

# LAMINAR SEALING RINGS



A Smalley Laminar Sealing Ring is a metallic labyrinth seal consisting of multiple rings in a groove. The arrangement of the rings and the specific orientation of the rings is dictated by the application and the severity of the environment.



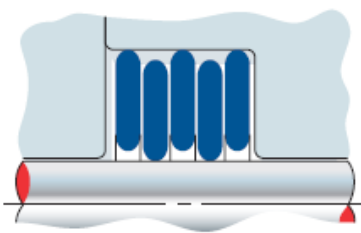
## ADVANTAGES OF LAMINAR SEALING RINGS

1. No friction with other rotating components and are ideal for high speed applications.
2. Prevent dirt and splash water from contaminating components.
3. When used in conjunction with other seals, Laminar Seals provide a primary seal against severe contamination, before the contaminants come in contact with secondary seal.
4. Sets of multiple rings provide an efficient Labyrinth seal.
5. Can be packed with grease for improved sealing capability.
6. Rings may be produced from a wide variety of alloys to withstand more severe conditions including higher temperatures and corrosive environments.
7. As a metallic mechanical seal they can out perform rubber seals in durability and life expectancy.
8. The change from rubber to metal reduces the need for frequent seal replacement.
9. Occupies small radial and axial space.

## THE ADVANCED METALLIC SEAL FOR CORROSIVE / HIGH TEMPERATURE APPLICATIONS

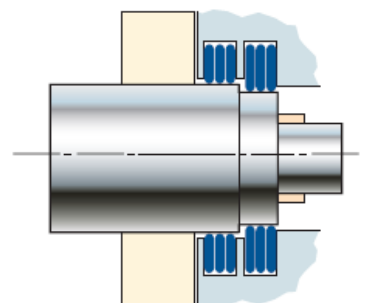
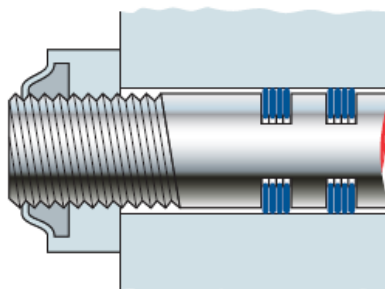
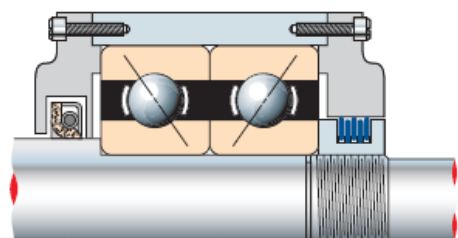
Laminar Sealing Rings for clutches and brakes, compressors, pneumatics and hydraulics, shock absorbers etc...

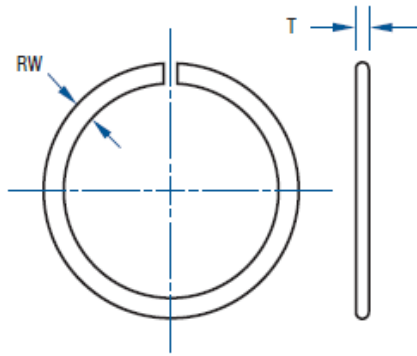
Single wound Laminar Rings as grease- seals for plain and roller bearings.



Double wound Laminar Rings for compensators in exhaust pipe systems of combustion engines, turbines, continuous casting equipment etc...

Complete seal unit with plastic ring carrier for grease lubricated axles and bearings.

