laminar sealing rings

design

bespoke

stock

technical

experience

bearings

automotive

aerospace

petrochem

pumps

railways

steel

paper

www.tfc.eu.com

LAMINAR SEALING RINGS

NEED A SAMPLE

Call our sales team to discuss your requirements

t +44 (0)1435 866011
e Sales@tfc.eu.com

CAN'T FIND A PART

Contact our specialist team for assistance

t +44 (0)1435 866011
e Design@tfc.eu.com

NEED A SPECIAL

Our engineers are available to discuss your application

t +44 (0)1435 866011
e Design@tfc.eu.com

THE PERFECT ANSWER TO ALL YOUR DESIGN PROBLEMS

With over 30 years of experience, TFC is the leading European supplier of Smalley Retaining Rings, Laminar Sealing Rings and Flat Wire Wave Springs, and we have the capability to solve most retention, sealing and pre-load problems, no matter how unusual the application, dimensions or materials.

This catalogue contains details of our extensive standard Laminar ranges, most of which are available for immediate delivery. However the unique 'No-Tooling' method of production enables us to easily provide special designs. Our qualified internal and external sales teams are available to assist in all aspects of design from prototypes through to final production.

TFC is ISO 9001:2000 approved incorporating design status and operates from purpose built headquarters in Sussex, UK and from regional offices in Germany.

Visit **www.tfc.eu.com** to find more information on our Smalley products including application stories and design data.

LAMINAR SEALING RINGS

For over 35 years Smalley has been manufacturing sealing rings designed to protect components in assemblies from outside conditions. The flexibility SMALLEY has in manufacturing (NO–TOOLING-COST-PROCESS) allows virtually any size ring to be designed into an application, at a reasonable cost.

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.

Smalley Laminar Sealing Rings are often an alternative means of sealing components in assemblies from contamination. Smalley offers several sealing ring configurations to accomplish this. Since they are produced from metal (not rubber, neoprene or other non-metallic material), they can often withstand higher temperatures, more corrosive environments and other extreme conditions than common O-rings or conventional rubber seals. This is a primary reason design engineers must specify Smalley Laminar Sealing Rings.

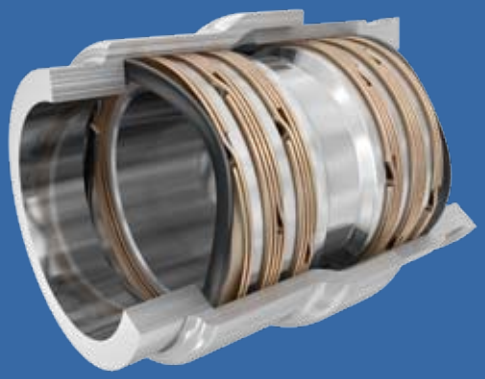


TABLE OF CONTENTS

OUR PRODUCTS

Manufacturing process 4
Material Guide 4
Advantages 5

APPLICATIONS

Application examples 5-7

SELECTION TABLES

METRIC

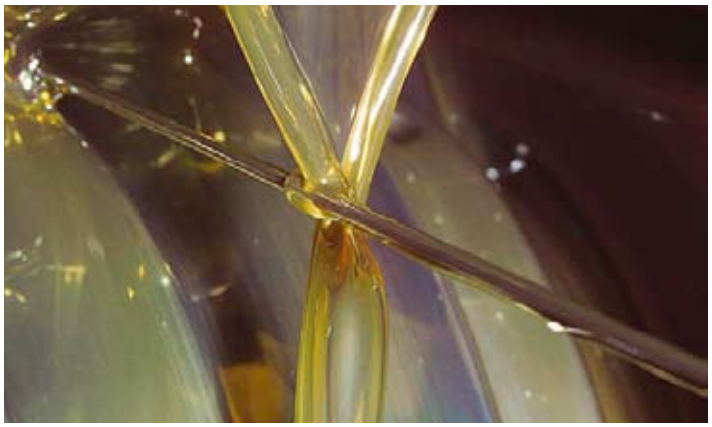
Single turn rings	WQH & WQHC and WQS & WQSC series	8
Double turn rings	WQHD & WQHCD and WQSD & WQSCD series	9

IMPERIAL

Single turn rings	WYH & WYHC and WYS & WYSC series	10
Double turn rings	WYHD & WYHCD and WYSD & WYSCD series	11

