

RSA SEAL®

Rubber Spring Actuated Symmetrical Rod Seal

The RSA (Rubber Spring Actuated) Seal is a compact, symmetrical, pressure-compensating U-type seal. Constructed of Greene, Tweed's proprietary urethane polymers, it incorporates an elastomeric energizer designed to apply a uniform, constant radial loading to the seal's precision-machined back-beveled lips.

This uniform radial loading, independent of system pressure, assures "dry rod" sealing through critical low pressure, low temperature cycles where conventional seals normally permit leakage.



The RSA Seal's unique elliptical annulus provides free space below the energizer allowing for axial expansion and assuring positive retention of the rubber spring. This is essential to the function of any U-type seal employing a "free" energizer, particularly during installation and cyclic shock conditions.

Unlike conventional seals, the RSA Seal's energizer remains wholly within the seal at all times. Thus it is able to exert its maximum radial force at the seal's lips, optimizing low temperature/low-pressure performance.

As system pressure increases, the rubber spring's energizing forces remain constant and the lips of the seal are additionally loaded against the metal sealing surfaces in proportion to fluid pressure.

MATERIALS

The RSA Seal is manufactured of Greene, Tweed's exceptional urethane polymers. Compounded to provide low compression set (high resiliency), and high tear resistance, modulus and abrasion resistance, their excellent physicals have provided the basis for the RSA Seal's unusually long service life in a broad range of rugged operating conditions including earthmoving, mining and oilfield equipment as well as standard industrial cylinders.

Of special note is a new compound, Urethane 369; this high-molecular-weight material represents a breakthrough in urethane technology and offers significant advantages over other premium polyurethane seal compounds in the areas of high and low temperature performance, as well as in compression set and abrasion resistance.

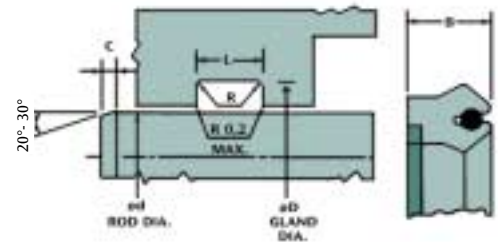


TABLE 1 TYPICAL PHYSICAL PROPERTIES

PROPERTY	COMPOUND		
	320	369	
Hardness, Shore A	94	90	
	Shore D	38	43
Tensile Strength (MPa)	41.3	31.5	
Ultimate Elongation (%)	475	175	
Modulus @ 100% (MPa)	11.0	19.1	
Brittle Point (ASTM D-746) (°C)	< -40	< -60	
Resilience-Bayshore (%) (ASTM D-2632)	35.7	34	
Compression Set-Method B (%) (ASTM D-395)			
	22 hours/70°C	22	9
	70 hours/70°C	23.2	11

PART NUMBERING SYSTEM

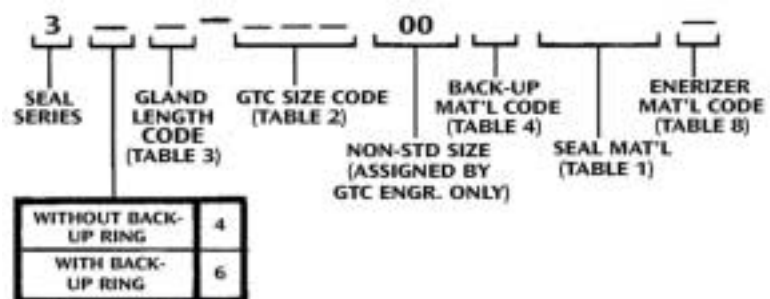
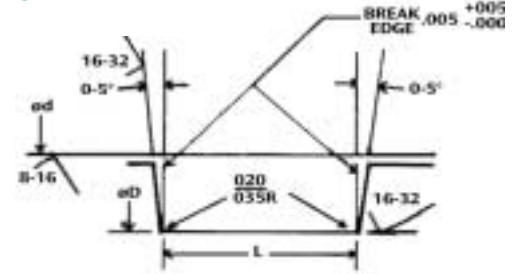