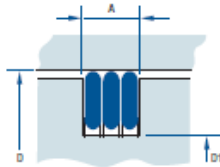




## WQH Series

Internal – Light Duty

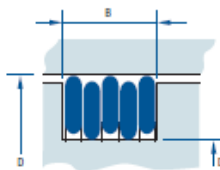
1 set = 3 individual rings  
(rings rotate with bore only)



## WQHC Series

Internal – Medium Duty

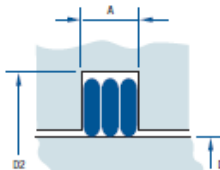
1 set = 5 individual rings  
(3 rings rotate with bore & 2 rings rotate with shaft)



## WQS Series

External – Light Duty

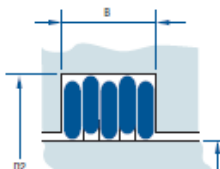
1 set = 3 individual rings  
(rings rotate with shaft only)



## WQSC Series

External – Medium Duty

1 set = 5 individual rings  
(3 rings rotate with shaft & 2 rings rotate with bore)



## Laminar Sealing Rings WQH / WQS & WQHC / WQSC

Single turn Laminar Sealing Rings WQH or WQS are used for a wide variety of applications and, very commonly to protect bearing systems by retaining grease/ lubricant and preventing water or other contaminating liquids from penetrating into the critical areas of the assembly. The alternating staggered series WQHC and WQSC offer, due to an increased labyrinth seal, further improved sealing efficiency. They are most often specified where the lubricating grease may liquefy due to higher operating temperatures or where protection against larger amounts of contaminating liquids such as cooling water is required.

**Standard material: Carbon spring steel and stainless steel.**

3 ring sets protect components from low dirt and low splash water contamination.  
5 ring sets provide a better labyrinth seal to protect components from medium dirt and medium splash water contamination.

## Configuration

Bore Shaft D	Groove Width		Ring Dimensions		Groove ø D2	Groove ø D1
	A	B	RW	T		
15 – 24.5	2.2	3.6	1.0	0.65	(D) + 2.6	(D) – 2.6
25 – 29.5	2.2	3.6	1.2	0.65	+ 3.0	– 3.0
30 – 35.5	2.2	3.6	1.5	0.65	+ 3.6	– 3.6
36 – 42.5	2.2	3.6	1.8	0.65	+ 4.2	– 4.2
43 – 48.5	2.4	4.0	2.2	0.72	+ 5.0	– 5.0
49 – 51.5	2.4	4.0	2.4	0.72	+ 5.4	– 5.4
52 – 59.5	2.4	4.0	2.6	0.72	+ 5.8	– 5.8
60 – 69.5	2.7	4.5	2.8	0.82	+ 6.2	– 6.2
70 – 74.5	2.7	4.5	3.1	0.82	+ 6.8	– 6.8
75 – 79.5	2.7	4.5	3.3	0.82	+ 7.2	– 7.2
80 – 89.5	2.7	4.5	3.5	0.82	+ 7.6	– 7.6
90 – 99.5	2.7	4.5	3.8	0.82	+ 8.2	– 8.2
100 – 104.5	2.7	4.5	4.1	0.82	+ 8.8	– 8.8
105 – 109.5	3.3	5.5	4.3	0.98	+ 9.2	– 9.2
110 – 119.5	3.3	5.5	4.6	0.98	+ 9.8	– 9.8
120 – 129.5	3.3	5.5	5.0	0.98	+ 10.8	– 10.8
130 – 149.5	3.3	5.5	5.5	0.98	+ 11.8	– 11.8
150 – 170.0	3.4	5.6	6.0	1.0	+ 13.0	– 13.0
150 – 170.0	5.1	8.2	6.0	1.5	+ 13.0	– 13.0
171 – 199.0	3.4	5.6	7.0	1.0	+ 15.0	– 15.0
171 – 199.0	5.1	8.2	7.0	1.5	+ 15.0	– 15.0
200 – 259.0	4.1	6.6	8.0	1.2	+ 18.0	– 18.0
200 – 259.0	5.1	8.2	8.0	1.5	+ 18.0	– 18.0
260 – 319.0	5.1	8.2	9.0	1.5	+ 20.0	– 20.0
320 – 399.0	5.2	8.3	10.0	1.5	+ 22.0	– 22.0
400 – 439.0	5.2	8.3	11.0	1.5	+ 24.0	– 24.0
440 – 600.0	5.2	8.3	12.0	1.5	+ 26.0	– 26.0
440 – 600.0	8.3	13.5	12.0	2.5	+ 26.0	– 26.0
601 – 699.0	8.3	13.5	14.0	2.5	+ 32.0	– 32.0
700 – 799.0	8.3	13.5	16.0	2.5	+ 36.0	– 36.0
800 – 899.0	8.3	13.5	18.0	2.5	+ 40.0	– 40.0
900 – 999.0	8.3	13.5	20.0	2.5	+ 44.0	– 44.0
1000 – 1300.0	8.4	13.6	22.0	2.5	+ 48.0	– 48.0