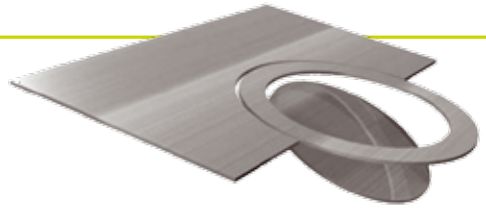
EDGE-WINDING

Our Smalley Laminar Sealing Rings are manufactured using Edge-Winding, also known as “The No-Tooling-Cost-Process”. This precision forming operation coils pre-tempered flat wire on edge to create a near-perfect circle. Circular-Grain® metallurgy gives our products strength and stability far superior to that of conventional retaining rings and wave washers which are simply stamped through the metal grain. Edge-wound products can be coiled to your exact specification in any diameter between 5mm-2300mm, and with any number of turns (layers or coils), effectively eliminating material waste.



The factory is vertically integrated with onsite material manufacturing and large warehouse. We are able to produce custom rings or springs using a wide variety of readily available materials or can produce custom raw material sizes to meet delivery requirements. Available materials include; Carbon Spring Steel, 302, 316 and 17/7PH Stainless Steels, plus exotic alloys such as Inconel, Elgiloy, A286, Phosphor Bronze and Beryllium copper. Please see our Material Selection Guide.

Whether you are looking for prototypes, short runs or high volumes, the unique No-Tooling- Cost™ manufacturing process allows our products to be manufactured in a timely fashion. Our substantial stocked range is available for immediate shipment and specials can be designed and produced in days, not weeks. For customers who use just-in-time inventory control, TFC will offer to stock parts for immediate shipment, ready for the next purchase order or blanket order release.



Conventional stamping process

Edge-winding process

As flexible as it is precise, our edge-winding process accommodates your design changes without the need for additional tooling and die modifications. This facilitates your developmental work, allowing us to produce your low quantity custom orders and your working prototypes quickly and economically. Even after your initial prototype is produced, or in mid-stream production, our edge-winding process allows us to alter your design or dimensions with simple machine adjustments or a change in raw material size. After the revised specifications are approved, we complete and document the final setup. Then, we quickly resume production of your order, whether it consists of one part or one million.

MATERIAL SELECTION GUIDE

Standard	*Maximum Recommended Operating Temperature	
	°F	°C
Carbon Steel (SAE 1070-1090)	250	120
302 Stainless Steel	400	200
Optional Materials	***Maximum Recommended Operating Temperature**	
	°F	°C
17-7 PH/C	650	340
A286 Alloy	1000	540
316 Stainless	400	200
Inconel X-750	700-1300	370-700
Elgiloy	800	420
Coppers	400	200
Bronze	200	90
Others	–	–

*Exceeding these temperatures will cause relaxation

STANDARD SERIES

There are 16 series of STANDARD Imperial and Metric Laminar Seal Ring (see pages 6-9) configurations to select from. Eight of these series are sets consisting of single turn rings. The other 8 series are sets consisting of double turn rings. Within each series are optional 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 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 shaft.

Standard material: Carbon spring steel and stainless steel.

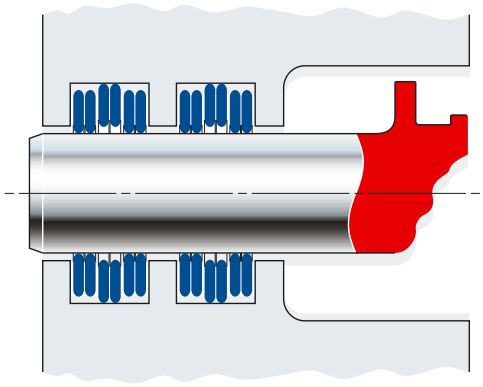
ADVANTAGES OF LAMINAR SEALING RINGS

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.

Laminar Configuration: WYSCD Series
(2 double-turn rings cling on the shaft and 1 double turn ring clings in the groove).

Application: Mining Tractor Drive Shaft
This assembly is subject to high dirt, mud and splash water. It is exposed to periodic high temperatures and requires the use of a Nickel Alloy Stainless Steel, suitable for extreme conditions. As an added safety feature, the assembly was designed with two sets of staggered/heavy duty Laminar Rings in separate grooves on the same shaft.

