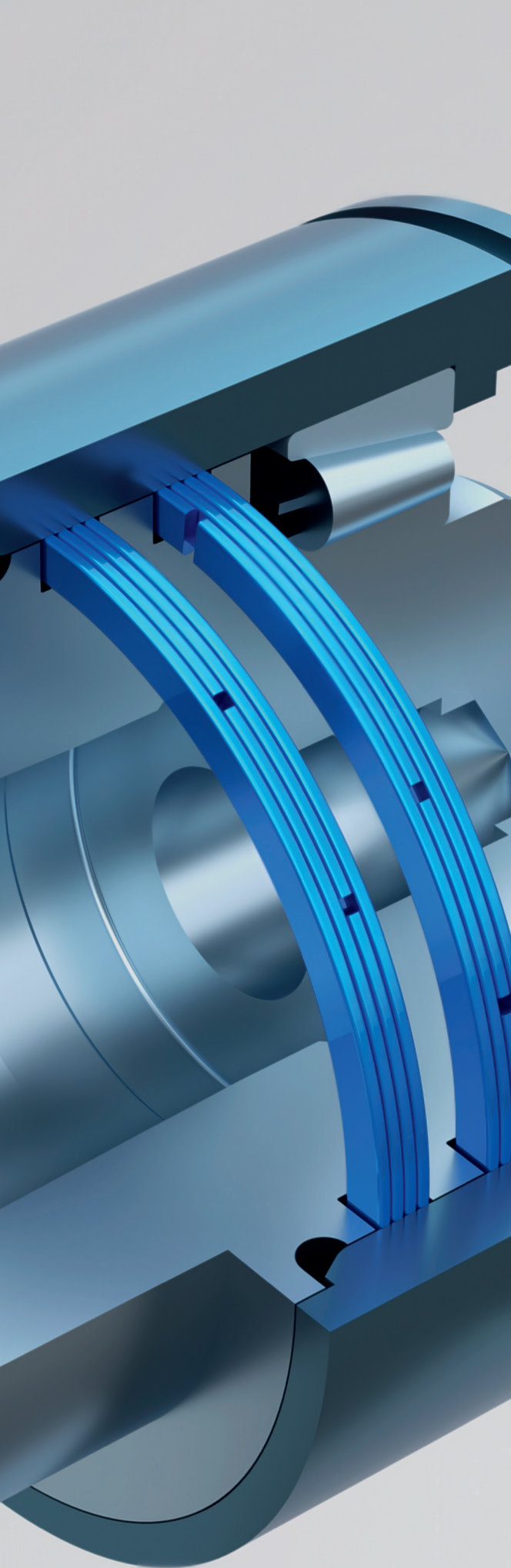


Sealing and retaining rings

General Catalogue A10



Fey Lamellenringe GmbH & Co. KG



Legal notice

This "A10" catalogue has been compiled with great care on the basis of the previous Fey laminar ring catalogues (A1 - A9) and all information has been checked for accuracy. However, no liability can be accepted for any incorrect or incomplete information.

Our General Terms and Conditions of Sale and Delivery, which can be accessed on our website, apply to deliveries, warranties and other services in commercial business transactions.

We are certified according to:

ISO 9001:2015

IATF 16949:2016

ISO 14001:2015

In view of the ongoing development of our products, we reserve the right to make changes.

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Printed in Germany, 08/2026

Over 75 years of experience.

Worldwide

Fey laminar rings as sealing elements for rotating and static sealing applications:

Fey laminar rings combine a low-contact multiple labyrinth with very small gap widths and are therefore particularly effective for grease sealing and exclusion of liquid media, dirt/dust and other contaminants. In addition to their excellent sealing properties for rotating components, the low-contact laminar rings are low friction and offer a significant reduction in intrinsic heat and wear, making them suitable as sealing elements for high-speed applications and applications in temperature- and/or friction-sensitive installation locations.

In static sealing applications, such as axial compensators in permanently bolted exhaust manifold systems in combustion engines, exhaust gas recirculation systems and engines with operating temperatures up to +700°C, Fey laminar rings are made of chrome-nickel materials that are resistant to high temperatures and therefore remain spring- and heat-resistant even at high temperatures in the sealing area.

Available as single wound (FK 3/FK 5) and double wound (FK 6/FK 5/FK 5-HFL) laminar rings:

Fey laminar rings are manufactured as single wound laminar rings (AS and IS) with a joint gap and as double wound laminar rings (ASD and ISD) without a joint gap. Use of the two different laminar ring geometries and the design of the installation technology depend on the operating conditions, the movement sequences of the components to be sealed and the customer's leakage requirements. Fey laminar rings are not only arranged as single-sided outside clamping or single-sided inside clamping ring sets, but can also be combined within a ring set in a groove: outside clamping rings with inside clamping rings and vice versa. The additional coverage of the groove base play in the bore of the housing or on the groove base of the shaft optimises the labyrinth effect and thus the sealing effect. It is important to note, however, that such combinations are not recommended for all sealing tasks. It is essential to prevent laminar ring sealing units and laminar retaining units from moving back

and forth in a kind of coupling effect by axial movements of the locating or guide groove caused by axial play or tilting movements of the bearings.

Depending on the frequency, friction could then occur between the groove and ring flanks, which would lead to premature wear of the laminar rings and the surrounding components.

Questionnaire (page 65):

Not all possible applications for laminar rings can be shown in this catalogue. We therefore advise you to complete the questionnaire, the answers to which will enable us to understand your sealing problems and make appropriate recommendations.

Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effect of the laminar sealing rings or locking effect of the laminar retaining rings can be achieved. In any case, we recommend contacting our technical office.

From tilling the soil to landing on Mars

Those who have followed the development of Fey laminar rings since 1946 will remember that laminar rings were first produced in Germany in a single wound version. The "FK2 AS" was utilised with previously used pistons in internal combustion engines to reestablish the sealing or the compression in oval and "worn out" cylinders. These laminar rings were made from spring band steel or flat wire, including stainless steel and high-temperature alloys.

A crucial prerequisite for the further development of Fey laminar ring seals was the design of a cost-effective manufacturing process so that the rings could be produced "out of round" in the loose state by thermal treatment, but then lie round in a housing bore as outside clamping rings or on a shaft as inside clamping rings in their working position with the best possible gap seal.

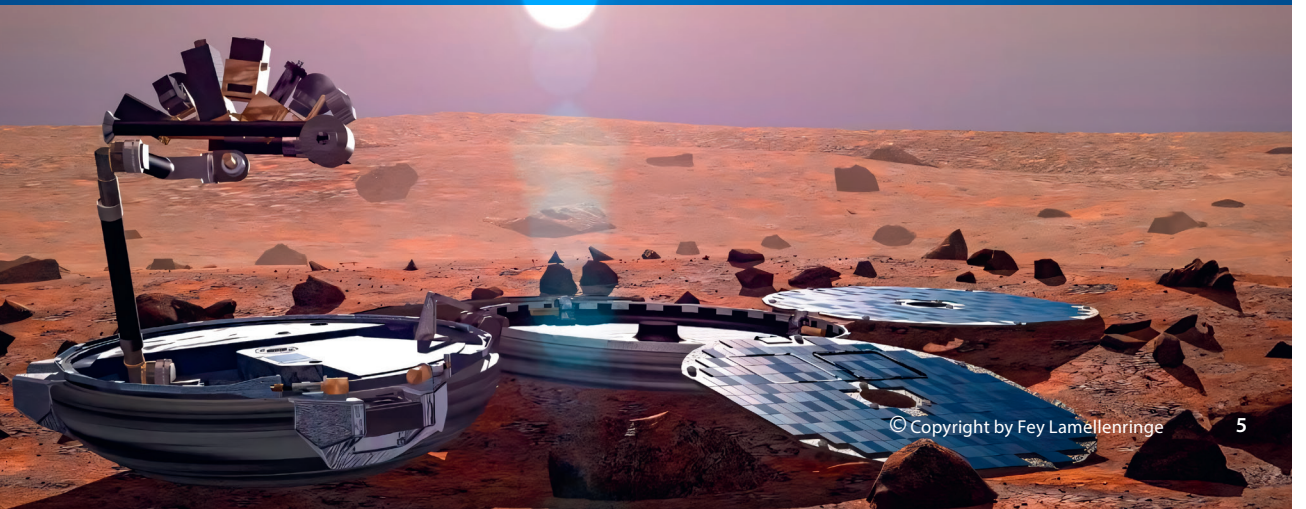
On this basis and with the positive sealing effects of its gap and labyrinth seals, Fey was able to tackle a wide range of sealing problems arising in industry. The steadily growing number of enquiries and ever higher requirements of industry in turn led to a sealing programme with a diameter range from 15 mm up to 1300 mm. Fey's production programme now comprises approx. 16,800 ring types with various ring diameters, ring cross-sections and ring materials.

Fey laminar rings are used successfully in the automotive industry, for example in exhaust pipes for combustion engines and turbochargers, the steel industry in continuous casting plants and rolling mills, and in the bearings industry. Transmission design, agricultural/construction machinery, commercial vehicles, rail transport, passenger transport and engine construction are also among the many sectors that rely on our products.



Do you have any questions? We will be happy to put our expertise at your disposal to assist you with your individual sealing requirements.





