

Laminar Seal Rings

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

There are sixteen series of standard imperial and metric Laminar Seal Ring configurations from which to select. Eight of these series are sets consisting of single-turn rings. The other eight series are sets consisting of double-turn rings. Within each series are operational ring-set configurations in both imperial and metric sizes. The selection of the appropriate set should be determined by the application. For some applications a complete labyrinth configuration (i.e.; a complete labyrinth configuration is one which has rings staggered within the set) is necessary due to a severe environment where contamination is highly probable. In other applications design engineers can keep the groove dimensions minimal by specifying laminar sets with rings clinging either to the bore or to the shaft.

Standard parts from 15 mm to 1300 mm and 5/8" to 50".

Special seals manufactured with No-Tooling-Charges.

Smalley's Laminar Seal Rings are interchangeable with FEY Rings.

Interchange Listing		
TFC	FEY	
WQH	AS	FK3
WQHC	ASK	
WQS	IS	
WQSC	ISK	
WQHD	ASD	FK6
WQHCD	ASKD	
WQSD	ISD	
WQSCD	ISKD	
Consult TFC Engineering		FK5



Advantages of Laminar Seal Rings

- No friction with other rotating components, ideal for high speed applications.
- Prevent dirt and splash water from contaminating components.
- When used in conjunction with other seals, Laminar Seals provide a primary seal against severe contamination, before the contaminants come in contact with the secondary seal.
- Sets of multiple rings provide an efficient labyrinth seal.
- Rings may be produced from a wide variety of alloys to withstand more severe conditions including higher temperatures and corrosive environments.
- As a metallic mechanical seal they can outperform rubber seals in durability and life expectancy.
- The change from rubber to metal reduces the need for frequent seal replacement.

Laminar Seal Rings

Selection Guide

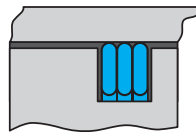
Standard Laminar Ring Sets Available

Single-Turn Laminar Seal Rings

Used in a variety of applications, this series of Seal Rings should be utilized for light to medium duty applications, dependent on the ring configuration specified. The sets are comprised of single-turn rings in either 3 rings per set or 5 rings per set.

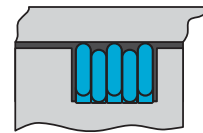
APPLICATIONS: 3 ring sets protect components from low dirt and low splash water contamination. 5 ring sets provide a better labyrinth seal to protect components from medium dirt and medium splash water contamination.

N.B. Laminar sealing ring sets should ideally be packed with grease to optimise performance.



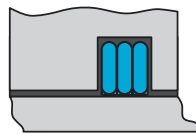
WYH Series WQH Series

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



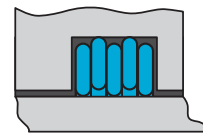
WYHC Series WQHC Series

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



WYS Series WQS Series

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



WYSC Series WQSC Series

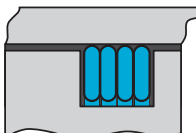
External - Medium Duty
1 set = 5 individual rings
(3 rings rotate with shaft & 2 rings rotate with bore)

Double-Turn Laminar Seal Rings

The sets are comprised of double-turn rings in either 2 rings per set or 3 rings per set. The double-turn rings fit tighter in the bore or on the shaft, provide complete 360° surface contact and resist higher axial/radial forces than single-turn ring sets, for medium to heavy duty applications.

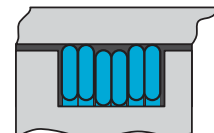
APPLICATIONS: 2 ring sets protect components from medium dirt and medium splash water contamination. 3 ring sets provide a better labyrinth seal to protect components from heavy dirt and heavy splash water contamination.

N.B. Laminar sealing ring sets should ideally be packed with grease to optimise performance.