### Tolerances (mm)

<sup>3</sup> D	15-104.5	105-149.5	150-439.0	440-1300.0
A-B	+0.10 -0	+0.15 -0	+0.20 -0	+0.25 -0
RW	+0.10 -0.10	+0.10 -0.20	+0.15 -0.30	+0.20 -0.40
T	+0.04 -0.02	+0.05 -0.02	+0.06 -0.04	+0.07 -0.04
D2	+0.20 -0	+0.25 -0	+0.30 -0	+0.40 -0
D1	+0 -0.20	+0 -0.25	+0 -0.30	+0 -0.40

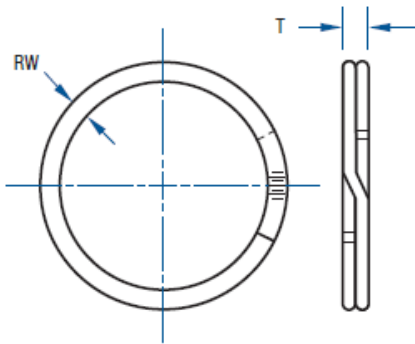
<sup>3</sup> Diameter increases by increments of:  
0.5mm for diameters 15mm – 149.5mm  
1.0mm for diameters 150mm – 1300mm

<sup>1</sup> Increased Cross-section

<sup>2</sup> If axial movement occurs during operation, an increase to groove width may be necessary to avoid friction between rings and groove

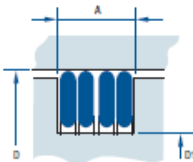
All dimensions in mm

## Laminar Sealing Rings WQHD / WQSD & WQHCD / WQSCD



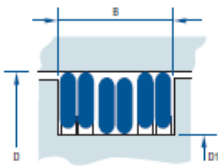
### WQHD Series

Internal – Medium/Heavy Duty  
1 set = 2 individual rings  
(rings rotate with bore only)



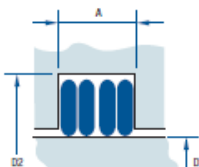
### WQHCD Series

Internal – Heavy Duty  
1 set = 3 individual rings  
(2 rings rotate with bore & 1 ring rotates with shaft)



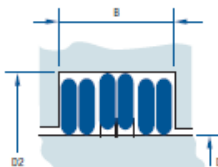
### WQSD Series

External – Medium/Heavy Duty  
1 set = 2 individual rings  
(rings rotate with shaft only)



### WQSCD Series

External – Heavy Duty  
1 set = 3 individual rings  
(2 rings rotate with shaft & 1 ring rotates with bore)



Double turn Laminar Rings offer higher clamping force when installed in the bore or on the shaft, are suited for higher operating speeds, have 360° (no axial gap) contact and should be used where application conditions are more severe. One typical application is where high amounts of dirt and dust are present and the ring sets provide the necessary seal against contamination from outside elements.

Double turn Laminar Ring Sets are also used to protect contacting radial seals, rubber seals, O-rings and other oil seals. For protection in the most severe environment, the alternating (staggered) sets WQHCD and WQSCD are the preferred choice by engineers. They provide sealing with 360° contact in both the bore and on the shaft and can withstand conditions with higher thrust loads.