FK 2 laminar piston rings

For pistons in combustion engines, compressors, pneumatic and hydraulic units, shock absorbers, etc.

FK 4 laminar piston rings

For pistons in freeform/drop forging machines, control slides and presses.

FK 3 single laminar sealing rings

Single wound laminar rings for sealing grease-lubricated roller and plain bearings.

FK 5 single and/or double laminar sealing rings

Single and/or double lamellar sealing rings for sealing sliding parts on exhaust pipes in combustion engines, turbochargers and turbines. "FK 5" rings also for sealing bearing units in continuous casting systems.

FK 6 double laminar sealing rings

Double wound laminar rings for sealing grease-lubricated roller and plain bearings for special requirements, including for high rotation speeds.

FK 7 laminar retaining rings

Single and double wound laminar retaining rings. DMS double laminar retaining rings with centrifugal force protection for high shaft rotation speeds.

FK 8 plastic laminar ring carrier seals

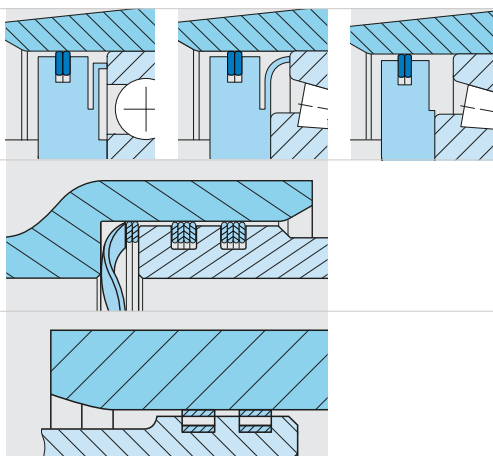
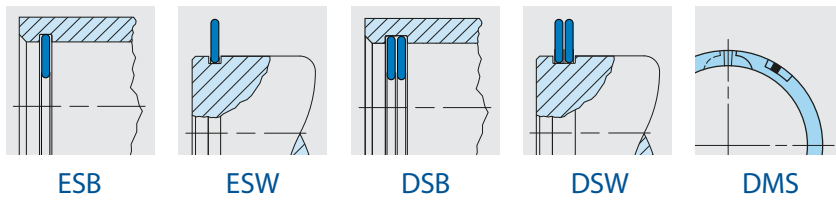
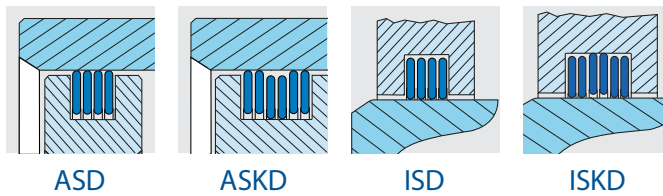
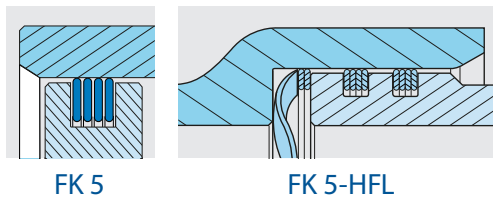
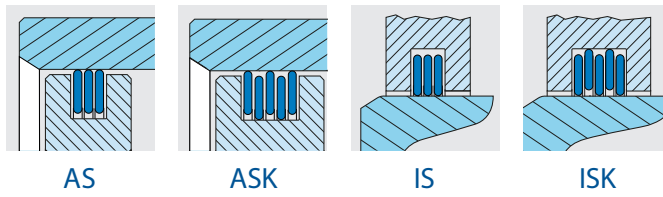
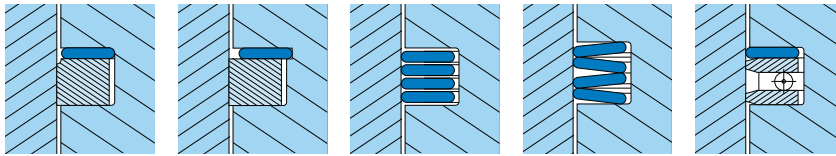
Plastic ring carrier with laminar sealing rings for sealing grease-lubricated axle/machine bearings and conveyor belt rollers.

FK 9 wave spring

Wave spring washer for length compensation, for axial pre-tensioning of static components.

FK 10 expander

Expander ring (polygon ring) for radial centring of static components.



Fitting



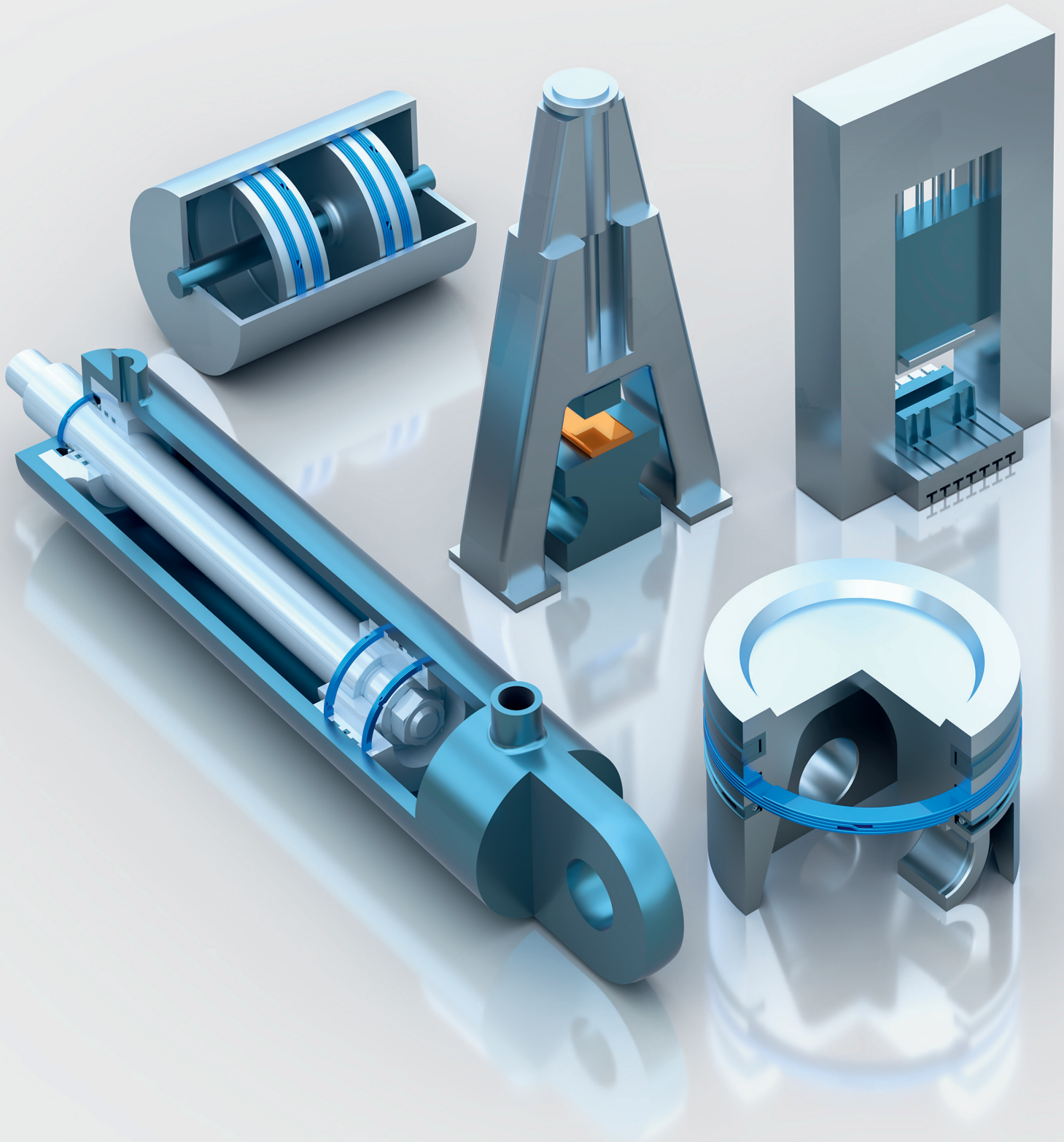
Greasing / Questionnaire



Sample applications

FK 2 – FK 4

Laminar piston rings for pistons in engines, compressors, hydraulic and pneumatic cylinders, shock absorbers, freeform/drop forging machine, presses and control slides



FK 2 and FK 4

FK 2 laminar sealing rings can be used for used and new combustion engines in conjunction with cast iron piston rings. Cast piston rings are not required for pistons in hydraulic and pneumatic units, compressors, shock absorbers, etc.

FK 4 laminar sealing rings for pistons in freeform/ drop forging machines, presses and control slides.

