

**METRIC 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 compressions

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.

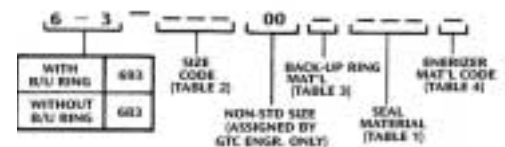
Of special note is a new compound, Urethane 369; this high-molecular-weight material represents a breakthrough in urethane technology and offers significant advantages over other premium polyurethane seal compounds in the areas of high and low temperature performance, as well as in compression set and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

Greene, Tweed's Urethane 369 has an average compression set of approximately 10% compared to 28-30% for other premium urethane seal compounds. In terms of temperature performance, the Urethane 369 compound retains its sealing flexibility and integrity from -50°F to +260°F; an operating envelope at least 100° wider than that of other urethane seal compounds.

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.



**PART NUMBERING SYSTEM**



**TABLE 1 TYPICAL PHYSICAL PROPERTIES**

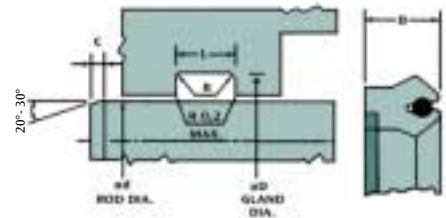
PROPERTY	COMPOUND		
	320	369	
Hardness, Shore A	94	90	
	Shore D	38	43
Tensile Strength (MPa)	41.3	31.5	
Ultimate Elongation (%)	475	175	
Modulus @ 100% (MPa)	11.0	19.1	
Brittle Point (ASTM D-746) (°C)	< -40	< -60	
Resilience-Bayshore (%) (ASTM D-2632)	35.7	34	
Compression Set-Method B (%) (ASTM D-395)			
	22 hours/70°C	22	9
	70 hours/70°C	25	11

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## Rubber Spring Actuated Symmetrical Rod Seal

**TABLE 2 DIMENSIONAL DATA**

NOM. SEAL CX	ROD DIMENSIONS		GLAND DIMENSIONS			B NOMINAL SEAL LENGTH	SIZE CODE
	Ød (f8)	C CHAMBER (min.)	ØD (H10)	L LENGTH +0,25 -0,00	R CORNER RADIUS		
4	6*	2	14	6,3	0,3	5,8	107
	8*		16				110
	10*		18				112
	12*		20				114
	14*		22				116
	16*		24				118
	18*		26				119
	20*		28				120
	22*		30				122
	25*		33				124
5	10*	2,5	20	8	0,3	7,4	212
	12*		22				214
	14*		24				216
	16*		26				218
	18*		28				219
	20*		30				220
	22*		32				222
	25*		35				224
	28*		38				226
	32*		42				228
	36*		46				231
	40*		50				233
	45*		55				235
7,5	50*	4	60	12,5	0,4	11,6	237
	55*		65				238
	56*		70				326
	60*		75				328
	63*		78				331
	65*		80				333
	70*		85				335
	75*		90				337
	80*		95				338
	85*		100				339
	85*		105				340
	90*		110				341
	95*		115				342
10	100*	5	120	16	0,6	15,1	343
	105*		125				344
	110*		130				345
	115*		135				346
	120*		140				439
	125*		145				440
	130*		150				441
	140*		160				442
	150*		170				443
	160*		180				444
							445
							446
							447
		448					



### SURFACE FINISHES

The RSA Seal is recommended for use with hardened and/or chrome-plated rods to 0,4 µM RMS max. The static surface should be finished to 0,8 µM RMS max.

*NOTE: Finishes up to 0,8 µM RMS on the dynamic surface and 1,6 µM RMS on the static have proven acceptable, but with possible reduced performance levels.*

### INSTALLATION

The Metric RSA Seal can normally be snapped into the gland housing except as follows:

SEAL CROSS-SECTION	ROD DIAMETER	
	OPEN END GLAND	INSTALLATION TOOL
4	<22	22+
5	<25	25+
7.5	<40	40+

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.

These installation 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.)

\*DIMENSIONS TO ISO 5597/1

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## Rubber Spring Actuated Symmetrical Rod Seal

**TABLE 2 DIMENSIONAL DATA (CONTINUED)**

NOM. SEAL CX	ROD DIMENSIONS		GLAND DIMENSIONS			B NOMINAL SEAL LENGTH	SIZE CODE
	Ød (f8)	C CHAMBER (min.)	ØD (H10)	L LENGTH +0,25 -0,00	R CORNER RADIUS		
12,5	90*	6,5	115	20	0,8	19	547
	95		120				548
	100*		125				549
	105		130				550
	110*		135				551
	120		145				553
	125*		150				554
	130		155				555
	140*		165				557
	150		175				559
	160*		185				561
	170		195				563
	180*		205				565
	190		215				567
	200*		225				569
15	200*	7,5	230	25			669
	220*		250				673

\*DIMENSIONS TO ISO 5597/1

**TABLE 3 BACK-UP RING MATERIAL SELECTOR**

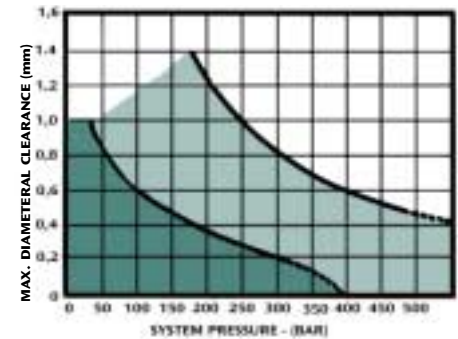
SERVICE CONDITIONS	BACK-UP RING	
	MATERIAL	DESIGNATOR
Standard system pressures and clearances (see table 5)	NONE	- (Dash)
High system pressures and/or wide clearances (see table 5) in standard petroleum base fluids.	NWR (Wear Resistant Nylon)	A

NOTE: To specify back-up rings only, use "0000" as the part number's last four digits.

**TABLE 4 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)

**TABLE 5 PRESSURE/CLEARANCE LIMITS**



Standard diametral clearances per ISO 5597/1 are suitable for RSA Seals operating with system pressures from 0-210 bar. If the RSA Seal is to be used with pressures higher than 210 bar, 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.

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