



# MSE<sup>®</sup> SEAL

## Versatile Sealing Performance

### METAL SPRING ENERGIZED SEALS

The MSE<sup>®</sup> seal's superior designed dual-lip body offers improved sealing performance. An unlimited number of custom-engineered MSE configurations are available. Greene, Tweed's MSE seals:

- Are machined not molded resulting in lower costs and quicker turnaround time compared to molded elastomeric seals
- Fit most types of O-ring grooves with an open configuration\*
- Offer unlimited shelf life
- Are available in sizes from 0.110 inch to 60 inches in diameter
- Are available in different spring designs
- Can be produced in custom sizes

*\*MSE seals are not typically installable in closed grooves.*

### FEATURES & BENEFITS

- Low friction
  - Precise and uniform movement without stick/slip
  - Low power absorption and torque requirements
  - Friction can be adjusted and controlled
  - Can run dry or lubricated giving a long service life
- Able to withstand corrosive environments
  - Virtually unlimited media service with one seal
  - Will not contaminate sensitive media
- Wide temperature performance envelope
  - Cryogenic to 625°F (330°C), giving excellent performance at extreme temperatures
- Operates effectively at pressures from vacuum to 19,000 psi (1,300 bar)



### APPLICATIONS

- Aircraft engines
- Brakes
- Fuel controls, pumps, valves
- Gearboxes
- Hydraulic systems
- APUs (Auxiliary Power Unit)
- Scrapers across various platforms
- Static seals in utility and landing gear actuation systems
- Oxygen systems
- Cryo coolers





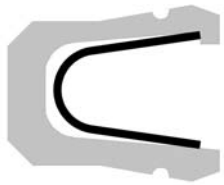
## MSE® DESIGN

The MSE® seal 2000 series uses a cantilever-type stainless steel spring to act as an energizer during low-pressure situations. The spring compensates for seal wear in dynamic applications as well as overcoming the nonresilient nature of PTFE materials. Calculated spring force is applied directly over the sealing lips creating a leak-free seal without causing excessive friction and wear. As pressure is applied the spring cavity is pressure energized, assisting the spring load. The dual lip cover is designed to provide primary sealing at the outermost contact point and secondary sealing at the innermost contact point.

### MSE Series

- **Series 2000 or 2060**—Dual lip seals are energized by a medium-load metal finger spring designed for general use under static or dynamic conditions. Temperature range -65°F to 550°F (-54°C to 288°C), surface speeds up to 250 ft/min. and pressures up to 60,000 psi. Available in rod and piston designs.

#### 2060 Series (Dual Sealing Lip)



- **Series 2001 or 2061**—The scraper lip design is best suited for nonlubricated applications or where abrasive media are present and where space is limited. The scraper lip keeps abrasive media from getting between the seal and the hardware, thus decreasing abrasion. Available in rod and piston designs.

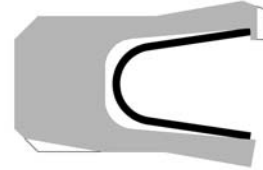
#### 2061 Series (Scraper Lip)



- **Series 2301 or 2361**—The Series is preferred for high-temperature/high-pressure scraper applications. Rod types use one back-up gland width.

*Note: Piston-type arrangements are available upon request.*

#### 2361 Series



- **Series 2100 or 2160**—The flanged Series 2100 dual lip seal is intended for use in lubricated applications or where the seal can be pre-lubricated. The flange helps prevent seal rotation, a major cause in rotary seal failure. For abrasive media or where dry sealing is required, the Series 2101 (2161) is the preferred choice. The scraper lip keeps abrasive media from getting between the seal and the shaft, thus decreasing abrasion.

#### 2160 Series (Flanged Version)

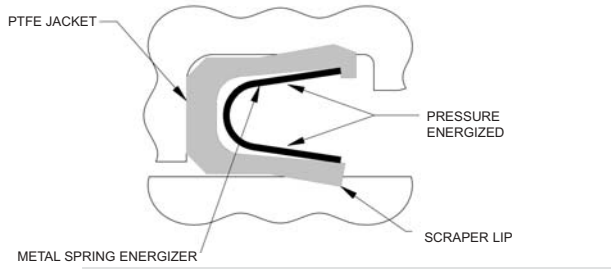


#### 2161 Series (Flanged Version)

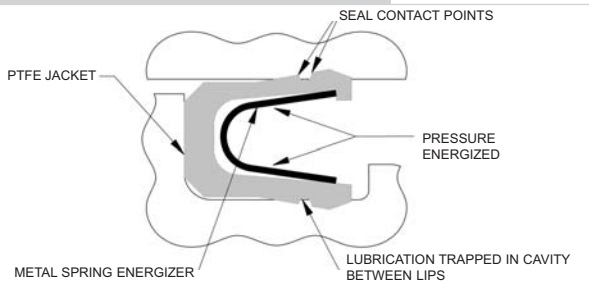


- **Series I2000 or 2060**—MSE internal pressure face seals are intended for both static and dynamic applications. However, whenever possible, it is recommended that dynamic sealing should be accomplished with a radial-type seal.