Environment:
High contamination; 600°C maximum operating temperature; low speeds.

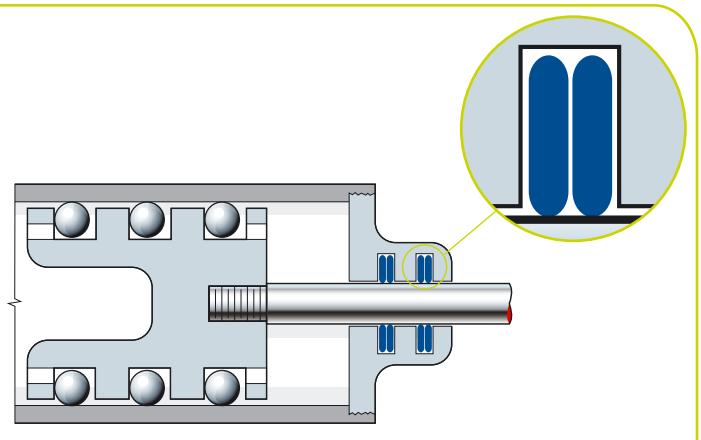


Mining Tractor Drive Shaft

Laminar Configuration: WQSD Series, modified
(2 double-turn rings cling on the shaft in separate grooves).

Application: Piston Shaft Seal
Two grooves per shaft provide a highly effective guard against contamination in the piston cavity. The space between the two grooves provides a labyrinth effect for better resistance to contamination, similar to the C series of Laminar Rings sets. For longevity, the Laminar Rings were specified to replace a conventional O-Ring seal.

Environment:
High contamination; 4°C to 50°C operating temperature; continuous axial movement.



Piston Shaft Seal

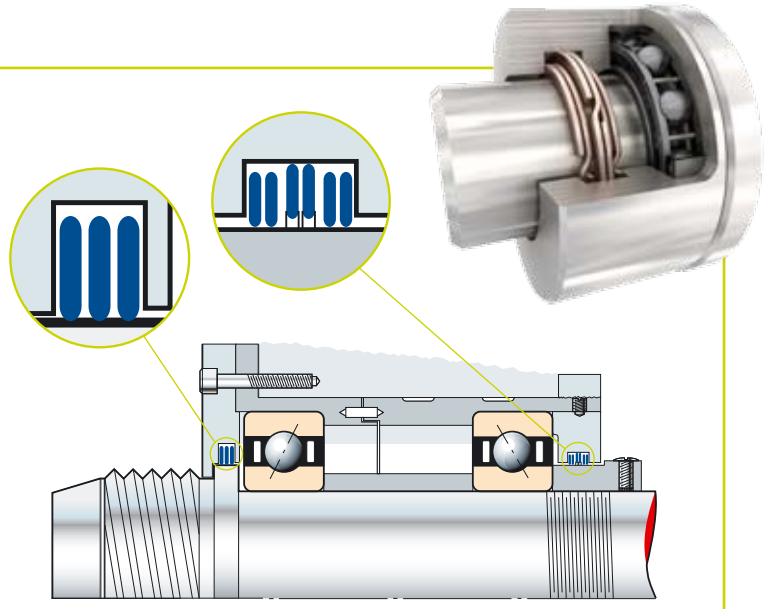
APPLICATIONS

Laminar Configuration: WYS Series
(3 single-turn rings cling on the shaft)

Laminar Configuration: WYSCD Series
(2 double-turn rings cling on the shaft & 1 double turn ring clings in the bore)

Application: Compressor Drive Shaft
Due to high thrust loads on the bearing assembly, the bearings must be well sealed. Two (2) sets of Laminar Rings, on opposite sides of the unit were designed into the compressor to achieve this efficient seal system. The ring sets have been specified to reduce the incidence of replacing the bearings, a very costly procedure. Note that the side of the assembly utilising the WYSCD Series is subject to much higher splash water and dirt contamination than the opposite side having the WYS ring set.

Environment:
Heavy splash water and dirt, 10°C to 200°C operating temperature; 300 RPM maximum.