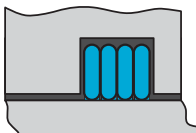
WYHD Series WQHD Series

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



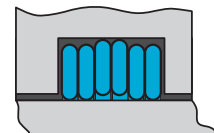
WYHCD Series WQHCD Series

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



WYSD Series WQSD Series

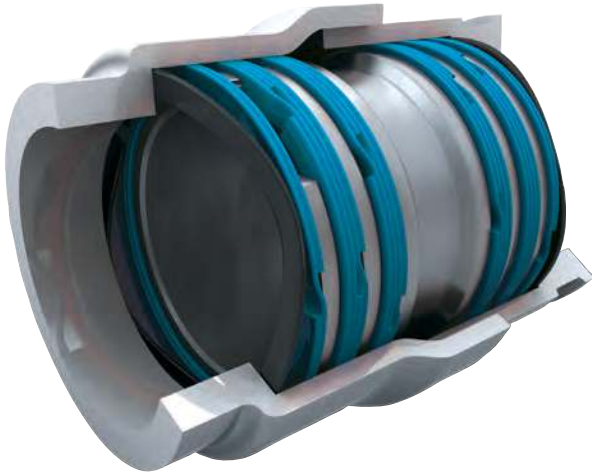
External - Medium/Heavy Duty
1 set = 2 individual rings
(rings rotate with shaft only)



WYSCD Series WQSCD Series

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

Laminar Seal Rings



A. Coupling



B. Bearing Protection



C. Pulley Idler



D. High Speed Spindle

A. Coupling

The seal arrangement in this assembly has been custom designed for optimum protection against contamination. Gases build up pressure in a center cavity, protected on both ends from contaminants entering.

C. Pulley Idler

The ring set designed in this application extends the life of the ball bearing by keeping contaminants from penetrating the precision bearing surfaces even though the bearing itself is sealed. When the shaft rotates only the groove ring rotates while the housing rings remain stationary.

B. Bearing Protection

The 3 ring set protects the ball bearing from contaminants like dirt and water. The seal retains grease/lubricant and prevents contaminants from penetrating into the critical components of the assembly.

D. High Speed Spindle

The WQS series has been designed into the spindle assembly to protect the tandem bearings against corrosive elements. Though it is not the primary seal in the assembly, it is designed as the final seal protecting the bearings. All rings in the set will cling to the shaft due to the high rotational speed of the main spindle.

Laminar Seal Rings (Metric)

Single-Turn Rings

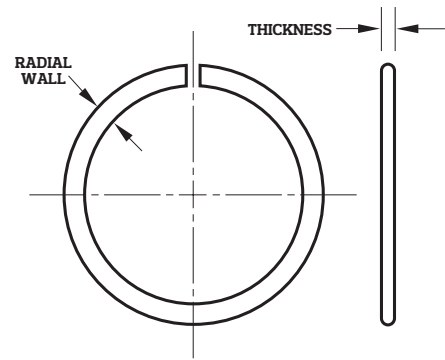
Single-Turn Laminar Sealing Rings WQH or WQS are used for a wide variety of applications.

They are commonly used to protect bearing systems by retaining grease/lubricant and preventing water or other contaminating liquids from penetrating into the critical areas of an assembly. The alternating (staggered) series WQHC and WQSC offer (due to an increased labyrinth seal) further improved sealing efficiency. They are 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.

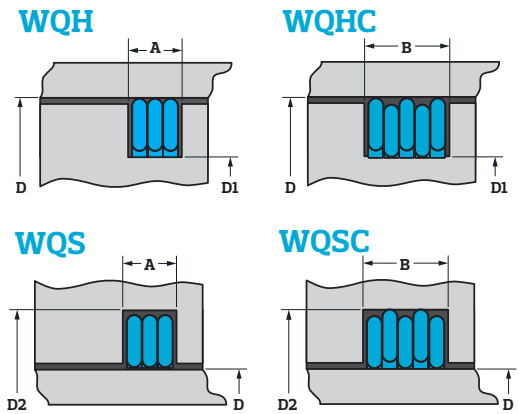
The metric Single-Turn Laminar Rings listed in the table below are readily available. Specials can be manufactured with No-Tooling-Charges™.

Standard materials available:

- Carbon steel
- 302 stainless steel



Metric (mm)	Bore Shaft		Groove ² Width		Ring Dimensions		Groove Diameter	Groove Diameter
	D		A	B	RW	T	D2	D1
	15 - 24,9		2,2	3,6	1,0	0,65	(D) +2,6	(D) -2,6
	25 - 29,9		2,2	3,6	1,2	0,65	+3,0	-3,0
	30 - 35,9		2,2	3,6	1,5	0,65	+3,6	-3,6
	36 - 42,9		2,2	3,6	1,8	0,65	+4,2	-4,2
	43 - 48,9		2,4	4,0	2,2	0,72	+5,0	-5,0
	49 - 51,9		2,4	4,0	2,4	0,72	+5,4	-5,4
	52 - 59,9		2,4	4,0	2,6	0,72	+5,8	-5,8
	60 - 69,9		2,7	4,5	2,8	0,82	+6,2	-6,2
	70 - 74,9		2,7	4,5	3,1	0,82	+6,8	-6,8
	75 - 79,9		2,7	4,5	3,3	0,82	+7,2	-7,2
	80 - 89,9		2,7	4,5	3,5	0,82	+7,6	-7,6
	90 - 99,9		2,7	4,5	3,8	0,82	+8,2	-8,2
	100 - 104,9		2,7	4,5	4,1	0,82	+8,8	-8,8
	105 - 109,9		3,3	5,5	4,3	0,98	+9,2	-9,2
	110 - 119,9		3,3	5,5	4,6	0,98	+9,8	-9,8
	120 - 129,9		3,3	5,5	5,0	0,98	+10,8	-10,8
	130 - 149,9		3,3	5,5	5,5	0,98	+11,8	-11,8
	150 - 170,9		3,4	5,6	6,0	1,00	+13,0	-13,0
	150 ¹ - 170,9		5,1	8,2	6,0	1,50	+13,0	-13,0
	171 - 199,9		3,4	5,6	7,0	1,00	+15,0	-15,0
	171 ¹ - 199,9		5,1	8,2	7,0	1,50	+15,0	-15,0
	200 - 259,9		4,1	6,6	8,0	1,20	+18,0	-18,0
	200 ¹ - 259,9		5,1	8,2	8,0	1,50	+18,0	-18,0
	260 - 319,9		5,1	8,2	9,0	1,50	+20,0	-20,0
	320 - 399,9		5,2	8,3	10,0	1,50	+22,0	-22,0
	400 - 439,9		5,2	8,3	11,0	1,50	+24,0	-24,0
	440 - 600,9		5,2	8,3	12,0	1,50	+26,0	-26,0
	440 ¹ - 600,0		8,3	13,5	12,0	2,50	+26,0	-26,0
	601 - 699,9		8,3	13,5	14,0	2,50	+32,0	-32,0
	700 - 799,9		8,3	13,5	16,0	2,50	+36,0	-36,0
	800 - 899,9		8,3	13,5	18,0	2,50	+40,0	-40,0
	900 - 999,9		8,3	13,5	20,0	2,50	+44,0	-44,0
	1000 - 1300,0		8,4	13,6	22,0	2,50	+48,0	-48,0



Tolerances (mm)				
D	15 - 104,9	105 - 149,9	150 - 439,9	440 - 1300
A-B	+0,10 -0,00	+0,15 -0,00	+0,20 -0,00	+0,25 -0,00
RW	+0,10 -0,10	+0,10 -0,20	+0,15 -0,30	+0,20 -0,40
T	+0,04 -0,02	+0,05 -0,03	+0,06 -0,04	+0,07 -0,05
D2	+0,20 -0,00	+0,25 -0,00	+0,30 -0,00	+0,40 -0,00
D1	+0,00 -0,20	+0,00 -0,25	+0,00 -0,30	+0,00 -0,40



¹ Increased cross-section. ² If axial movement occurs during operation, an increase to Groove Width may be necessary to avoid friction between Rings and Groove.

Laminar Seal Rings (Metric)

Double-Turn Rings

Double-Turn Laminar Sealing Rings offer a higher clamping force when installed in the bore or on the shaft.

They are suited for higher operating speeds, have 360° contact (no axial gap) 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.

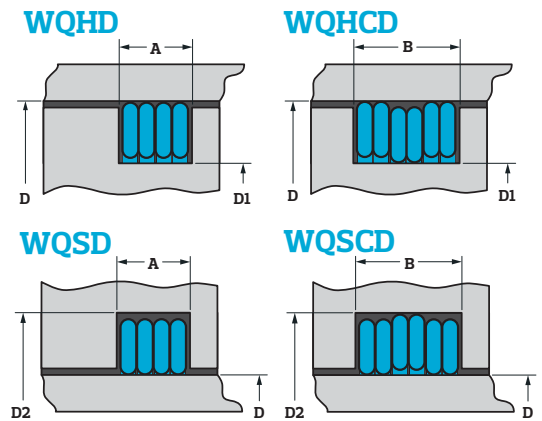
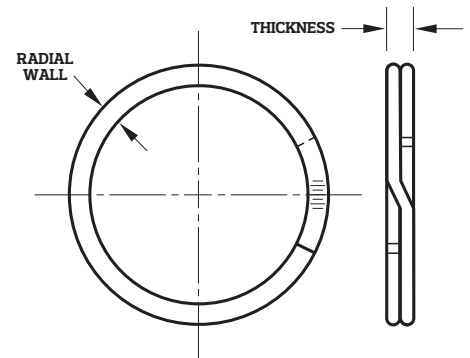
Double-Turn Laminar Ring Sets are also used to protect contacting radial seals, rubber seals, O-rings and other oil seals. For protection in the most severe environments the alternating (staggered) sets WQHCD and WQSCD are the preferred choice by engineers. They provide sealing with 360° contact in both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