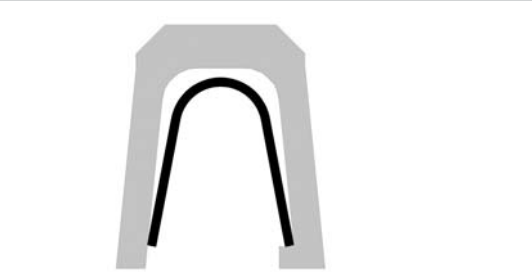
Finger Spring Energized MSE® in Gland—  
 Scraper Configuration



Finger Spring Energized MSE in Gland—  
 Seal Configuration

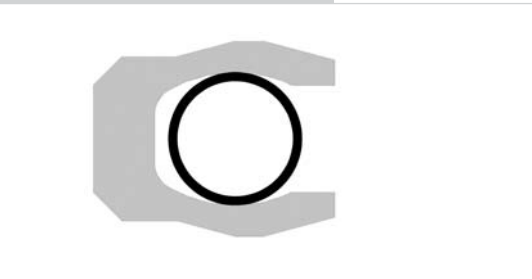


I2060 Series (Internally Pressurized)

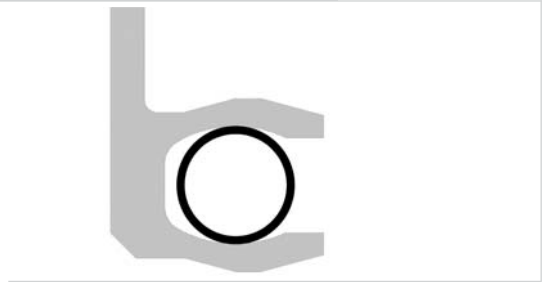


- **Series 3000 or 3060**—Series 3000 seals are energized by a high-loading coil spring and are intended for temperatures from 270°F to 550°F (-168°C to 288°C). Series 3000 seals are mainly designed for static applications but will also work under dynamic conditions with surface speeds up to 100 ft/min. Configurations: rod, piston, flanged and face seals.

3060 Series (STD)



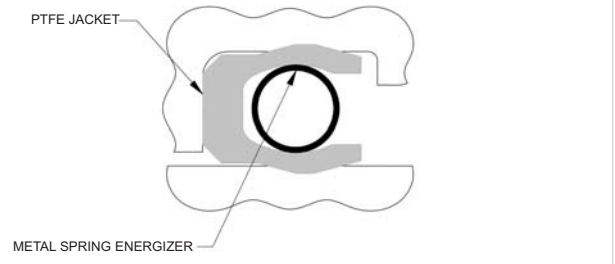
3160 Series (Flanged)



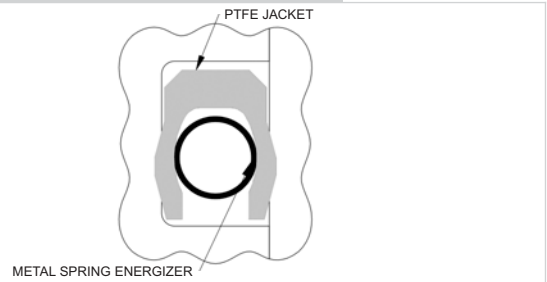
I3060 Series (Internally Pressurized)



Coil Spring in Gland

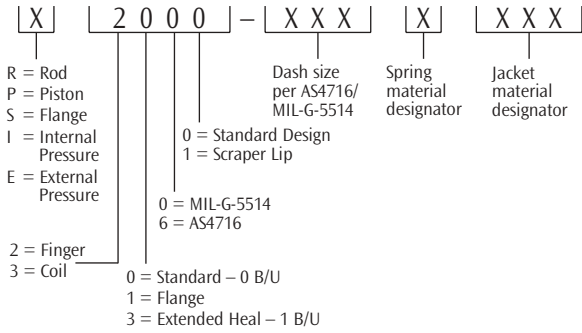


SFS (Static Face Seal) Coil Spring in Gland

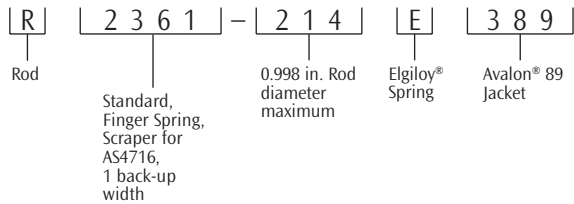


## MSE® PART NUMBERING SYSTEM

The part numbering system requires the use of the material designator tables found in the next column. For nonstandard designs contact GT engineering.