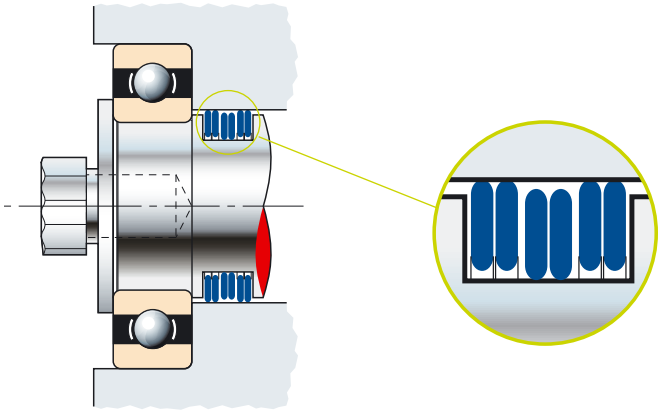


Compressor Drive Shaft

Laminar Configuration: WYHCD Series
(2 double turn rings cling in the housing and 1 double turn ring clings to the shaft).

Application: 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 is sealed itself. When the shaft rotates only the groove ring rotates while the housing rings remain stationary.

Environment:
High contamination; 240°C maximum operating temperature; 1250 RPM maximum.

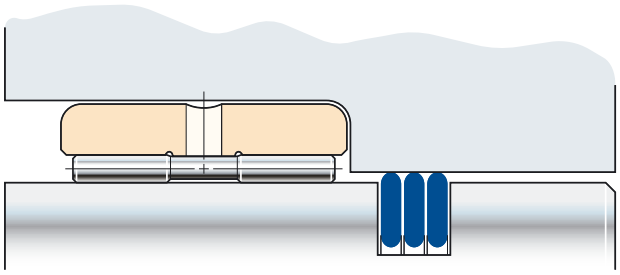


Pulley Idler

Laminar Configuration: WQH Series
(3 single-turn rings cling in the housing)

Application: Gear Box Needle Bearing
Ring set is used as a seal against debris in this highly lubricated needle roller bearing. The seal is packed with grease and remains stationary as the shaft rotates.

Environment:
Low/medium contamination, low/medium rotation; low/medium operating temperature.

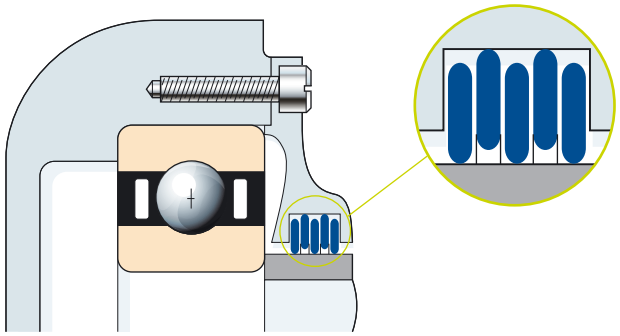


Gear Box Needle Bearing

Laminar Configuration: WYSC Series
(3 single turn rings cling on the shaft & 2 single turn rings cling in the housing)

Application: Special Brake Caliper
The ring set is used in conjunction with a clamping device and collar for retention of the bearing. The Laminar Ring set is used as a replacement for a felt seal which could not be used due to high temperature restrictions.

Environment:
Medium splash water and mud, -10°C to 135°C operating temperature; 250 RPM maximum.

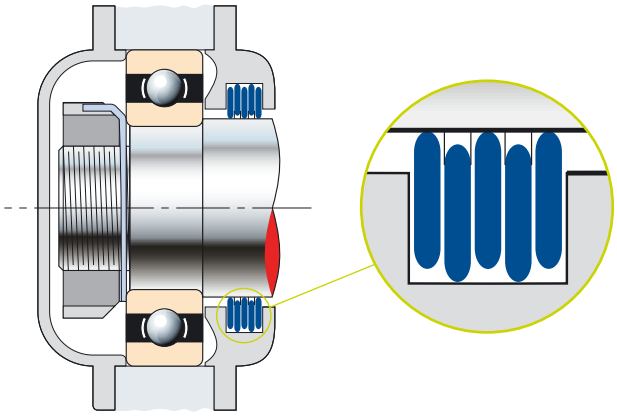


Special Brake Caliper

Laminar Configuration: WQSC Series
(3 single turn rings cling on the shaft & 2 single turn rings cling in the bore)

Application: Conveyor System Idle Roller
Used to protect the bearing against water and dirty oil, the labyrinth configuration of the rings are packed with grease to form an excellent seal. The shaft rings rotate with the shaft during operation while the housing rings remain stationary.