**Standard material: Carbon spring steel and stainless steel.**

2 ring sets protect components from medium dirt & medium splash water contamination. 3 ring sets provide a better labyrinth seal to protect components from heavy dirt & heavy splash water contamination.

### Configuration

Bore Shaft D	Groove Width		Ring Dimensions		Groove ø D2	Groove ø D1
	A	B	RW	T		
15 – 24.5	2.9	4.3	1.0	1.3	(D) + 2.6	(D) – 2.6
25 – 29.5	2.9	4.3	1.2	1.3	+ 3.0	– 3.0
30 – 35.5	2.9	4.3	1.5	1.3	+ 3.6	– 3.6
36 – 42.5	2.9	4.3	1.8	1.3	+ 4.2	– 4.2
43 – 48.5	3.2	4.8	2.2	1.45	+ 5.0	– 5.0
49 – 51.5	3.2	4.8	2.4	1.45	+ 5.4	– 5.4
52 – 59.5	3.2	4.8	2.6	1.45	+ 5.8	– 5.8
60 – 69.5	3.6	5.4	2.8	1.65	+ 6.2	– 6.2
70 – 74.5	3.6	5.4	3.1	1.65	+ 6.8	– 6.8
75 – 79.5	3.6	5.4	3.3	1.65	+ 7.2	– 7.2
80 – 89.5	3.6	5.4	3.5	1.65	+ 7.6	– 7.6
90 – 99.5	3.6	5.4	3.8	1.65	+ 8.2	– 8.2
100 – 104.5	3.6	5.4	4.1	1.65	+ 8.8	– 8.8
105 – 109.5	4.3	6.4	4.3	1.96	+ 9.2	– 9.2
110 – 119.5	4.3	6.4	4.6	1.96	+ 9.8	– 9.8
120 – 129.5	4.3	6.4	5.0	1.96	+ 10.8	– 10.8
130 – 149.5	4.3	6.4	5.5	1.96	+ 11.8	– 11.8
150 – 170.0	4.4	6.5	6.0	2.0	+ 13.0	– 13.0
150 – 170.0	6.5	9.6	<sup>1</sup> 6.0	3.0	+ 13.0	– 13.0
171 – 199.0	4.4	6.5	7.0	2.0	+ 15.0	– 15.0
171 – 199.0	6.5	9.6	<sup>1</sup> 7.0	3.0	+ 15.0	– 15.0
200 – 259.0	5.3	7.8	8.0	2.4	+ 18.0	– 18.0
200 – 259.0	6.5	9.6	<sup>1</sup> 8.0	3.0	+ 18.0	– 18.0
260 – 319.0	6.5	9.6	9.0	3.0	+ 20.0	– 20.0
320 – 399.0	6.6	9.8	10.0	3.0	+ 22.0	– 22.0
400 – 439.0	6.6	9.8	11.0	3.0	+ 24.0	– 24.0
440 – 600.0	6.6	9.8	12.0	3.0	+ 26.0	– 26.0
440 – 600.0	10.6	15.9	<sup>1</sup> 12.0	5.0	+ 26.0	– 26.0
601 – 699.0	10.8	16.2	14.0	5.0	+ 32.0	– 32.0
700 – 799.0	10.8	16.2	16.0	5.0	+ 36.0	– 36.0
800 – 899.0	11.0	16.5	18.0	5.0	+ 40.0	– 40.0
900 – 999.0	11.0	16.5	20.0	5.0	+ 44.0	– 44.0
1000 – 1300.0	11.0	16.5	22.0	5.0	+ 48.0	– 48.0