### Part Numbering Example



Contact your local Greene, Tweed representative for specific recommendations to suit higher performance requirements.

## Material Designator Tables

CODE	SPRING MATERIAL	SERIES 2000	SERIES 3000	MAX. RECOMMENDED TEMP. RANGE
S	301 SS	Standard	Available*	500°F (260°C)
P	17-7 PH SS		Standard	500°F (260°C)
E	Elgiloy	Standard	Standard	500°F (260°C)

\*Contact GT engineering for availability.

CODE	JACKET MATERIAL
301	Avalon 01
043	Avalon 07
019	Avalon 09
344	Avalon 44
069	Avalon 50
357	Avalon 57
379	Avalon 69
389	Avalon 89

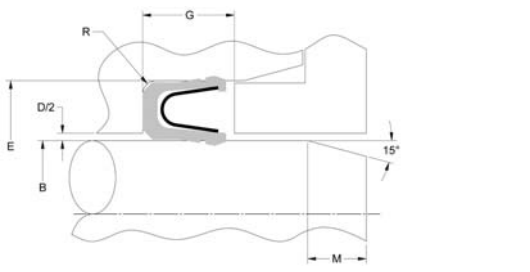
See GT Surface Finish guidelines.

## SEAL CONFIGURATIONS

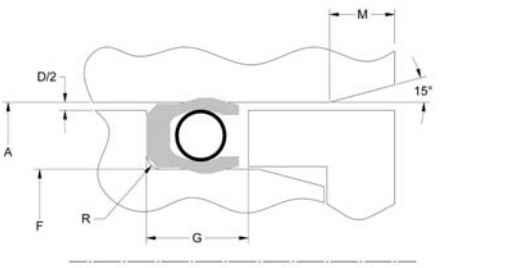
Special consideration should be given to applications that require sealing at temperatures below -65°F (-54°C). The thermal contraction of PTFE materials must be overcome to ensure positive sealing. This is best accomplished by 1) trapping the PTFE on the flanged OD to prevent shrinkage away from the hardware, and 2) geometry changes in the jacket and spring design to assure positive loading. Both are accomplished by flanged seal designs.

### Gland Dimensions

#### Seal Groove—Rod



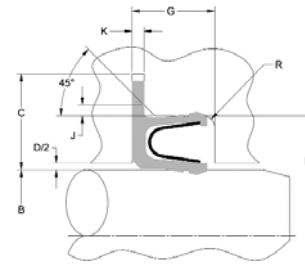
#### Seal Groove—Piston



ROD AND PISTON GROOVE	
DASH NO.	M
-006 – 028	0.075
-110 – 149	0.100
-210 – 247	0.120
-325 – 349	0.150
-425 – 460	0.190

Note: See gland tables for rod and piston diameters and gland widths.

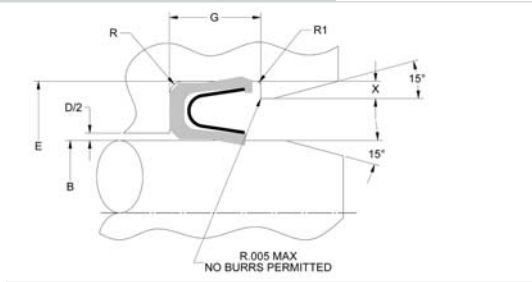
#### Seal Groove—Flange



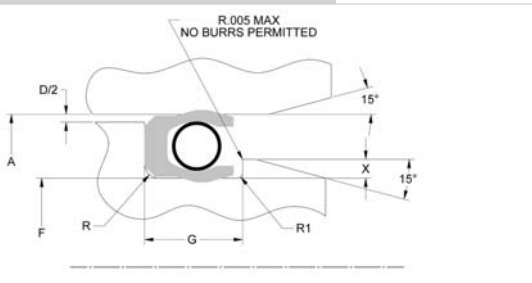
FLANGED SEALS			
DASH NO.	C	J	K
-006 – 028	0.156/0.160	0.015	0.010/0.013
-110 – 149	0.186/0.190	0.020	0.016/0.020
-210 – 247	0.218/0.255	0.025	0.024/0.027
-325 – 349	0.343/0.350	0.035	0.028/0.032
-425 – 460	0.437/0.445	0.045	0.041/0.045