Environment:
Medium corrosion, 120°C maximum operating temperature;
200 RPM maximum.

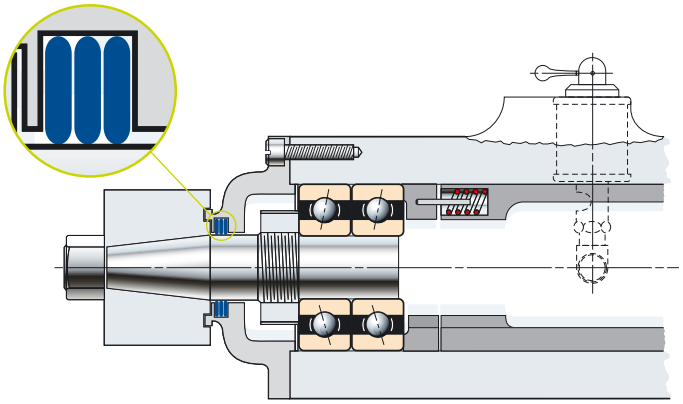


Conveyor System Idle Roller

Laminar Configuration: WYS Series
(3 single turn rings cling to the shaft)

Application: High Speed Spindle
The WYS Series has been designed into the spindle assembly to protect the tandem bearings against the corrosive elements. Though it is not the primary seal in the assembly, it is designed as the final seal against contamination to protect the angular contact bearings. All rings in the set will cling to the shaft during high rotation of the main spindle.

Environment:
Low/medium contamination, 20°C to 120°C operating temperature;
2000 RPM maximum.

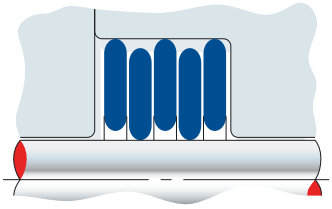


High Speed Spindle

THE ADVANCED METALLIC SEAL FOR CORROSIVE / HIGH TEMPERATURE APPLICATIONS

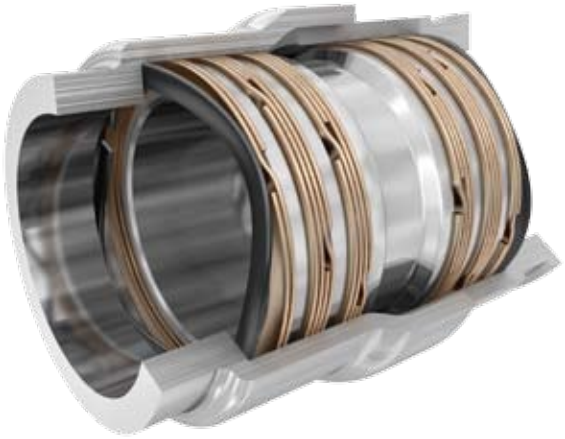
Laminar Sealing Rings for clutches and brakes, compressors, pneumatics and hydraulics, shock absorbers etc…

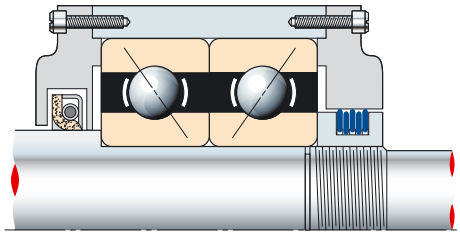
Single wound Laminar Rings as grease- seals for plain and roller bearings.

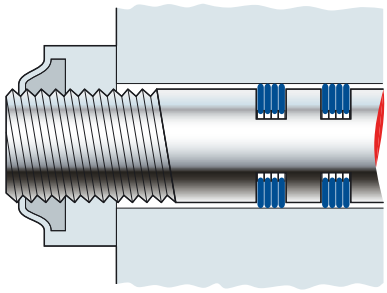


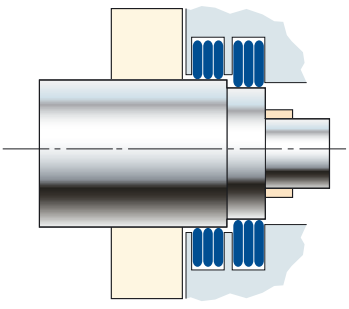
Double wound Laminar Rings for compensators in exhaust pipe systems of combustion engines, turbines, continuous casting equipment etc…