The metric Double-Turn Laminar Rings listed in the table below are readily available. Specials can be manufactured with No-Tooling-Charges™.

Standard materials available:

- Carbon steel
- 302 stainless steel

Metric (mm)	Bore Shaft		Groove ² Width		Ring Dimensions		Groove Diameter	Groove Diameter
	D		A	B	RW	T	D2	D1
	15 - 24,9		2,9	4,3	1,0	1,30	(D) +2,6	(D) -2,6
	25 - 29,9		2,9	4,3	1,2	1,30	+3,0	-3,0
	30 - 35,9		2,9	4,3	1,5	1,30	+3,6	-3,6
	36 - 42,9		2,9	4,3	1,8	1,30	+4,2	-4,2
	43 - 48,9		3,2	4,8	2,2	1,45	+5,0	-5,0
	49 - 51,9		3,2	4,8	2,4	1,45	+5,4	-5,4
	52 - 59,9		3,2	4,8	2,6	1,45	+5,8	-5,8
	60 - 69,9		3,6	5,4	2,8	1,65	+6,2	-6,2
	70 - 74,9		3,6	5,4	3,1	1,65	+6,8	-6,8
	75 - 79,9		3,6	5,4	3,3	1,65	+7,2	-7,2
	80 - 89,9		3,6	5,4	3,5	1,65	+7,6	-7,6
	90 - 99,9		3,6	5,4	3,8	1,65	+8,2	-8,2
	100 - 104,9		3,6	5,4	4,1	1,65	+8,8	-8,8
	105 - 109,9		4,3	6,4	4,3	1,96	+9,2	-9,2
	110 - 119,9		4,3	6,4	4,6	1,96	+9,8	-9,8
	120 - 129,9		4,3	6,4	5,0	1,96	+10,8	-10,8
	130 - 149,9		4,3	6,4	5,5	1,96	+11,8	-11,8
	150 - 170,9		4,4	6,5	6,0	2,00	+13,0	-13,0
	150 ¹ - 170,9		6,5	9,6	6,0	3,00	+13,0	-13,0
	171 - 199,9		4,4	6,5	7,0	2,00	+15,0	-15,0
	171 ¹ - 199,9		6,5	9,6	7,0	3,00	+15,0	-15,0
	200 - 259,9		5,3	7,8	8,0	2,40	+18,0	-18,0
	200 ¹ - 259,9		6,5	9,6	8,0	3,00	+18,0	-18,0
	260 - 319,9		6,5	9,6	9,0	3,00	+20,0	-20,0
	320 - 399,9		6,6	9,8	10,0	3,00	+22,0	-22,0
	400 - 439,9		6,6	9,8	11,0	3,00	+24,0	-24,0
	440 - 600,9		6,6	9,8	12,0	3,00	+26,0	-26,0
	440 ¹ - 600,9		10,6	15,9	12,0	5,00	+26,0	-26,0
	601 - 699,9		10,8	16,2	14,0	5,00	+32,0	-32,0
	700 - 799,9		10,8	16,2	16,0	5,00	+36,0	-36,0
	800 - 899,9		11,0	16,5	18,0	5,00	+40,0	-40,0
	900 - 999,9		11,0	16,5	20,0	5,00	+44,0	-44,0
	1000 - 1300,0		11,0	16,5	22,0	5,00	+48,0	-48,0



Tolerances (mm)				
D	15 - 104,9	105 - 149,9	150 - 439,9	440 - 1300
A-B	+0,10 -0,00	+0,15 -0,00	+0,20 -0,00	+0,25 -0,00
RW	+0,10 -0,10	+0,10 -0,20	+0,15 -0,30	+0,20 -0,40
T	+0,08 -0,04	+0,10 -0,06	+0,12 -0,08	+0,14 -0,10
D2	+0,20 -0,00	+0,25 -0,00	+0,30 -0,00	+0,40 -0,00
D1	+0,00 -0,20	+0,00 -0,25	+0,00 -0,30	+0,00 -0,40



¹ Increased cross-section. ² If axial movement occurs during operation, an increase to Groove Width may be necessary to avoid friction between Rings and Groove.