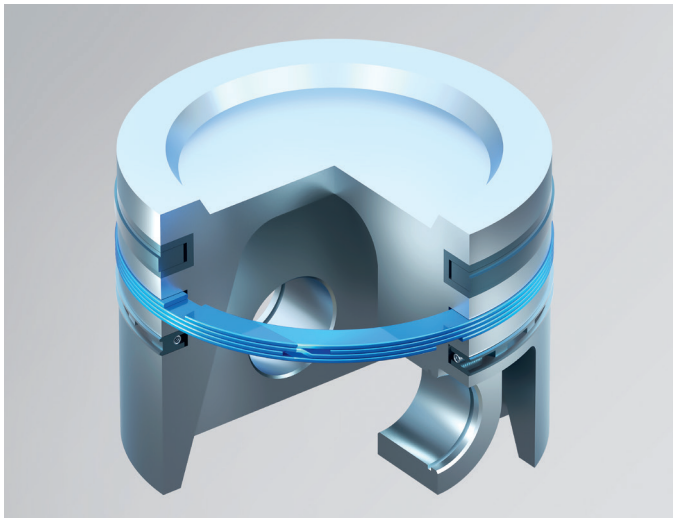
Please contact our technical office for information about ring dimensions, ring materials and groove geometries.

FK 2

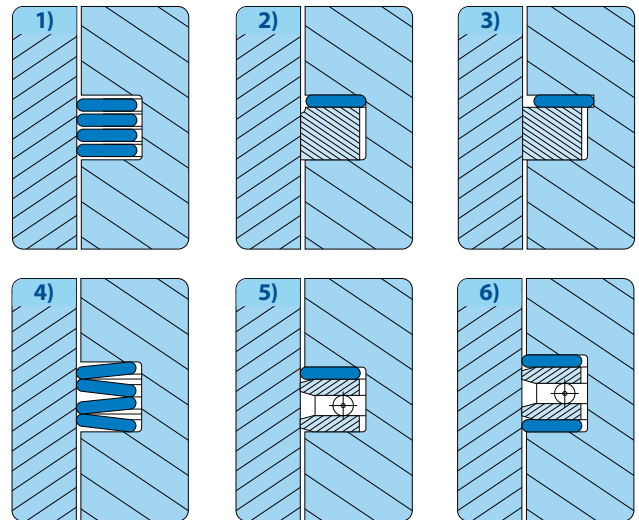
Laminar piston rings for pistons in engines, compressors, hydraulic and pneumatic cylinders and shock absorbers



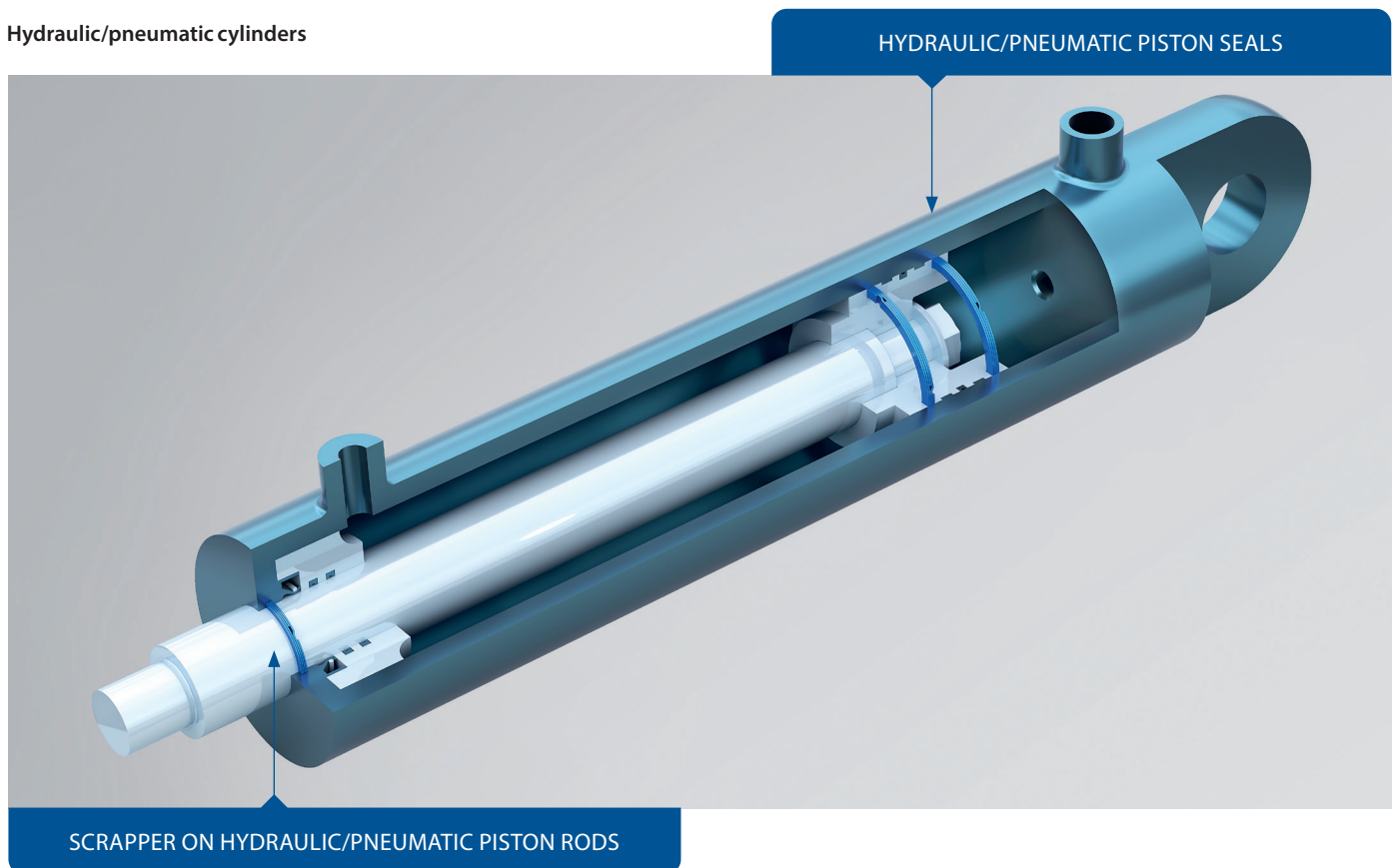
Piston sealing



Sample applications



Hydraulic/pneumatic cylinders



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Order information:

For enquiries and/or orders for all ring types, the ring diameter specifications must correspond to the housing or shaft diameter exactly.

Fitting instructions and installation tips can be found on pages 62 and 63.

FK 4

Laminar piston rings for Freeform and drop forging hammers, presses and control slides



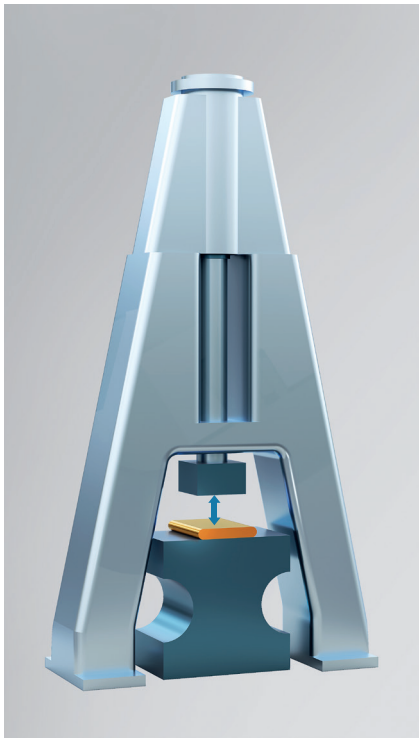
Ring materials

STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

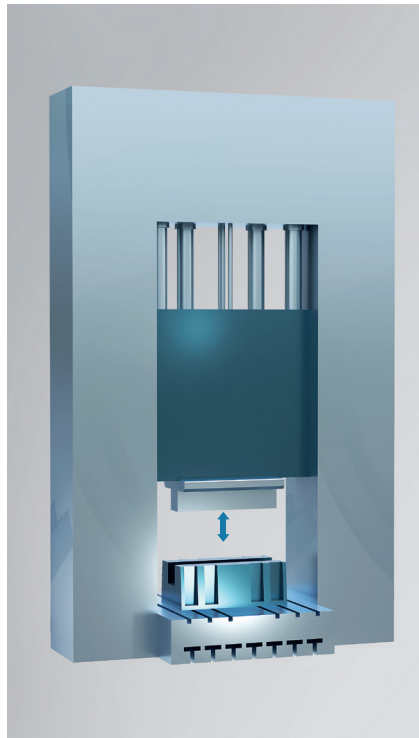
Freeform/drop forging machines



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

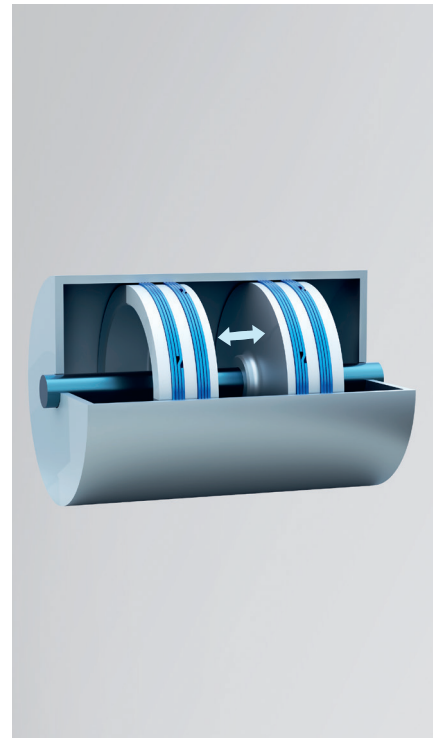
Presses



Order information:

For enquiries and/or orders for all ring types, the ring diameter specifications must correspond to the housing or shaft diameter exactly.