### Tolerances (mm)

	15-104.5	105-149.5	150-439.0	440-1300.0
<sup>3</sup> D				
A-B	+0.10 -0	+0.15 -0	+0.20 -0	+0.25 -0
RW	+0.10 -0.10	+0.10 -0.20	+0.15 -0.30	+0.20 -0.40
T	+0.08 -0.04	+0.10 -0.05	+0.12 -0.06	+0.14 -0.07
D2	+0.20 -0	+0.25 -0	+0.30 -0	+0.40 -0
D1	+0 -0.20	+0 -0.25	+0 -0.30	+0 -0.40

<sup>3</sup> Diameter increases by increments of:  
0.5mm for diameters 15mm – 149.5mm  
1.0mm for diameters 150mm – 1300mm

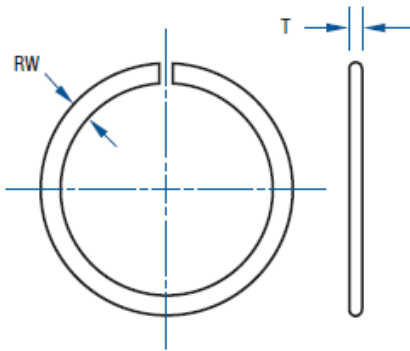
<sup>1</sup> Increased Cross-section

<sup>2</sup> If axial movement occurs during operation, an increase to groove width may be necessary to avoid friction between rings and groove

All dimensions in mm

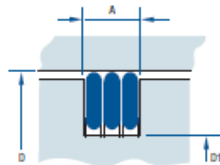


# IMPERIAL SINGLE-TURN RINGS



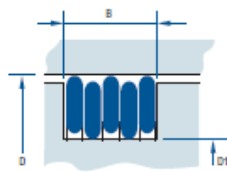
## WYH Series

Internal – Light Duty  
1 set = 3 individual rings  
(rings rotate with bore only)



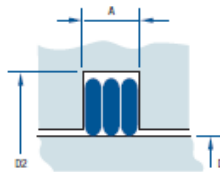
## WYHC Series

Internal – Medium Duty  
1 set = 5 individual rings  
(3 rings rotate with bore & 2 rings rotate with shaft)



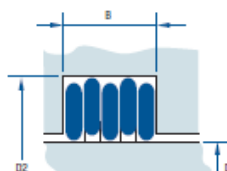
## WYS Series

External – Light Duty  
1 set = 3 individual rings  
(rings rotate with shaft only)



## WYSC Series

External – Medium Duty  
1 set = 5 individual rings  
(3 rings rotate with shaft & 2 rings rotate with bore)



## Laminar Sealing Rings WYH / WYS & WYHC / WYSC

Similar in dimension to the Single-Turn Metric Series of Smalley Laminar Seal Rings, this series of Imperial Laminar Rings was designed using more common and readily available raw material (flat wire) sizes in a wider variety of alloys.

When fast deliveries are required, the standard Laminar Rings listed in the table below are readily available. If special Laminar Rings are desired, the availability of Imperial raw material sizes provides the engineer with the maximum design flexibility. The Imperial Laminar Rings are suitable for the same applications as the Metric rings and are designed to provide equal sealing capability, with the same radial & axial clearances traditionally used with the Metric Series.

**Standard material: Carbon spring steel and stainless steel.**

3 ring sets protect components from low dirt & low splash water contamination, 5 ring sets provide a better labyrinth seal to protect components from medium dirt & medium splash water contamination.