Laminar Seal Rings (Imperial)

Single-Turn Rings

Single-Turn Laminar Sealing Rings WYH or WYS are used for a wide variety of applications.

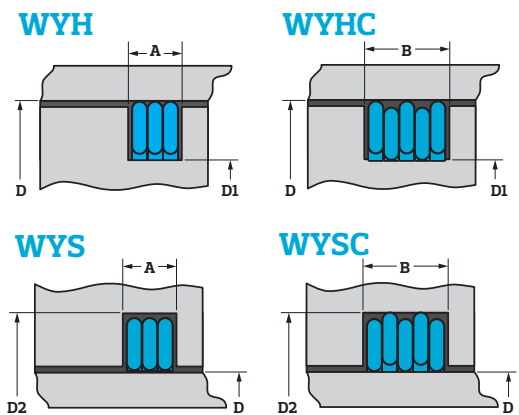
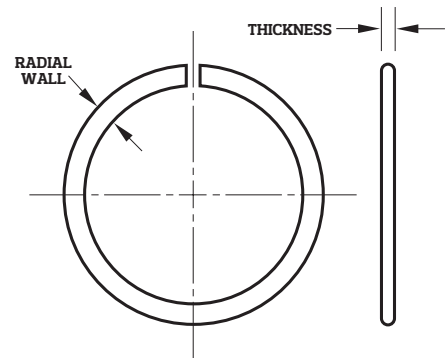
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The imperial Single-Turn Laminar Rings listed in the table below are readily available. Specials can be manufactured with No-Tooling-Charges™.

Standard materials available:

- Carbon steel
- 302 stainless steel

	Bore Shaft	Groove ² Width		Ring Dimensions		Groove Diameter	Groove Diameter
	D	A	B	RW	T	D2	D1
Imperial (in.)	0,625 - 1,249	0,072	0,119	0,055	0,021	(D) +0,134	(D) -0,134
	1,250 - 1,499	0,072	0,119	0,065	0,021	+0,154	-0,154
	1,500 - 1,749	0,084	0,139	0,078	0,025	+0,180	-0,180
	1,750 - 2,249	0,102	0,170	0,095	0,031	+0,214	-0,214
	2,250 - 2,749	0,102	0,170	0,113	0,031	+0,250	-0,250
	2,750 - 2,999	0,102	0,170	0,123	0,031	+0,270	-0,270
	3,000 - 3,249	0,102	0,170	0,128	0,031	+0,280	-0,280
	3,250 - 3,499	0,102	0,170	0,138	0,031	+0,300	-0,300
	3,500 - 3,999	0,102	0,170	0,158	0,031	+0,340	-0,340
	4,000 - 4,499	0,102	0,170	0,168	0,031	+0,360	-0,360
	4,500 - 4,999	0,131	0,215	0,188	0,039	+0,408	-0,408
	5,000 - 5,499	0,131	0,215	0,200	0,039	+0,432	-0,432
	5,500 - 6,249	0,158	0,254	0,225	0,046	+0,490	-0,490
	6,250 - 7,749	0,187	0,301	0,250	0,055	+0,540	-0,540
	7,750 - 9,999	0,187	0,301	0,312	0,055	+0,702	-0,702
	10,000 - 12,499	0,217	0,346	0,350	0,063	+0,778	-0,778
12,500 - 14,999	0,217	0,346	0,375	0,063	+0,828	-0,828	
15,000 - 19,999	0,307	0,496	0,437	0,093	+0,952	-0,952	
20,000 - 24,999	0,310	0,504	0,500	0,093	+1,158	-1,158	
25,000 - 29,999	0,310	0,504	0,567	0,093	+1,292	-1,292	
30,000 - 50,000	0,310	0,504	0,750	0,093	+1,658	-1,658	



Tolerances (in)				
D	0,625 - 4,499	4,500 - 9,999	10,000 - 14,999	15,000 - 50,000
A-B	+0,004 -0,000	+0,008 -0,000	+0,010 -0,000	+0,010 -0,000
RW	+0,004 -0,004	+0,006 -0,006	+0,007 -0,007	+0,015 -0,010
T	+0,002 -0,002	+0,003 -0,003	+0,004 -0,004	+0,005 -0,005
D2	+0,008 -0,000	+0,012 -0,000	+0,012 -0,000	+0,016 -0,000
D1	+0,000 -0,008	+0,000 -0,012	+0,000 -0,012	+0,000 -0,016

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Laminar Seal Rings (Imperial)

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Double-Turn Laminar Sealing Rings offer a higher clamping force when installed in the bore or on the shaft.