Control slides



Fitting instructions and installation tips can be found on pages 62 and 63.

FK 3 AS / ASK and IS / ISK

Single laminar sealing rings + combined
for bores and shafts



FK 3 AS / ASK and IS / ISK

FK 3 AS outside clamping single rings
(3 rings = 1 set)

FK 3 ASK outside clamping combined
single rings (5 rings = 1 set)

FK 3 IS inside clamping single rings
(3 rings = 1 set)

FK 3 ISK inside clamping combined single
rings (5 rings = 1 set)

Single wound laminar rings are used for grease sealing of roller and plain bearings and provide protection against dust ingress and environmental moisture when greased.

The additional sealing of the groove base diameter means that combination sets provide optimised sealing as a result of the increased deflection effect.

The "FK 3 AS" or "FK 3 ASK" arrangement is preferred to the "FK 3 IS" or "FK 3 ISK" arrangement wherever possible because of easier installation in the grooves. The ring carriers can be made of steel, cast iron, light metal or plastic, depending on the application and technical requirements.

Ring materials

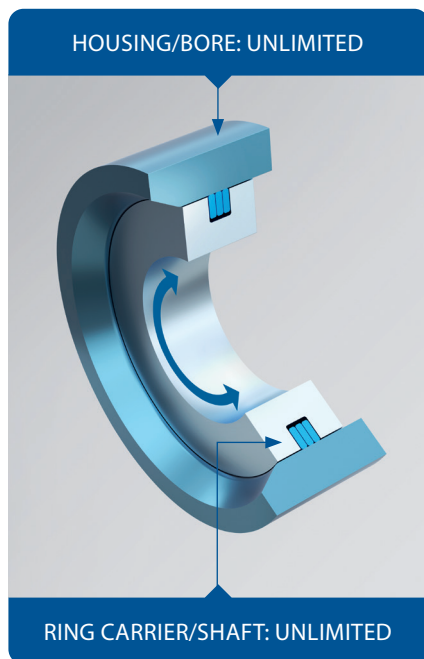
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

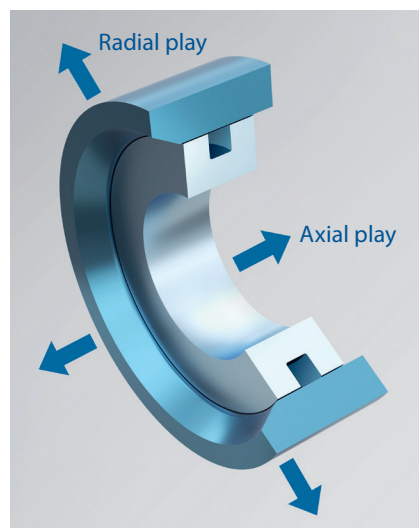
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be reduced by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 3 AS ring set ⁴⁾

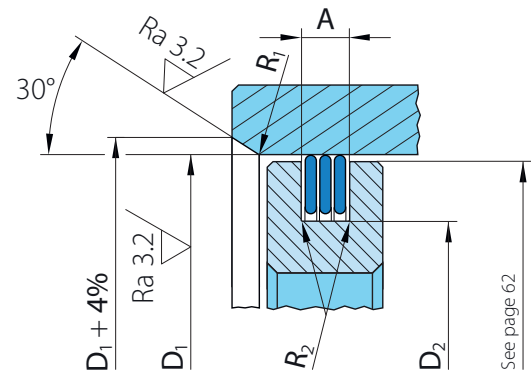
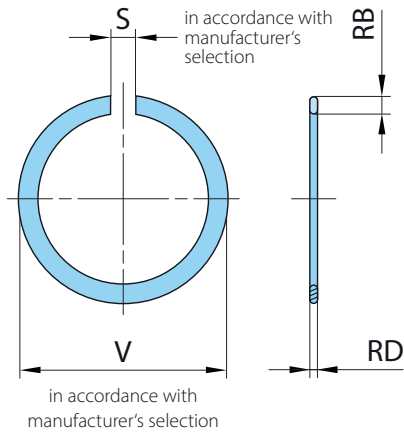
1 set = 3 AS rings



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the bore diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 3 AS rings).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		0.65		- 2.6		2.2			
25 - 29.9		1.2		0.65		- 3.0		2.2			
30 - 35.9		1.5		0.65		- 3.6		2.2			
36 - 42.9		1.8		0.65		- 4.2		2.2			
43 - 48.9		2.2		0.72		- 5.0		2.4			
49 - 51.9	H6	2.4	+ 0.1	0.72	+ 0.04	- 5.4	+ 0	2.4	+ 0.1	min. 1	0.1
52 - 59.9	H7	2.6	- 0.1	0.72	- 0.02	- 5.8	- 0.2	2.4	- 0		
60 - 69.9		2.8		0.82		- 6.2		2.7			
70 - 74.9		3.1		0.82		- 6.8		2.7			
75 - 79.9		3.3		0.82		- 7.2		2.7			
80 - 89.9		3.5		0.82		- 7.6		2.7			
90 - 99.9		3.8		0.82		- 8.2		2.7			
100 - 104.9		4.1		0.82		- 8.8		2.7			
105 - 109.9		4.3		0.98		- 9.2		3.3			
110 - 119.9	H7	4.6	+ 0.1	0.98	+ 0.05	- 9.8	+ 0	3.3	+ 0.15	min. 2	0.2
120 - 129.9	H8	5.0	- 0.2	0.98	- 0.03	- 10.8	- 0.25	3.3	- 0		
130 - 149.9		5.5		0.98		- 11.8		3.3			
150 - 170.9		6.0		1.0		- 13.0		3.4			
*150 - 170.9		6.0		1.5		- 13.0		5.1			
171 - 199.9		7.0		1.0		- 15.0		3.4			
*171 - 199.9	H8	7.0	+ 0.15	1.5	+ 0.06	- 15.0	+ 0	5.1	+ 0.2	min. 3	0.3
200 - 259.9	H9	8.0	- 0.3	1.2	- 0.04	- 18.0	- 0.3	4.1	- 0		
*200 - 259.9		8.0		1.5		- 18.0		5.1			
260 - 319.9		9.0		1.5		- 20.0		5.1			
320 - 399.9		10.0		1.5		- 22.0		5.2			
400 - 439.9		11.0		1.5		- 24.0		5.2			
440 - 600.9		12.0		1.5		- 26.0		5.2			
*440 - 600.9		12.0		2.5		- 26.0		8.3			
601 - 699.9	H9	14.0	+ 0.2	2.5	+ 0.07	- 32.0	+ 0	8.3	+ 0.25	min. 4	0.4
700 - 799.9	H10	16.0	- 0.4	2.5	- 0.05	- 36.0	- 0.4	8.3	- 0		
800 - 899.9		18.0		2.5		- 40.0		8.3			
900 - 999.9		20.0		2.5		- 44.0		8.3			
1000 - 1300		22.0		2.5		- 48.0		8.4			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 13, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact bore or housing diameter " D_1 "!

FK 3 ASK

Single laminar sealing rings combined for bores

Ring materials

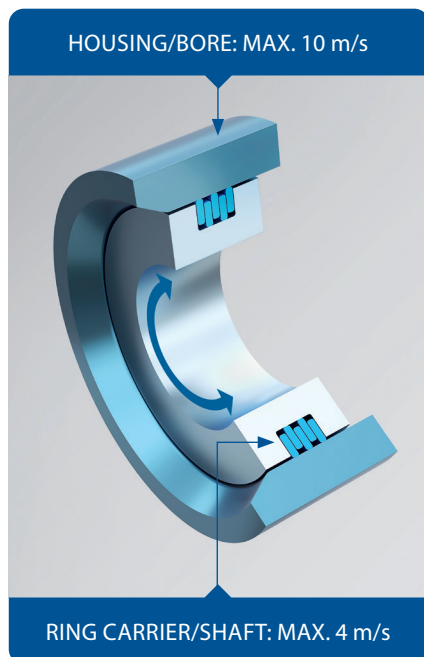
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

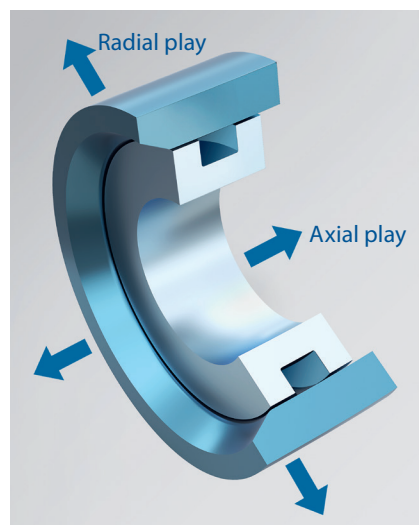
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be reduced by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 3 ASK ring set ⁴⁾