TABLE 2 DIMENSIONAL DATA

NOMINAL SEAL SIZE				METAL DIMENSIONS					SIZE CODE
CROSS-SECTION	ID	OD	HEIGHT	Ød ROD DIA.	ØD GLAND DIA.	D MAX. DIA. CLEARANCE	L GLAND LENGTH +.015 -.000		
.125	1/2	3/4	1/4	.500	.750	.005	.275 (.187)*	210	
	5/8	7/8		.625	.875			212	
	11/16	15/16		.687	.937			213	
	3/4	1		.750	1.000			215	
	7/8	1 1/8		.875 +.000	1.125 +.002			217	
	1	1 1/4		1.000 -.002	1.250 -.000			219	
	1 1/8	1 3/8		1.125	1.375			221	
	1 1/4	1 1/2		1.250	1.500			223	
	1 3/8	1 5/8		1.375	1.625			225	
	1 1/2	1 3/4		1.500	1.750			228	
.187	1	1 3/8	5/16	1.000	1.375	.006	3.44 (.280)*	319	
	1 1/8	1 1/2		1.125	1.500			321	
	1 1/4	1 5/8		1.250	1.625			323	
	1 3/8	1 3/4		1.375	1.750			325	
	1 1/2	1 7/8		1.500 +.000	1.875 +.002			328	
	1 5/8	2		1.625 -.002	2.000 -.000			329	
	1 3/4	2 1/8		1.750	2.125			330	
	1 7/8	2 1/4		1.875	2.250			331	
	2	2 3/8		2.000	2.375			332	
	2 1/4	2 5/8		2.250	2.625			334	
.250	1 1/2	2	3/8	1.500	2.000	.007	.413 (.375)*	528	
	1 5/8	2 1/8		1.625	2.125			529	
	1 3/4	2 1/4		1.750	2.250			530	
	1 7/8	2 3/8		1.875	2.375			531	
	2	2 1/2		2.000	2.500			532	
	2 1/4	2 3/4		2.250	2.750			534	
	2 1/2	3		2.500	3.000			536	
	2 3/4	3 1/4		2.750	3.250			538	
	3	3 1/2		3.000 +.000	3.500 +.002			540	
	3 1/4	3 3/4		3.250 -.002	3.750 -.000			542	
	3 1/2	4		3.500	4.000			544	
	3 3/4	4 1/4		3.750	4.250			546	
	4	4 1/2		4.000	4.500			548	
	4 1/4	4 3/4		4.250	4.750			550	
	4 1/2	5		4.500	5.000			552	
4 3/4	5 1/4	4.750	5.250	554					
5	5 1/2	5.000	5.500	556					
5 1/4	5 3/4	5.250	5.750	558					
.312	2 1/2	3 1/8	1/2	2.500	3.125	.007	.550 (.470)*	636	
	2 3/4	3 3/8		2.750	3.375			638	
	3	3 5/8		3.000	3.625			640	
	3 1/4	3 7/8		3.250	3.875			642	
	3 1/2	4 1/8		3.500	4.125			644	
	3 3/4	4 3/8		3.750	4.375			646	
	4	4 5/8		4.000 +.000	4.625 +.002			648	
	4 1/4	4 7/8		4.250 +.002	4.875 -.000			650	
	4 1/2	5 1/8		4.500	5.125			652	
	4 3/4	5 3/8		4.750	5.375			654	
5	5 5/8	5.000	5.625	656					
5 1/4	5 7/8	5.250	5.875	658					
.375	4 1/4	5	5/8	4.250	5.000	.008	.688 (.560)*	750	
	4 1/2	5 1/4		4.500	5.250			752	
	4 3/4	5 1/2		4.750	5.500			754	
	5	5 3/4		5.000	5.750			756	
	5 1/4	6		5.250	6.000			758	
	5 1/2	6 1/4		5.500	6.250			760	
	5 3/4	6 1/2		5.750 +.000	6.500 +.003			762	
	6	6 3/4		6.000 -.003	6.750 -.000			764	
	6 1/4	7		6.250	7.000			765	
	6 1/2	7 1/4		6.500	7.250			766	
	6 3/4	7 1/2		6.750	7.500			767	
	7	7 3/4		7.000	7.750			768	
	7 1/2	8 1/4		7.500	8.250			770	
	8	8 3/4		8.000	8.750			772	
	.500	7		8	3/4			7.000	8.000
7 1/2		8 1/2	7.500	8.500		870			
8		9	8.000	9.000		872			
8 1/2		9 1/2	8.500 +.000	9.500 +.004		873			
9		10	9.000 -.004	10.000 -.000		874			
9 1/2		10 1/2	9.500	10.500		875			
10		11	10.000	11.000		876			

