwinHydrostatic™ 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 twin-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 is a hydrostatic gas lubricated seal which 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 1500 FPM – optimal face loading and lubrication are maintained.

Dynamic Pressure Regulation

Patent pending Dual In Gland Control System (DIGCS) regulates barrier gas pressure and maintains optimum differential during changing process conditions. It also allows active 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 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 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 with a flow-meter is all that is necessary for proper operation. The seal regulates the barrier gas pressure 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.

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 DIGCS mechanism precisely regulates barrier gas/process differential pressure as well as face separation. The dynamic link provided by the DIGCS ensures reliable operation during fluctuating process conditions.

3 Robust, monolithic faces resist process induced deflection and maintain flatness across the operating range.

4 No double balance. 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 coefficients of materials.

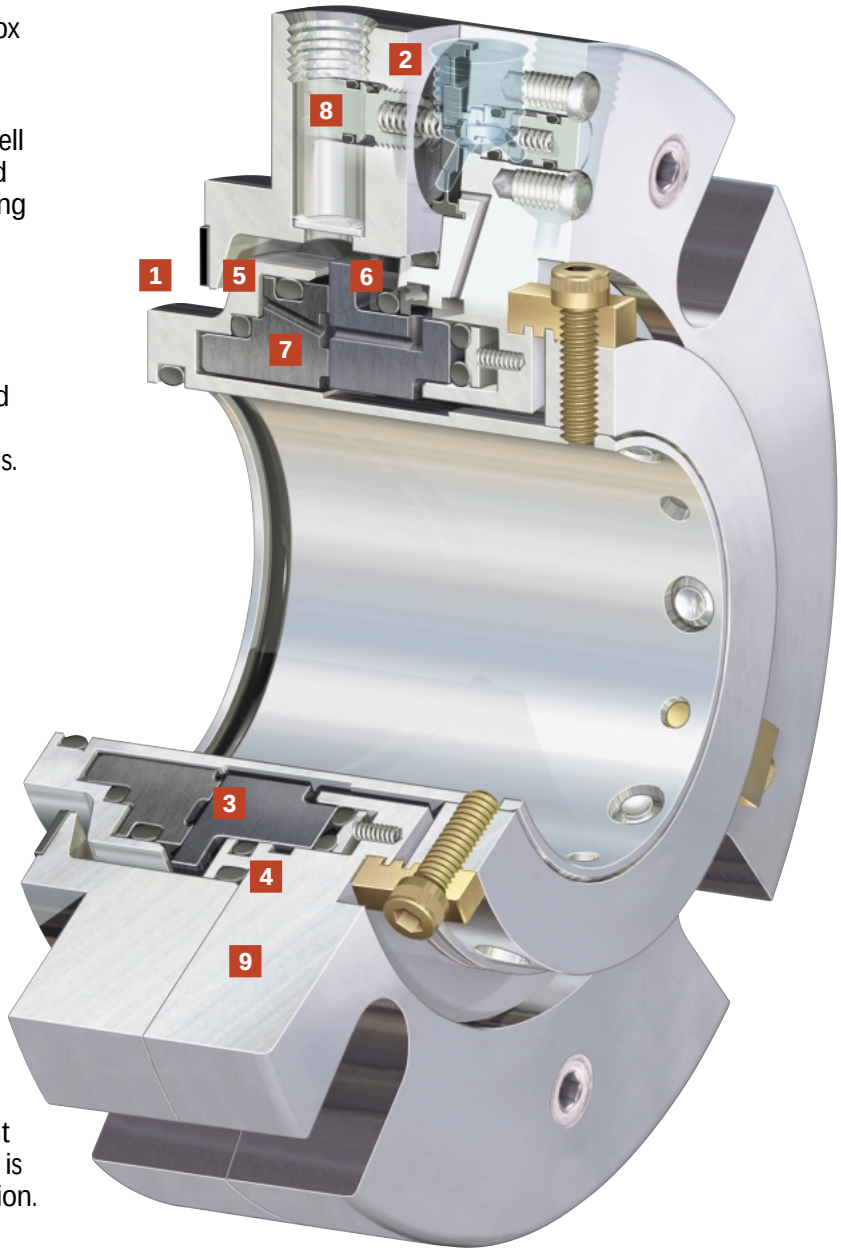
6 Compact coaxial, coplanar design effects 2 sealing interfaces in only 2 seal rings. This adds to reliability, reduces axial space and minimizes spare parts requirements.