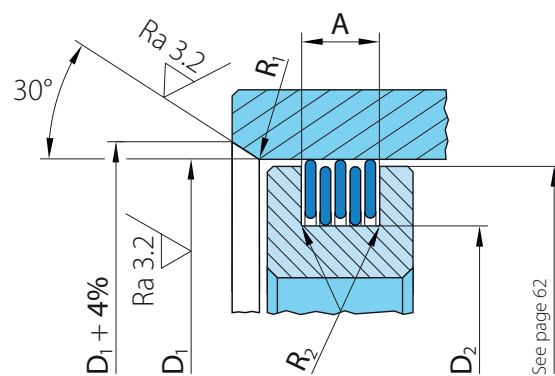
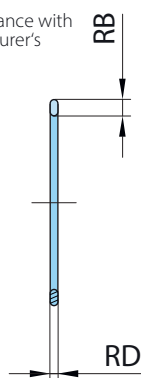
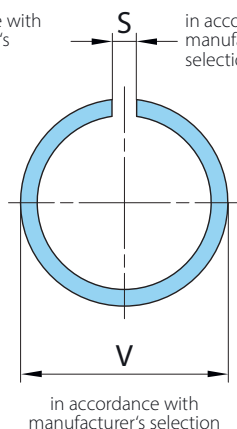
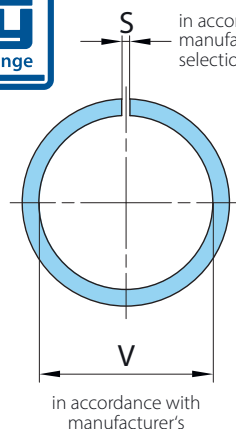
1 set = 3 AS rings and 2 IS rings



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the bore diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 3 AS rings + 2 IS rings).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		0.65		- 2.6		3.6			
25 - 29.9		1.2		0.65		- 3.0		3.6			
30 - 35.9		1.5		0.65		- 3.6		3.6			
36 - 42.9		1.8		0.65		- 4.2		3.6			
43 - 48.9		2.2		0.72		- 5.0		4.0			
49 - 51.9	H6	2.4	+ 0.1	0.72	+ 0.04	- 5.4	+ 0	4.0	+ 0.1	min. 1	0.1
52 - 59.9	H7	2.6	- 0.1	0.72	- 0.02	- 5.8	- 0.2	4.0	- 0		
60 - 69.9		2.8		0.82		- 6.2		4.5			
70 - 74.9		3.1		0.82		- 6.8		4.5			
75 - 79.9		3.3		0.82		- 7.2		4.5			
80 - 89.9		3.5		0.82		- 7.6		4.5			
90 - 99.9		3.8		0.82		- 8.2		4.5			
100 - 104.9		4.1		0.82		- 8.8		4.5			
105 - 109.9		4.3		0.98		- 9.2		5.5			
110 - 119.9	H7	4.6	+ 0.1	0.98	+ 0.05	- 9.8	+ 0	5.5	+ 0.15	min. 2	0.2
120 - 129.9	H8	5.0	- 0.2	0.98	- 0.03	- 10.8	- 0.25	5.5	- 0		
130 - 149.9		5.5		0.98		- 11.8		5.5			
150 - 170.9		6.0		1.0		- 13.0		5.6			
*150 - 170.9		6.0		1.5		- 13.0		8.2			
171 - 199.9		7.0		1.0		- 15.0		5.6			
*171 - 199.9	H8	7.0	+ 0.15	1.5	+ 0.06	- 15.0	+ 0	8.2	+ 0.2	min. 3	0.3
200 - 259.9	H9	8.0	- 0.3	1.2	- 0.04	- 18.0	- 0.3	6.6	- 0		
*200 - 259.9		8.0		1.5		- 18.0		8.2			
260 - 319.9		9.0		1.5		- 20.0		8.2			
320 - 399.9		10.0		1.5		- 22.0		8.3			
400 - 439.9		11.0		1.5		- 24.0		8.3			
440 - 600.9		12.0		1.5		- 26.0		8.3			
*440 - 600.9		12.0		2.5		- 26.0		13.5			
601 - 699.9	H9	14.0	+ 0.2	2.5	+ 0.07	- 32.0	+ 0	13.5	+ 0.25	min. 4	0.4
700 - 799.9	H10	16.0	- 0.4	2.5	- 0.05	- 36.0	- 0.4	13.5	- 0		
800 - 899.9		18.0		2.5		- 40.0		13.5			
900 - 999.9		20.0		2.5		- 44.0		13.5			
1000 - 1300		22.0		2.5		- 48.0		13.6			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 13, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact bore or housing diameter " D_1 "!

Ring materials

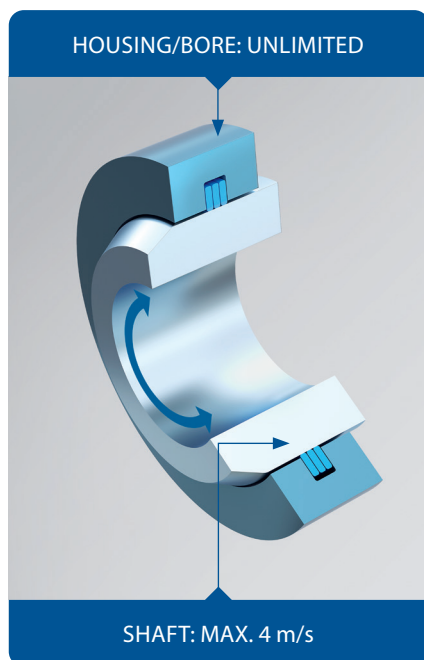
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

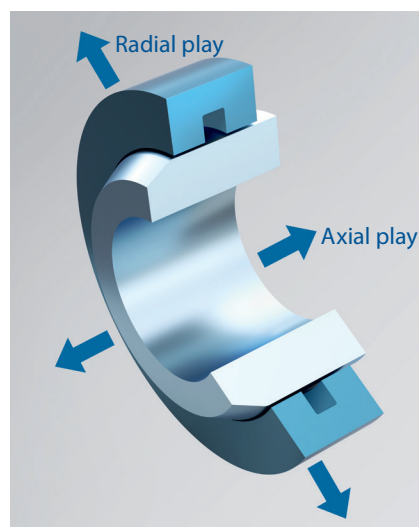
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be increased by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 3 IS ring set ⁴⁾

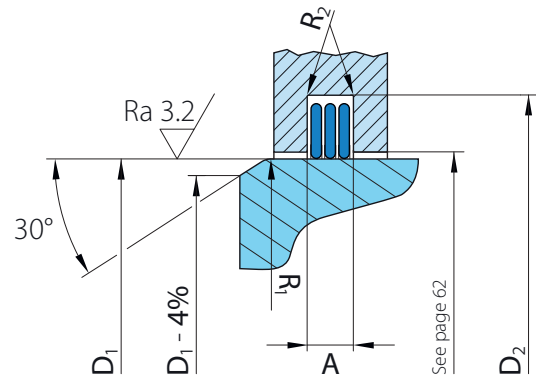
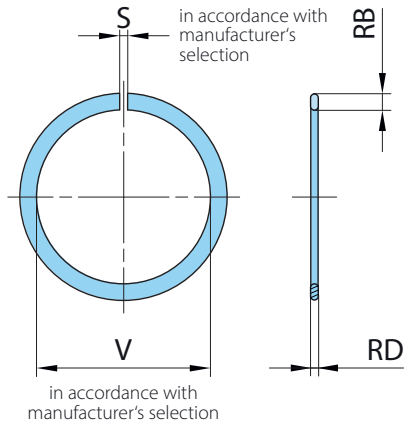
1 set = 3 IS rings



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the shaft diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 3 IS rings).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ plus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		0.65		+ 2.6		2.2			
25 - 29.9		1.2		0.65		+ 3.0		2.2			
30 - 35.9		1.5		0.65		+ 3.6		2.2			
36 - 42.9		1.8		0.65		+ 4.2		2.2			
43 - 48.9		2.2		0.72		+ 5.0		2.4			
49 - 51.9	h6	2.4	+ 0.1	0.72	+ 0.04	+ 5.4	+ 0.2	2.4	+ 0.1	min. 1	0.1
52 - 59.9	h7	2.6	- 0.1	0.72	- 0.02	+ 5.8	- 0	2.4	- 0		
60 - 69.9		2.8		0.82		+ 6.2		2.7			
70 - 74.9		3.1		0.82		+ 6.8		2.7			
75 - 79.9		3.3		0.82		+ 7.2		2.7			
80 - 89.9		3.5		0.82		+ 7.6		2.7			
90 - 99.9		3.8		0.82		+ 8.2		2.7			
100 - 104.9		4.1		0.82		+ 8.8		2.7			
105 - 109.9		4.3		0.98		+ 9.2		3.3			
110 - 119.9	h7	4.6	+ 0.1	0.98	+ 0.05	+ 9.8	+ 0.25	3.3	+ 0.15	min. 2	0.2
120 - 129.9	h8	5.0	- 0.2	0.98	- 0.03	+ 10.8	- 0	3.3	- 0		
130 - 149.9		5.5		0.98		+ 11.8		3.3			
150 - 170.9		6.0		1.0		+ 13.0		3.4			
*150 - 170.9		6.0		1.5		+ 13.0		5.1			
171 - 199.9		7.0		1.0		+ 15.0		3.4			
*171 - 199.9	h8	7.0	+ 0.15	1.5	+ 0.06	+ 15.0	+ 0.3	5.1	+ 0.2	min. 3	0.3
200 - 259.9	h9	8.0	- 0.3	1.2	- 0.04	+ 18.0	- 0	4.1	- 0		
*200 - 259.9		8.0		1.5		+ 18.0		5.1			
260 - 319.9		9.0		1.5		+ 20.0		5.1			
320 - 399.9		10.0		1.5		+ 22.0		5.2			
400 - 439.9		11.0		1.5		+ 24.0		5.2			
440 - 600.9		12.0		1.5		+ 26.0		5.2			
*440 - 600.9		12.0		2.5		+ 26.0		8.3			
601 - 699.9	h9	14.0	+ 0.2	2.5	+ 0.07	+ 32.0	+ 0.4	8.3	+ 0.25	min. 4	0.4
700 - 799.9	h10	16.0	- 0.4	2.5	- 0.05	+ 36.0	- 0	8.3	- 0		
800 - 899.9		18.0		2.5		+ 40.0		8.3			
900 - 999.9		20.0		2.5		+ 44.0		8.3			
1000 - 1300		22.0		2.5		+ 48.0		8.4			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 13, 62, 63, 64 and 65 (questionnaire).