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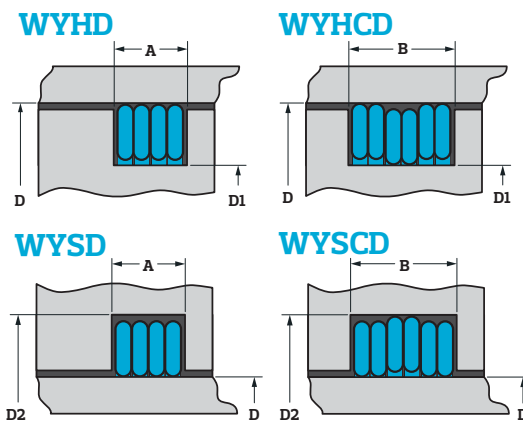
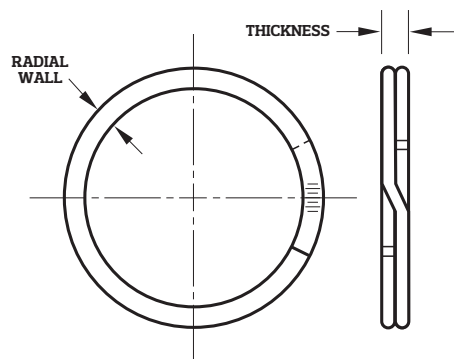
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	1,250 - 1,499		0,098	0,145	0,065	0,043	+0,154	-0,154
	1,500 - 1,749		0,112	0,166	0,078	0,050	+0,180	-0,180
	1,750 - 2,249		0,136	0,204	0,095	0,062	+0,214	-0,214
	2,250 - 2,749		0,136	0,204	0,113	0,062	+0,250	-0,250
	2,750 - 2,999		0,136	0,204	0,123	0,062	+0,270	-0,270
	3,000 - 3,249		0,136	0,204	0,128	0,062	+0,280	-0,280
	3,250 - 3,499		0,136	0,204	0,138	0,062	+0,300	-0,300
	3,500 - 3,999		0,136	0,204	0,158	0,062	+0,340	-0,340
	4,000 - 4,499		0,136	0,206	0,168	0,062	+0,360	-0,360
	4,500 - 4,999		0,172	0,254	0,188	0,078	+0,408	-0,408
	5,000 - 5,499		0,172	0,254	0,200	0,078	+0,432	-0,432
	5,500 - 6,249		0,202	0,299	0,225	0,093	+0,490	-0,490
	6,250 - 7,749		0,238	0,353	0,250	0,111	+0,540	-0,540
	7,750 - 9,999		0,242	0,357	0,312	0,111	+0,702	-0,702
	10,000 - 12,499		0,274	0,405	0,350	0,127	+0,778	-0,778
	12,500 - 14,999		0,278	0,412	0,375	0,127	+0,828	-0,828
	15,000 - 19,999		0,398	0,592	0,437	0,187	+0,952	-0,952
20,000 - 24,999		0,398	0,596	0,500	0,187	+1,158	-1,158	
25,000 - 29,999		0,405	0,608	0,567	0,187	+1,292	-1,292	
30,000 - 50,000		0,413	0,620	0,750	0,187	+1,658	-1,658	



Tolerances (in)				
D	0,625 - 4,499	4,500 - 9,999	10,000 - 14,999	15,000 - 50,000
A-B	+0,004 -0,000	+0,008 -0,000	+0,010 -0,000	+0,010 -0,000
RW	+0,004 -0,004	+0,006 -0,006	+0,007 -0,007	+0,015 -0,010
T	+0,002 -0,002	+0,003 -0,003	+0,004 -0,004	+0,005 -0,005
D2	+0,008 -0,000	+0,012 -0,000	+0,012 -0,000	+0,016 -0,000
D1	+0,000 -0,008	+0,000 -0,012	+0,000 -0,012	+0,000 -0,016

¹ Increased cross-section. ² If axial movement occurs during operation, an increase to Groove Width may be necessary to avoid friction between Rings and Groove.