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

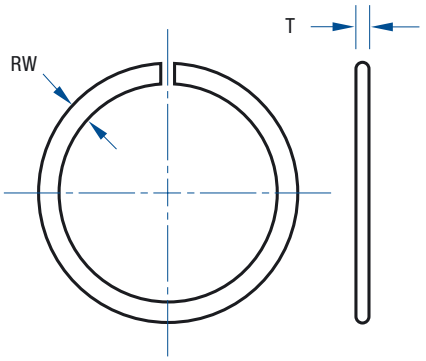








Advanced Metallic Seal



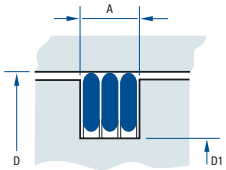
Laminar Sealing Rings WQH / WQS & WQHC / WQSC

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.

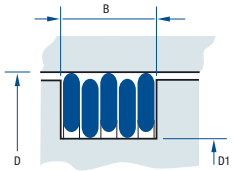
WQH Series

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



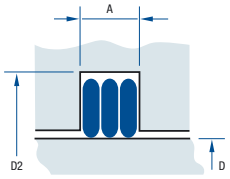
WQHC Series

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



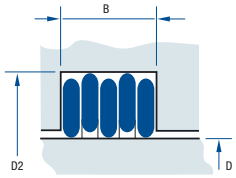
WQS Series

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)



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	[2] Groove Width A	B	Ring Dimensions RW	T	Groove ø D2	Groove ø D1
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	[1] 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	[1] 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	[1] 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	[1] 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

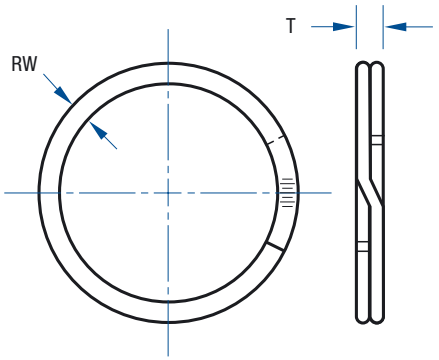
All dimensions in mm

Tolerances (mm)

[3] 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

[3] Diameter increases by increments of:
0.5mm for diameters 15mm – 149.5mm
1.0mm for diameters 150mm – 1300mm

[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 Sealing Rings WQHD / WQSD & WQHCD / WQSCD

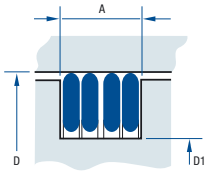
Double turn Laminar Rings offer higher clamping force when installed in the bore or on the shaft, are suited for higher operating speeds, have 360° (no axial gap) contact and should be used where application conditions are more severe. One typical application is where high amounts of dirt and dust are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

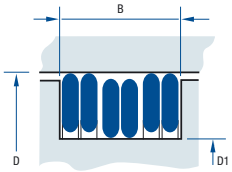
WQHD Series

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



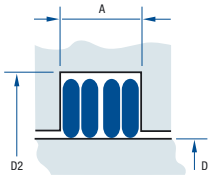
WQHCD Series

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



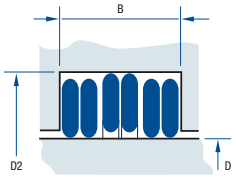
WQSD Series

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)



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	[2] Groove Width A	B	Ring Dimensions RW	T	Groove ø D2	Groove ø D1
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	[1]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	[1]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	[1]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	[1]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

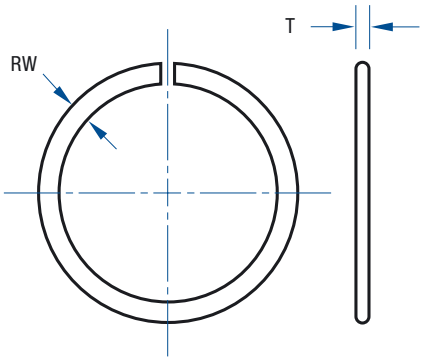
All dimensions in mm

[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

Tolerances (mm)

[3] 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	+0.08 -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

[3] Diameter increases by increments of:
0.5mm for diameters 15mm – 149.5mm
1.0mm for diameters 150mm – 1300mm



Laminar Sealing Rings WYH / WYS & WYHC / WYSC

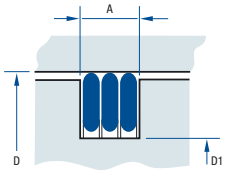
Similar in dimension to the Single-Turn Metric Series of Smalley Laminar Seal Rings, this series of Imperial Laminar Rings was designed using more common and readily available raw material (flat wire) sizes in a wider variety of alloys.