GLAND DETAIL

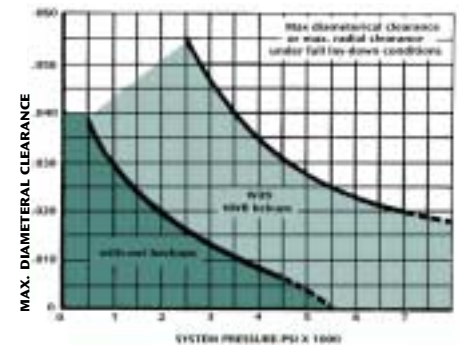


SURFACE FINISHES

The RSA Seal is recommended for use with hardened and/or chrome-plated rods and bores 16 µm RMS max. The static surface should be finished to 32 µm RMS max.

NOTE: Finishes up to 32 µm µm RMS on the dynamic surface and 64 µm RMS on the static have proven acceptable, but with possible reduced performance levels.

**TABLE 6
PRESSURE/CLEARANCE LIMITS**



†Std. Seal height. Other heights available.

*Recommended alternate gland length

NOTE: Tooling may not be available for all combinations of seal sizes and materials. Please contact GTC Engineering for further information.

The elastomeric spring energizer used with the RSA Seal has been compounded specifically for the high compression modulus, low compression set, and low temperature characteristics required for an effective energizer.

The diametral clearances illustrated in Table 2 are suitable for RSA Seals operating with system pressures from 0 to 3000 psi. If the RSA Seal is to be used with pressures higher than 3000 psi, consult the above table to determine the maximum diametral clearances recommended for higher pressures and adjust metal dimensions accordingly.

With designs that necessitate very high pressures or large clearance conditions, such as use of the seal in conjunction with Greene, Tweed's Wear Rings, it may be necessary to use an RSA Seal which incorporates a backup ring. The table above also shows the pressure clearance limits that may be used with an RSA Seal and NWR backup ring.

NOTE: When pressure and clearance coordinates fall in unshaded areas of the above chart, please contact Greene, Tweed Engineering for a specific recommendation.

INSTALLATION

The RSA Urethane Seal can normally be snapped into the grooves without the use of special tools. For ¼" cross-section seals used on rods less than 3" diameter a special tool is recommended (below). For ¼" cross-section seals used on rods less than 2" diameter, an open end gland is recommended.

The tools are available from Greene, Tweed or your Greene, Tweed distributor. (Please contact Greene, Tweed Engineering for specific information on installing the RSA Seal in your application.)

TABLE 3 GLAND LENGTH SELECTION

	NOMINAL CROSS-SECTION						GLAND LENGTH CODE
	.125	.187	.250	.312	.375	.500	
Stan. Gland Length Alt.	.275	.344	.413	.550	.688	.825	2
Gland Length	.187	.280	.375	.470	.560	.750	1

TABLE 4 BACK-UP RING MATERIAL SELECTOR

SERVICE CONDITIONS	BACK-UP RING	
	MATERIAL	DESIGNATOR
Standard system pressures and clearances (see table 2)	NONE	- (Dash)
High system pressures and/or wide clearances (see table 6) in standard petroleum base fluids.	NWR (Wear Resistant Nylon)	A

NOTE: To specify back-up rings only, substitute "000" for the digits "320" (the last digits) in the part number.

TABLE 5 ENERGIZER MATERIAL SELECTION

SERVICE CONDITIONS		RECOMMENDED ENERGIZER MATERIAL	
FLUID	TEMP. RANGE	BASE POLYMER	MATERIAL CODE
Petroleum base hydraulic fluids	-40 to 200°F (-40 to 93°C)	NBR	A (Std. Grade) B (Prem. Grade)
MIL-H-5606, MIL-H-83282, MIL-H-6083, MIL-H-46170	-65 to 225°F (-54 to 107°C)	NBR	C (Mil. Spec. Grade)

Illustrated in the pictures below, the tool is used to "Marcel" the seal, permitting easy installation.



Fig. 1. Seal on flat surface, lips down.



Fig. 2. Bring handles together smoothly.



Fig. 3. Carefully center seal, open handles smoothly.



Fig. 4. Insure that seal is evenly sealed.

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