Please specify the exact shaft diameter " D_1 " for enquiries and/or orders!

FK 3 ISK

Single laminar sealing rings combined for shafts



Ring materials

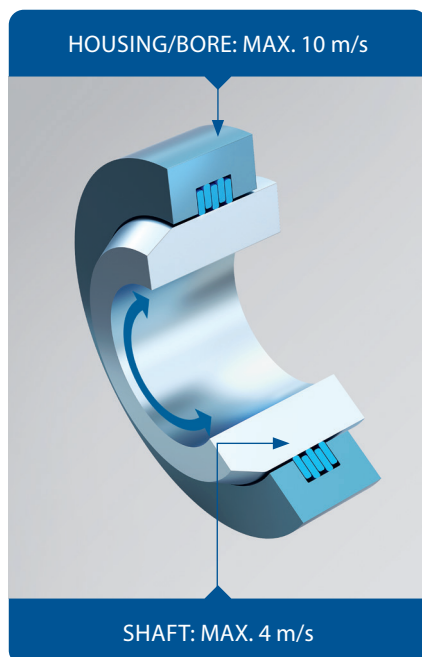
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

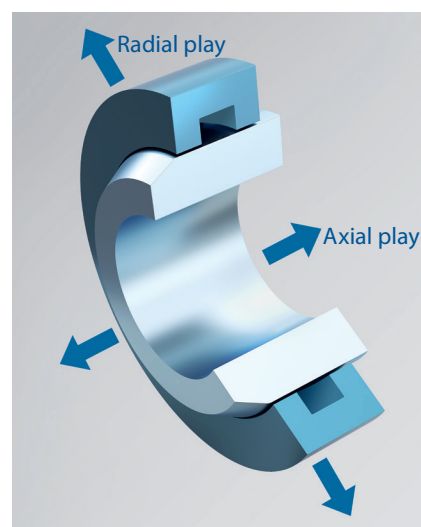
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be increased by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 3 ISK ring set ⁴⁾

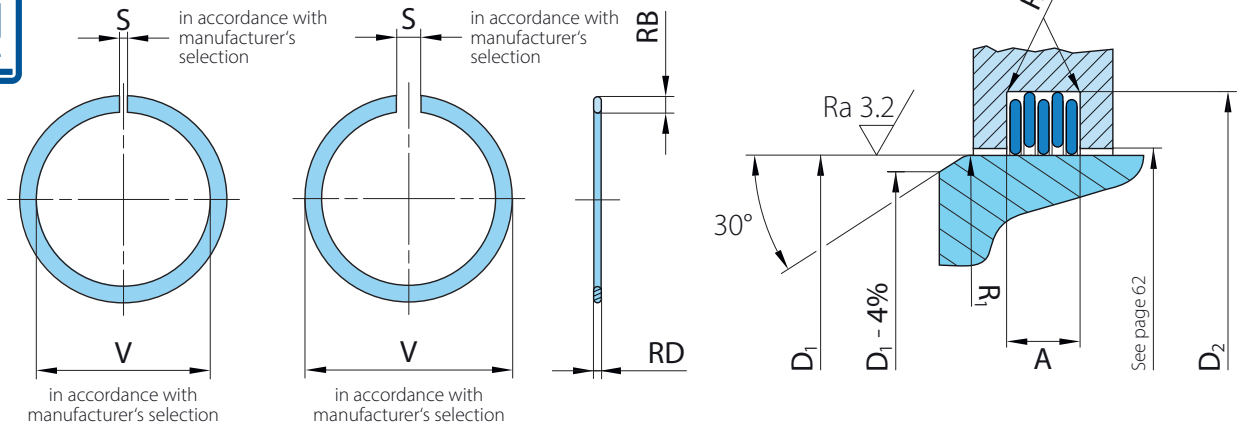
1 set = 3 IS rings and 2 AS rings



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the shaft diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 3 IS rings + 2 AS rings).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ plus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		0.65		+ 2.6		3.6			
25 - 29.9		1.2		0.65		+ 3.0		3.6			
30 - 35.9		1.5		0.65		+ 3.6		3.6			
36 - 42.9		1.8		0.65		+ 4.2		3.6			
43 - 48.9		2.2		0.72		+ 5.0		4.0			
49 - 51.9	h6	2.4	+ 0.1	0.72	+ 0.04	+ 5.4	+ 0.2	4.0	+ 0.1	min. 1	0.1
52 - 59.9	h7	2.6	- 0.1	0.72	- 0.02	+ 5.8	- 0	4.0	- 0		
60 - 69.9		2.8		0.82		+ 6.2		4.5			
70 - 74.9		3.1		0.82		+ 6.8		4.5			
75 - 79.9		3.3		0.82		+ 7.2		4.5			
80 - 89.9		3.5		0.82		+ 7.6		4.5			
90 - 99.9		3.8		0.82		+ 8.2		4.5			
100 - 104.9		4.1		0.82		+ 8.8		4.5			
105 - 109.9		4.3		0.98		+ 9.2		5.5			
110 - 119.9	h7	4.6	+ 0.1	0.98	+ 0.05	+ 9.8	+ 0.25	5.5	+ 0.15	min. 2	0.2
120 - 129.9	h8	5.0	- 0.2	0.98	- 0.03	+ 10.8	- 0	5.5	- 0		
130 - 149.9		5.5		0.98		+ 11.8		5.5			
150 - 170.9		6.0		1.0		+ 13.0		5.6			
*150 - 170.9		6.0		1.5		+ 13.0		8.2			
171 - 199.9		7.0		1.0		+ 15.0		5.6			
*171 - 199.9	h8	7.0	+ 0.15	1.5	+ 0.06	+ 15.0	+ 0.3	8.2	+ 0.2	min. 3	0.3
200 - 259.9	h9	8.0	- 0.3	1.2	- 0.04	+ 18.0	- 0	6.6	- 0		
*200 - 259.9		8.0		1.5		+ 18.0		8.2			
260 - 319.9		9.0		1.5		+ 20.0		8.2			
320 - 399.9		10.0		1.5		+ 22.0		8.3			
400 - 439.9		11.0		1.5		+ 24.0		8.3			
440 - 600.9		12.0		1.5		+ 26.0		8.3			
*440 - 600.9		12.0		2.5		+ 26.0		13.5			
601 - 699.9	h9	14.0	+ 0.2	2.5	+ 0.07	+ 32.0	+ 0.4	13.5	+ 0.25	min. 4	0.4
700 - 799.9	h10	16.0	- 0.4	2.5	- 0.05	+ 36.0	- 0	13.5	- 0		
800 - 899.9		18.0		2.5		+ 40.0		13.5			
900 - 999.9		20.0		2.5		+ 44.0		13.5			
1000 - 1300		22.0		2.5		+ 48.0		13.6			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 13, 62, 63, 64 and 65 (questionnaire).

Please specify the exact shaft diameter " D_1 " for enquiries and/or orders!

FK 5 and FK 5-HFL

Single and double laminar sealing rings for roller bearings in continuous casting plants, steam turbines and engines and for sealing axial balancers in exhaust pipes of internal combustion engines, manifold metal pipe connections, exhaust gas recirculation systems and turbochargers



FK 5 and FK 5-HFL

Single and double laminar sealing rings FK 5

The rings are used to seal roller and plain bearing units on the roller tables of continuous casting plants, industrial steam turbines, mobile and stationary engines. They can be used practically anywhere where extreme operating conditions place higher demands on the sealing system. This includes, for example, corrosion and media resistance of the ring material, high operating temperatures and a high degree of contamination.

Single and double laminar sealing rings FK 5-HFL

The rings made of high-temperature resistant chromium-nickel steels are designed for sealing sliding pieces and axial and radial compensators on exhaust pipes of combustion engines, exhaust gas recirculation systems, exhaust gas flaps, turbochargers, mobile and stationary engines.

They are used especially when high operating temperatures and high axial or radial displacements occur due to thermal expansion.