7 Pressure balance design reduces pressure induced distortion.

8 DIGCS fine adjustment is accessible during operation, but protected from inadvertent adjustment.

9 Cartridge design simplifies installation and protects seal components from damage.

■ Bidirectional operation. 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, Graphited Silicon Carbide

Elastomers:
- Fluorocarbon, EPR, FFKM (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:
- 1500 fpm 8 m/sec Maximum

Temperature Limits:
- 500°F/260°C Maximum

Pressure Limits:
- 150 psig/10 bar g†

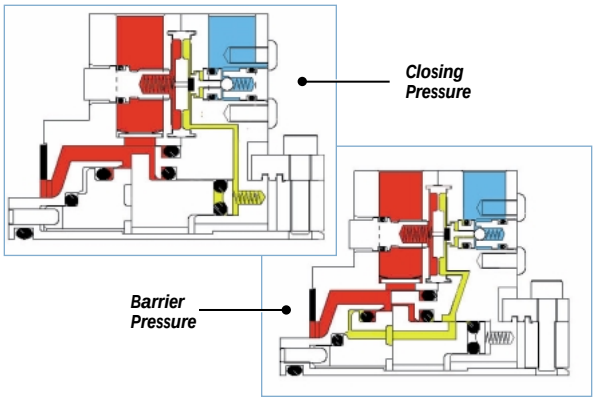
Suggested Uses:
- Mixers, dryers, rollers, other specialty equipment
- Any dual seal application where barrier liquid or process contamination is undesireable.

Target Markets:
- Chemical processing, pharmacetical, food processing, petrochemical.

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

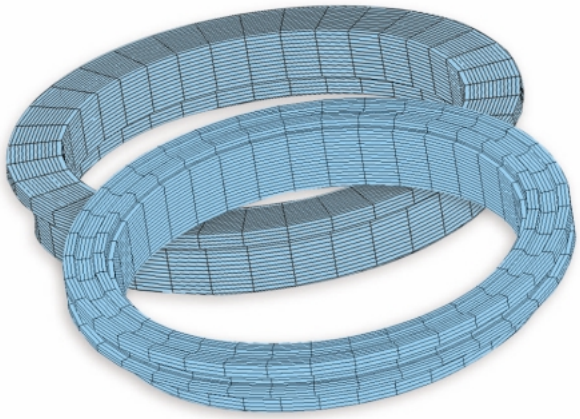
Dynamic Pressure Regulation

Patented Dual In Gland Control System is used to both control barrier gas/process fluid differential pressure at the seal interface as well as to control closing pressure on the seal backface. Both systems are actively linked to a process pressure feedback source. Response time is minimal. In this method, the seal operates at an optimal state regardless of process upsets or fluctuations.



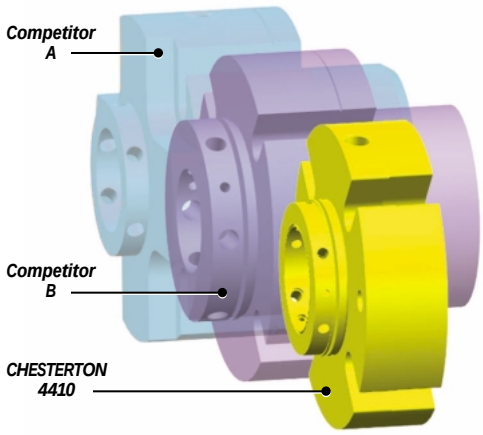
Lift-Off at Any speed

Through DIGCS, maximum reliability can be achieved in a very wide operational range. This allows the 4410 to operate equally well at near-zero and nominal 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 other gas seals.



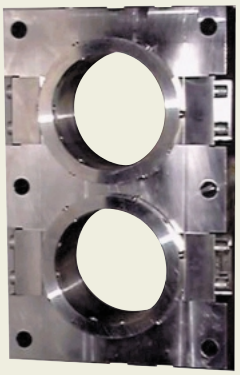
Space Saving Envelope

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.



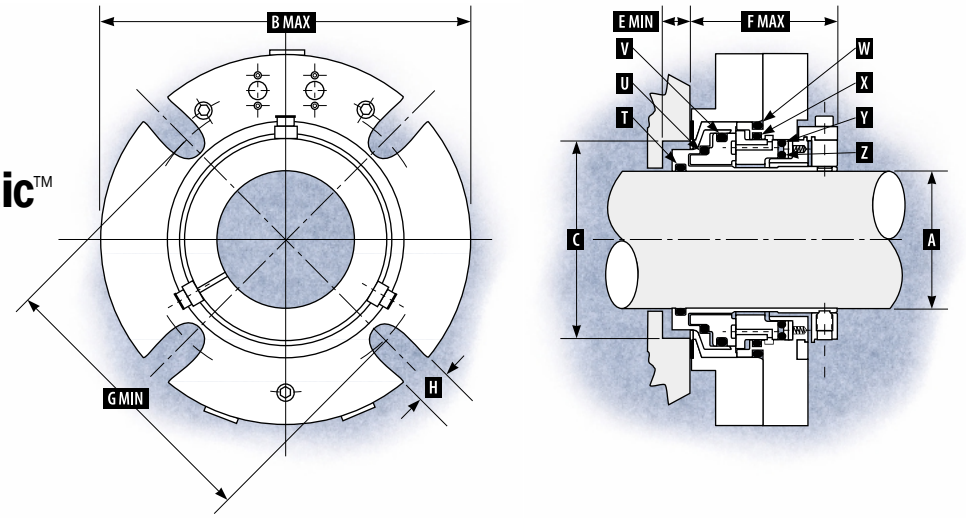
Custom Configurations Available

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.