### Configuration

	<sup>1</sup> Bore Shaft D		<sup>2</sup> Groove Width		Ring Dimensions RW T		Groove ø D2	Groove ø D1
	A	B	A	B	RW	T		
.625 – 1.188	.072	.119	.055	.021	(D) + .134	(D) – .134		
1.250 – 1.438	.072	.119	.065	.021	+ .154	– .154		
1.500 – 1.688	.084	.139	.078	.025	+ .180	– .180		
1.750 – 2.188	.102	.170	.095	.031	+ .214	– .214		
2.250 – 2.688	.102	.170	.113	.031	+ .250	– .250		
2.750 – 2.938	.102	.170	.123	.031	+ .270	– .270		
3.000 – 3.188	.102	.170	.128	.031	+ .280	– .280		
3.250 – 3.438	.102	.170	.138	.031	+ .300	– .300		
3.500 – 3.938	.102	.170	.158	.031	+ .340	– .340		
4.000 – 4.438	.102	.170	.168	.031	+ .360	– .360		
4.500 – 4.938	.131	.215	.188	.039	+ .408	– .408		
5.000 – 5.438	.131	.215	.200	.039	+ .432	– .432		
5.500 – 6.188	.158	.254	.225	.046	+ .490	– .490		
6.250 – 7.625	.187	.301	.250	.055	+ .540	– .540		
7.750 – 9.875	.187	.301	.312	.055	+ .702	– .702		
10.000 – 12.375	.217	.346	.350	.063	+ .778	– .778		
12.500 – 14.875	.217	.346	.375	.063	+ .828	– .828		
15.000 – 19.875	.307	.496	.437	.093	+ .952	– .952		
20.000 – 24.875	.310	.504	.500	.093	+ 1.158	– 1.158		
25.000 – 29.875	.310	.504	.567	.093	+ 1.292	– 1.292		
30.000 – 50.000	.310	.504	.750	.093	+ 1.658	– 1.658		

### Tolerances (inches)

	.625-4.114	4.115-9.999	10.000-17.283	17.284-50.000
<sup>3</sup> D	.625-4.114	4.115-9.999	10.000-17.283	17.284-50.000
A-B	+ .004 – 0	+ .008 – 0	+ .010 – 0	+ .010 – 0
RW	+ .004 – .004	+ .006 – .006	+ .007 – .007	+ .015 – .010
T	+ .002 – .002	+ .003 – .003	+ .004 – .004	+ .005 – .005
D2	+ .008 – 0	+ .012 – 0	+ .012 – 0	+ .016 – 0
D1	+ 0 – .008	+ 0 – .012	+ 0 – .012	+ 0 – .016

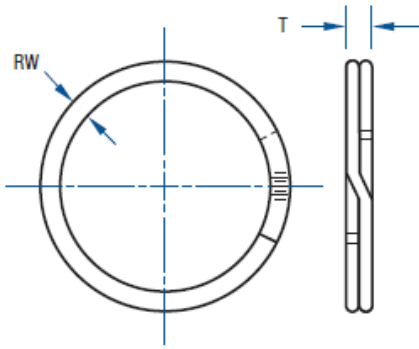
<sup>3</sup> Diameter increases by increments of: .062 for diameters .625 – 6.188 .125 for diameters 6.250 – 50.000

<sup>1</sup> Standard raw materials are Carbon Steel and 302 Stainless Steel

<sup>2</sup> If axial movement occurs during operation, an increase to groove width may be necessary to avoid friction between rings and groove

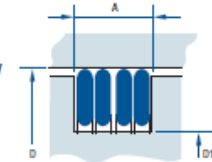
All dimensions in inches

## Laminar Sealing Rings WYHD / WYSD & WYHCD / WYSCD



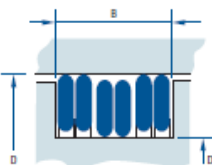
### WYHD Series

Internal – Medium/Heavy Duty  
1 set = 2 individual rings  
(rings rotate with bore only)



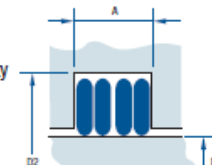
### WYHCD Series

Internal – Heavy Duty  
1 set = 3 individual rings  
(2 rings rotate with bore & 1 ring rotates with shaft)



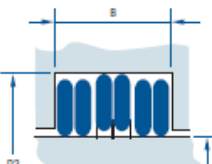
### WYSD Series

External = Medium/Heavy Duty  
1 set = 2 individual rings  
(rings rotate with shaft only)



### WYSCD Series

External – Heavy Duty  
1 set = 3 individual rings  
(2 rings rotate with shaft & 1 ring rotates with bore)



As with the Metric Single-Turn arrangements offered, the Double-Turn Imperial Series of Smalley Laminar Seal Rings are designed to compliment the Metric series using more common and readily available raw material (flat wire) sizes, in a wider variety of alloys. This makes deliveries faster for the standard Laminar Rings shown in the table below and provides the design engineer with greater design freedom when a standard seal ring cannot be utilised and a special seal arrangement is necessary.