FK 5

Single and double laminar sealing rings for roller bearings in continuous casting plants, steam turbines and engines



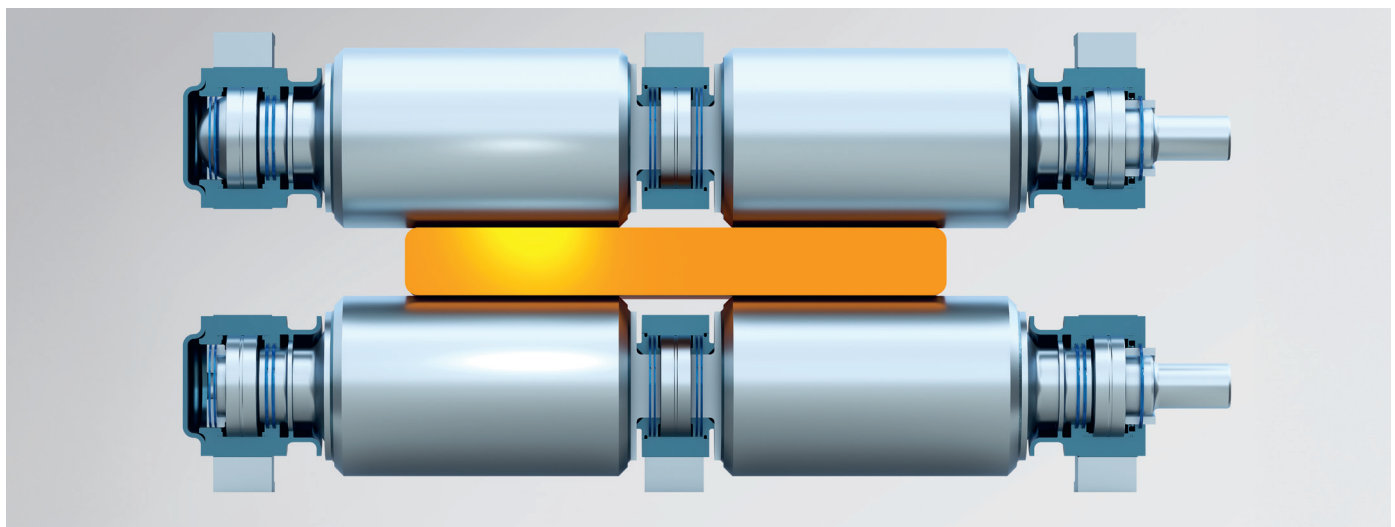
Ring materials

STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
1.4571	max. +500°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Driver rollers (example)



Roller table rollers (example)



Run and installation tests:

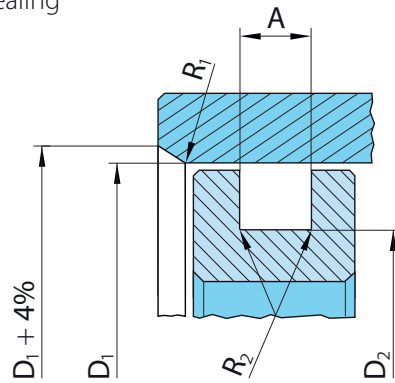
Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Order information:

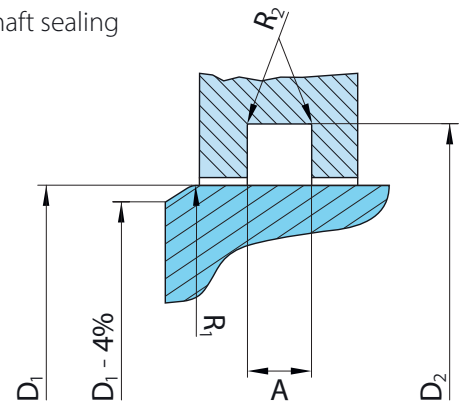
For enquiries and/or orders, the ring diameter specification must correspond to the bore or shaft diameter " D_1 " exactly. The rings can be ordered individually or in sets.

Fitting instructions and installation tips can be found on pages 62 and 63.

For bore sealing



For shaft sealing



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Bore/shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus/plus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		1.3							
25 - 29.9		1.2		1.3							
30 - 35.9		1.5		1.3							
36 - 42.9		1.8		1.3							
43 - 48.9		2.2		1.45							
49 - 51.9	H/h 6	2.4	+ 0.1	1.45	+ 0.08						
52 - 59.9	H/h 7	2.6	- 0.1	1.45	- 0.04						
60 - 69.9		2.8		1.65							
70 - 74.9		3.1		1.65							
75 - 79.9		3.3		1.65							
80 - 89.9		3.5		1.65							
90 - 99.9		3.8		1.65							
100 - 104.9		4.1		1.65							
105 - 109.9		4.3		1.96							
110 - 119.9	H/h 7	4.6	+ 0.1	1.96	+ 0.1						
120 - 129.9	H/h 8	5.0	- 0.2	1.96	- 0.06						
130 - 149.9		5.5		1.96							
150 - 170.9		6.0		2.0							
*150 - 170.9		6.0		3.0							
171 - 199.9		7.0		2.0							
*171 - 199.9	H/h 8	7.0	+ 0.15	3.0	+ 0.12						
200 - 259.9	H/h 9	8.0	- 0.3	2.4	- 0.08						
*200 - 259.9		8.0		3.0							
260 - 319.9		9.0		3.0							
320 - 399.9		10.0		3.0							
400 - 439.9		11.0		3.0							
440 - 600.9		12.0		3.0							
*440 - 600.9		12.0		5.0							
601 - 699.9	H/h 9	14.0	+ 0.2	5.0	+ 0.14						
700 - 799.9	H/h 10	16.0	- 0.4	5.0	- 0.1						
800 - 900.0		18.0		5.0							

GROOVE DIMENSIONS ON REQUEST

PLEASE CONTACT OUR
TECHNICAL OFFICE!

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 23, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact bore or shaft diameter " D_1 "!

FK 5-HFL

Single and double laminar sealing rings for sealing axial compensators in exhaust pipes of combustion engines, manifold metal pipe connections, exhaust gas recirculation systems and turbochargers



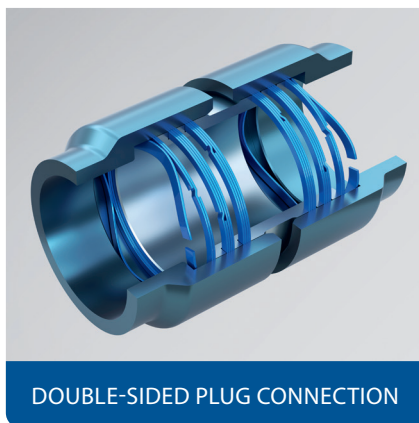
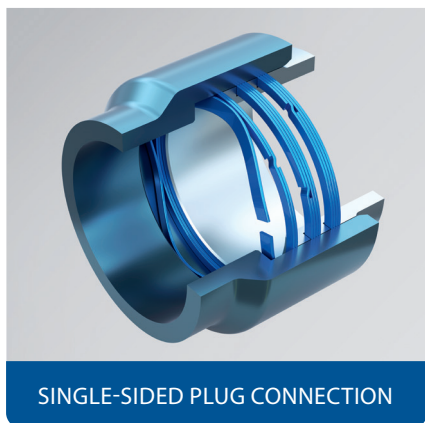
Ring materials

STEEL GRADE	SPRING-RESISTANT UP TO	HARDNESS VALUE	SURFACE TREATMENT	SURFACE PROTECTION	SURFACE COLOUR
1.4571	max. +500°C	On request ¹⁾	Vibratory finishing	Dry	Varies ²⁾
1.4980	max. +700°C	On request ¹⁾	Vibratory finishing	Dry	Varies ²⁾

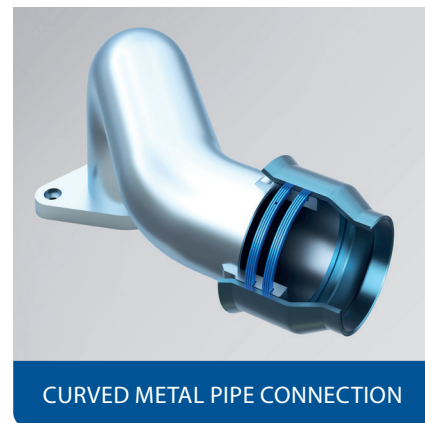
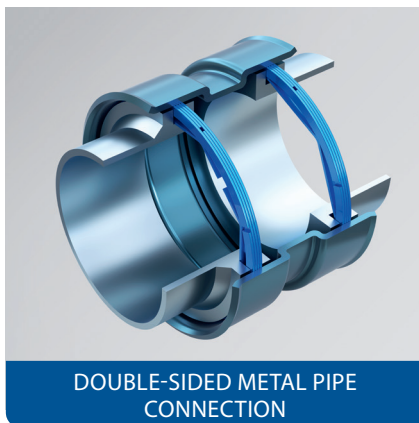
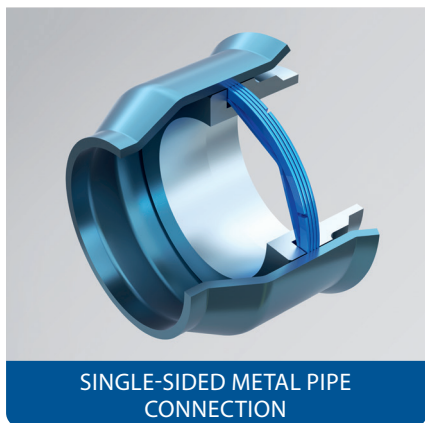
¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Connection examples for cast parts



Metal pipe - push-fit connections with centring expander



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

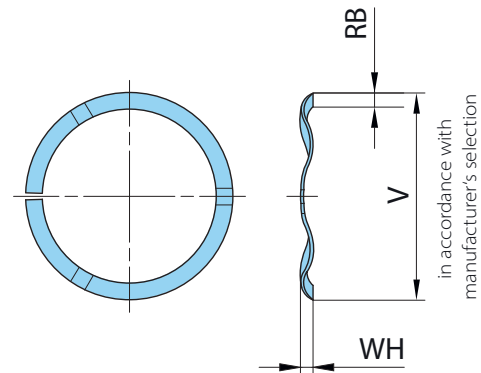
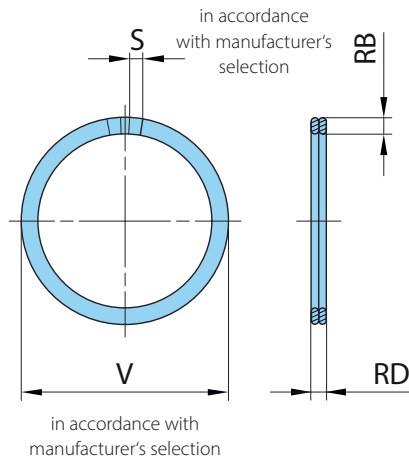
Order information:

For enquiries and/or orders, the ring diameter specification must correspond to the bore diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets.