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.

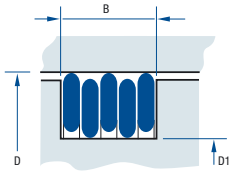
WYH Series

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



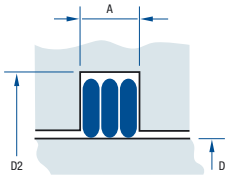
WYHC Series

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



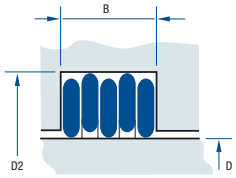
WYS Series

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)



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

[1] Bore Shaft D		[2] Groove Width A	B	Ring Dimensions RW	T	Groove ø D2	Groove ø D1
.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

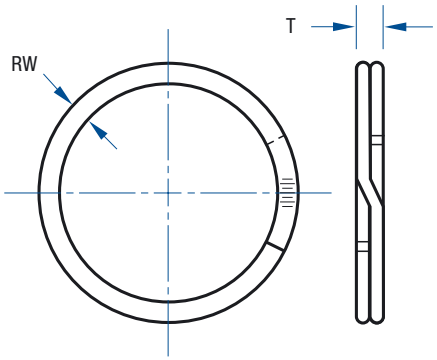
All dimensions in inches

[1] Standard raw materials are Carbon Steel and 302 Stainless Steel
[2] If axial movement occurs during operation, an increase to groove width may be necessary to avoid friction between rings and groove

Tolerances (inches)

[3] 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

[3] Diameter increases by increments of:
.062 for diameters .625 – 6.188
.125 for diameters 6.250 – 50.000



Laminar Sealing Rings WYHD / WYSD & WYHCD / WYSCD

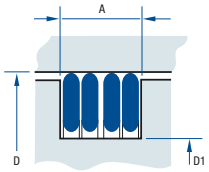
As with the Metric Single-Turn arrangements offered, the Double-Turn Imperial Series of Smalley Laminar Seal Rings are designed to compliment the Metric series using more common and readily available raw material (flat wire) sizes, in a wider variety of alloys. This makes deliveries faster for the standard 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.

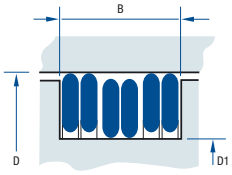
WYHD Series

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



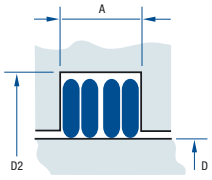
WYHCD Series

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



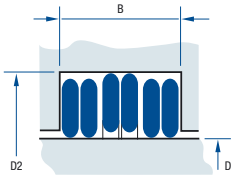
WYSD Series

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)



Tolerances (inches)				
[3] 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

[3] Diameter increases by increments of:
.062 for diameters .625 – 6.188
.125 for diameters 6.250 – 50.000

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

[1] Bore Shaft D		[2] Groove Width A	B	Ring Dimensions RW	T	Groove ø D2	Groove ø D1
.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

[1] Standard raw materials are Carbon Steel and 302 Stainless Steel
[2] 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

brings it together

TFC Ltd

Hale House • Ghyll Industrial Estate • Heathfield • East Sussex • TN21 8AW • UNITED KINGDOM
T: +44 (0)1435 866011 **F:** +44 (0)1435 866620 **E:** sales@tfc.eu.com

Niederlassung Bochum • Herner Strasse 299 • Eingang B • D-44809 Bochum • GERMANY
T: +49 (0)234 923610 **F:** +49 (0)234 9236161 **E:** tfc-bochum@tfc.eu.com

BSI REGISTERED
RS 10882

www.tfc.eu.com