Custom Configuration 4410 Seal for Extruder Application

CHESTERTON® 4410™ TwinHydrostatic™ Gas Seal Specifications



4410 LARGE – Dimensional Data/Inch

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE			SLOT WIDTH	O-RINGS						
										SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
											SUPPORT	OD			OD	ID
A	B MAX	C MIN	C MAX	E MIN	F MAX	1/2"	G MIN 5/8"	3/4"	H	T	U	V	W	X	Y	Z
2.625	7.10	3.60	4.16	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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		SB DEPTH	OB LENGTH	POSSIBLE BOLT CIRCLE BY BOLT SIZE			SLOT WIDTH	O-RINGS						
										SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
											SUPPORT	OD			OD	ID
A	B MAX	C MIN	C MAX	E MIN	F MAX	7/8"	G MIN 1"	1 1/8"	H	T	U	V	W	X	Y	Z
5.000	11.15	6.32	7.55	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	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	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	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	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	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	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	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	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	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	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	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	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™ TwinHydrostatic™ Gas Seal Specifications

4410 LARGE – Dimensional Data/Metric

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE			SLOT WIDTH	O-RINGS						
										SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
											SUPPORT	OD			OD	ID
A	B MAX	C MIN	C MAX	E MIN	F MAX	12 mm	G MIN 16 mm	20 mm	H	T	U	V	W	X	Y	Z
65 mm	180	91	106	10	71	133	136	–	18	-230	-236	-241	-244	-241	-239	-235
70 mm	183	95	109	10	71	137	140	–	18	-232	-237	-242	-245	-242	-240	-236
75 mm	190	101	116	10	71	144	148	–	18	-234	-239	-244	-247	-244	-242	-238
80 mm	196	107	122	10	71	151	154	–	18	-235	-241	-246	-249	-246	-244	-240
85 mm	199	111	125	10	71	153	157	160	21	-237	-242	-247	-250	-247	-245	-241
90 mm	206	117	132	10	71	160	163	166	21	-238	-244	-249	-252	-249	-247	-243
95 mm	209	120	135	10	71	162	165	168	21	-240	-245	-250	-253	-250	-248	-244
100 mm	215	126	141	10	71	170	173	176	21	-241	-247	-252	-255	-252	-250	-246
110 mm	225	136	151	10	71	179	182	186	21	-245	-250	-255	-258	-255	-253	-249
120 mm	234	145	161	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		SB DEPTH	OB LENGTH	POSSIBLE BOLT CIRCLE BY BOLT SIZE			SLOT WIDTH	O-RINGS						
										SHAFT	ROTARY		GLAND ADAPTER	STATIONARY	PUSHER	
											SUPPORT	OD			OD	ID
A	B MAX	C MIN	C MAX	E MIN	F MAX	22 mm	G MIN 24 mm	28 mm	H	T	U	V	W	X	Y	Z
125 mm	283	160	192	15	102	233	236	239	*	-352	-361	-363	-263	-364	-362	-360
130 mm	289	167	198	15	102	239	242	246	*	-354	-362	-364	-264	-365	-363	-361
135 mm	296	173	204	15	102	246	249	252	*	-356	-363	-365	-265	-366	-364	-362
140 mm	296	173	204	15	102	246	249	252	*	-357	-363	-365	-265	-366	-364	-362
145 mm	302	179	211	15	102	252	255	258	*	-359	-364	-366	-266	-367	-365	-363
150 mm	309	186	217	15	102	258	261	265	*	-361	-365	-367	-267	-368	-366	-364
155 mm	315	192	224	15	102	265	268	271	*	-361	-366	-368	-268	-369	-367	-365
160 mm	321	199	230	15	102	271	274	277	*	-362	-367	-369	-269	-370	-368	-366
165 mm	321	199	230	15	102	271	274	277	*	-363	-367	-369	-269	-370	-368	-366
170 mm	328	205	236	15	102	277	281	284	*	-364	-368	-370	-270	-371	-369	-367
175 mm	334	211	243	15	102	284	287	290	*	-365	-369	-371	-271	-372	-370	-368
180 mm	340	218	249	15	102	290	293	296	*	-366	-370	-372	-272	-373	-371	-369
185 mm	347	224	255	15	102	296	300	303	*	-366	-371	-373	-273	-374	-372	-370
190 mm	347	224	255	15	102	296	300	303	*	-367	-371	-373	-273	-374	-372	-370
195 mm	353	230	262	15	102	303	306	309	*	-368	-372	-374	-274	-375	-373	-371
200 mm	359	237	268	15	102	309	312	315	*	-369	-373	-375	-275	-376	-374	-372

NOTE: *Bolt Circle manufactured to Customer Specifications.

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