The Imperial Laminar Rings are suitable for the same applications as the Metric rings and are designed to provide equal sealing capability, with the same radial & axial clearance traditionally used with the Metric Series.

**Standard material: Carbon spring steel and stainless steel.**

2 ring sets protect components from medium dirt & medium splash water contamination. 3 ring sets provide a better labyrinth seal to protect components from heavy dirt & heavy splash water contamination.



### Configuration

Bore Shaft D	Groove Width		Ring Dimensions		Groove ø D2	Groove ø D1
	A	B	RW	T		
.625 – 1.188	.098	.145	.055	.043	(D) + .134	(D) – .134
1.250 – 1.438	.098	.145	.065	.043	+ .154	– .154
1.500 – 1.688	.112	.166	.078	.050	+ .180	– .180
1.750 – 2.188	.136	.204	.095	.062	+ .214	– .214
2.250 – 2.688	.136	.204	.113	.062	+ .250	– .250
2.750 – 2.938	.136	.204	.123	.062	+ .270	– .270
3.000 – 3.188	.136	.204	.128	.062	+ .280	– .280
3.250 – 3.438	.136	.204	.138	.062	+ .300	– .300
3.500 – 3.938	.136	.204	.158	.062	+ .340	– .340
4.000 – 4.438	.136	.206	.168	.062	+ .360	– .360
4.500 – 4.938	.172	.254	.188	.078	+ .408	– .408
5.000 – 5.438	.172	.254	.200	.078	+ .432	– .432
5.500 – 6.188	.202	.299	.225	.093	+ .490	– .490
6.250 – 7.625	.238	.353	.250	.111	+ .540	– .540
7.750 – 9.875	.242	.357	.312	.111	+ .702	– .702
10.000 – 12.375	.274	.405	.350	.127	+ .778	– .778
12.500 – 14.875	.278	.412	.375	.127	+ .828	– .828
15.000 – 19.875	.398	.592	.437	.187	+ .952	– .952
20.000 – 24.875	.398	.596	.500	.187	+ 1.158	– 1.158
25.000 – 29.875	.405	.608	.567	.187	+ 1.292	– 1.292
30.000 – 50.000	.413	.620	.750	.187	+ 1.658	– 1.658

### Tolerances (inches)

	.625-4.114	4.115-9.999	10.000-17.283	17.284-50.000
<sup>3</sup> D	.625-4.114	4.115-9.999	10.000-17.283	17.284-50.000
A-B	+ .004 – 0	+ .008 – 0	+ .010 – 0	+ .010 – 0
RW	+ .004 – .004	+ .006 – .006	+ .007 – .007	+ .015 – .010
T	+ .0025 – .0025	+ .003 – .003	+ .004 – .004	+ .005 – .005
D2	+ .008 – 0	+ .012 – 0	+ .012 – 0	+ .016 – 0
D1	+ 0 – .008	+ 0 – .012	+ 0 – .012	+ 0 – .016

<sup>3</sup> Diameter increases by increments of:  
.062 for diameters .625 – 6.188  
.125 for diameters 6.250 – 50.000

<sup>1</sup> Standard raw materials are Carbon Steel and 302 Stainless Steel

<sup>2</sup> If axial movement occurs during operation, an increase to groove width may be necessary to avoid friction between rings and groove

All dimensions in inches