### Gland dimensions

#### Click Fit Groove—Rod



#### Click Fit Groove—Piston



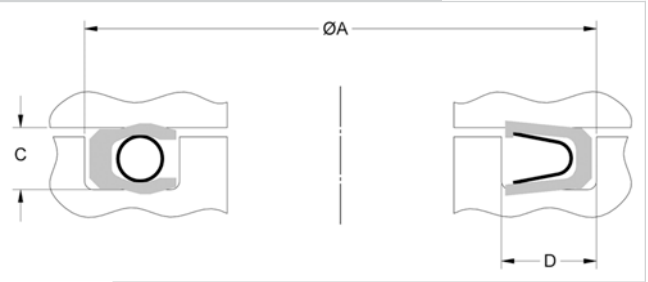
CLICK FIT GROOVE DIMENSIONS (IN INCHES)

DASH NO.*	NOMINAL CX	RECOMMENDED MAX GLAND LIP RADIUS R1	X	
			DIMENSION	TOL.
-006 – 028	0.070	0.005	0.017	±0.001
-110 – 149	0.103	0.007	0.021	±0.001
-210 – 247	0.139	0.007	0.021	±0.001
-325 – 349	0.210	0.009	0.032	±0.002
-425 – 460	0.275	0.012	0.042	±0.002

\*Note: For numbers -006 through -015 and -110 through -114 a two-piece gland is recommended.

### Static Face Seal Gland\*

#### SFS (Static Face Seal) Finger Spring in Gland



\*Note: Reference for dimensional information on next page.

INTERNAL PRESSURE FACE SEALS  
DIMENSIONAL INFORMATION (IN INCHES)

DASH NO.	$\varnothing A \begin{smallmatrix} +0.000 \\ -0.005 \end{smallmatrix}$	$C \pm 0.001$	$D \begin{smallmatrix} +0.010 \\ -0.000 \end{smallmatrix}$
012*	0.504	0.057	0.094
013*	0.566		
014*	0.629		
015*	0.691		
016*	0.754		
017*	0.816		
018*	0.879		
019	0.941		
020	1.004		
021	1.066		
022	1.129		
023	1.191		
024	1.254		
025	1.316		
026	1.379		
027	1.441		
028	1.504		
113	0.755	0.090	0.141
114	0.818		
115	0.880		
116	0.943		
117	1.005		
118	1.068		
119	1.130		
120	1.193		
121	1.255		
122	1.318		
123	1.380		
124	1.443		
125	1.505		
126	1.568		
127	1.630		
128	1.693		
129	1.755		
130	1.818		
131	1.880		
132	1.943		
133	2.005		
134	2.068		
135	2.131		
210	1.012	0.122	0.188
211	1.074		
212	1.137		
213	1.199		
214	1.262		
215	1.324		
216	1.387		
217	1.449		
218	1.512		
219	1.574		

DASH NO.	$\varnothing A \begin{smallmatrix} +0.000 \\ -0.005 \end{smallmatrix}$	$C \pm 0.001$	$D \begin{smallmatrix} +0.010 \\ -0.000 \end{smallmatrix}$
220	1.637	0.122	0.188
221	1.699		
222	1.762		
223	1.887		
224	2.012		
225	2.137		
226	2.262		
227	2.387		
228	2.512		
229	2.637		
230	2.762		
231	2.887		
232	3.012		
233	3.137		
234	3.262		
235	3.387		
236	3.512		
237	3.637		
238	3.762		
239	3.887		
240	4.012		
241	4.137		
242	4.262		
243	4.387		
244	4.512		
245	4.637		
246	4.762		
247	4.887		
328	2.270	0.187	0.281
329	2.395		
330	2.520		
331	2.645		
332	2.770		
333	2.895		
334	3.020		
335	3.145		
336	3.270		
337	3.395		
338	3.520		
339	3.645		
340	3.770		
341	3.895		
342	4.020		
343	4.145		
344	4.270		
345	4.395		
346	4.520		
347	4.645		
348	4.770		
349	4.895		

\*External pressurized arrangements are available. Contact GT engineering.  
\*Coil spring will go from 012 – 028 but finger spring will only go as small as 019.



Contact Us

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