Expander dimensions on request:

See page 61

Fitting instructions and installation tips can be found on pages 62 and 63.



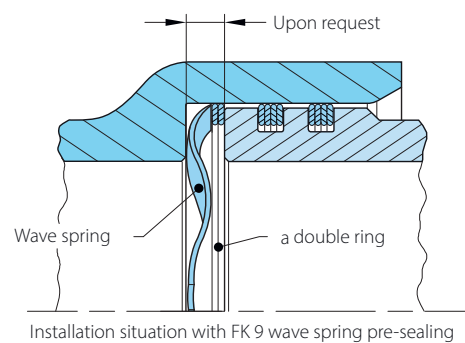
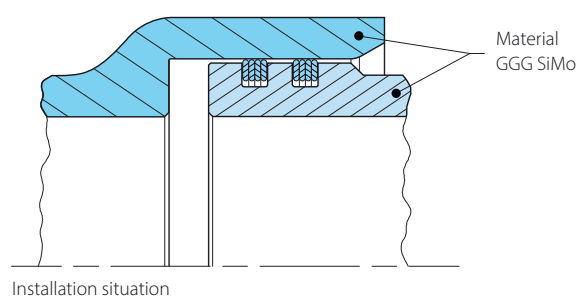
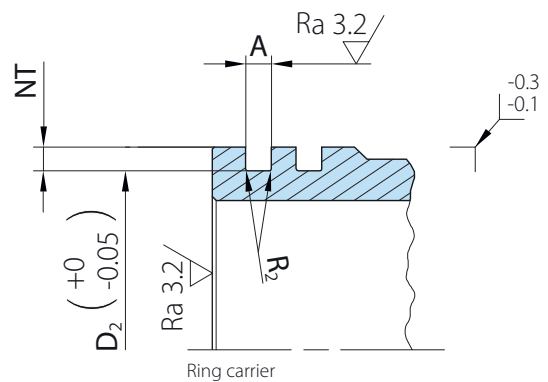
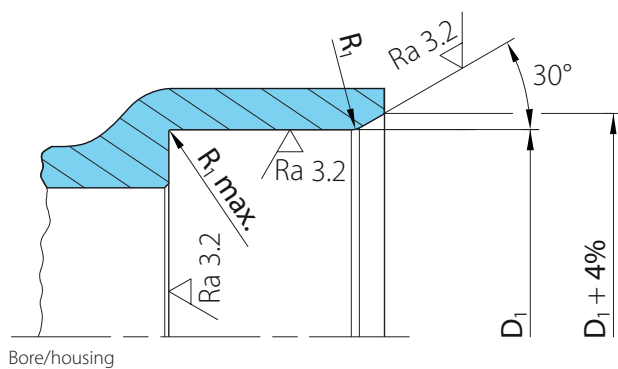
Wave spring FK 9 Dimensions and diameters on request! Please contact our technical office for these questions!

NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	NT	Tolerance	A	Tolerance	R_1	R_2
30 - 39.9	H7	2.2	+ 0.1 - 0.1	1.45	+ 0.06 - 0.04	GROOVE DIMENSIONS ON REQUEST PLEASE CONTACT OUR TECHNICAL OFFICE!					
40 - 49.9		2.4		1.45							
50 - 59.9		2.6		1.45							
60 - 69.9		2.8		1.65							
70 - 79.9		3.3		1.65							
80 - 89.9		3.8		1.65							
90 - 104.9		4.1		1.65							
105 - 119.9		4.5		1.95							
120 - 140		5.0		1.95							

All dimensions in mm

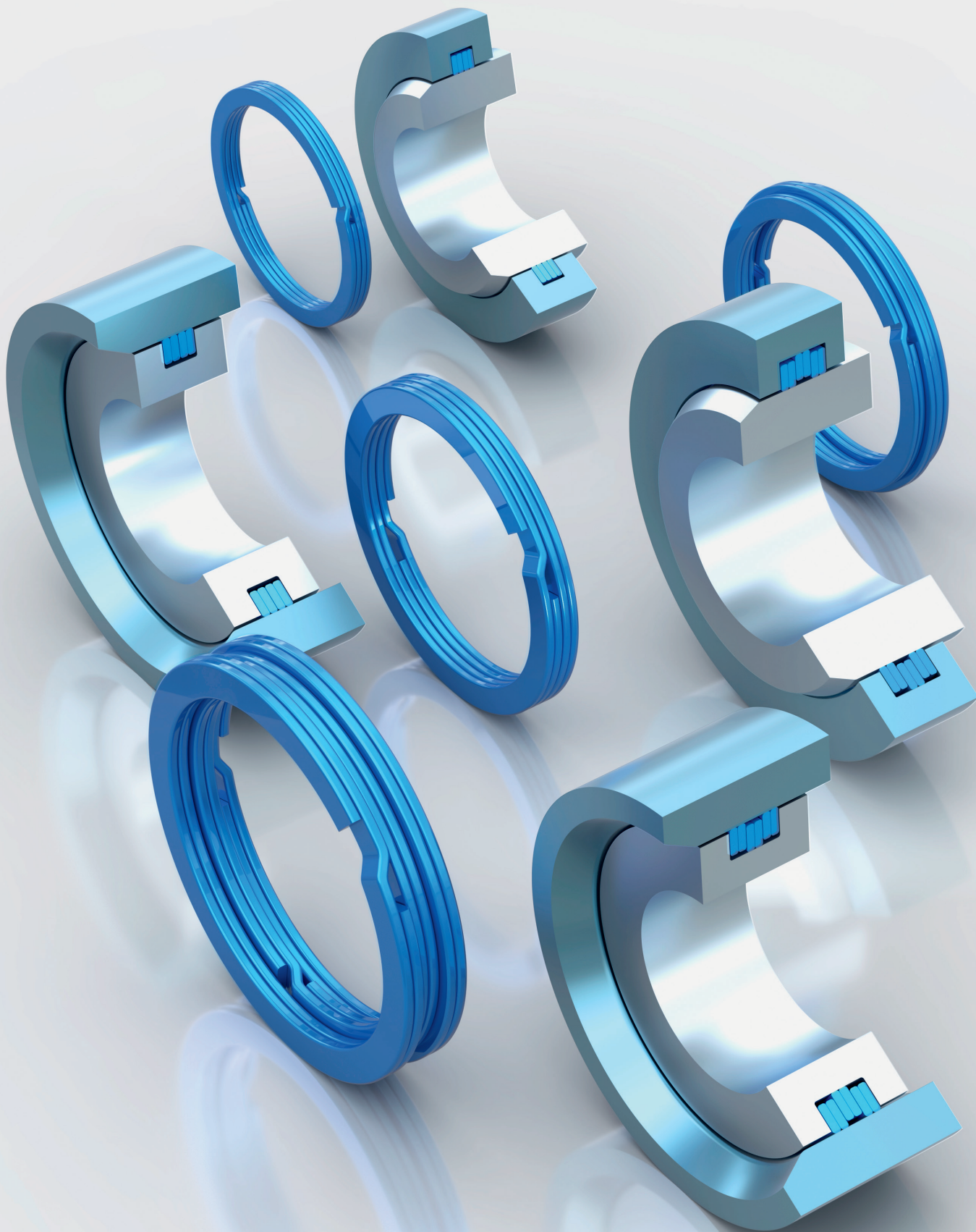
Note: Please refer to the information on pages 23, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact bore diameter " D_1 "!



FK 6 ASD / ASKD and ISD / ISKD

Double laminar sealing rings + combined
for bores and shafts



FK 6 ASD / ASKD and ISD / ISKD

FK 6 ASD outside clamping double rings
(2 rings = 1 set)

FK 6 ASKD outside clamping combined double
rings (3 rings = 1 set)

FK 6 ISD inside clamping double rings
(2 rings = 1 set)

FK 6 ISKD inside clamping combined double
rings (3 rings = 1 set)

In contrast to the "FK 3" single wound laminar rings, "FK 6" laminar rings are double wound. They are used for grease sealing in roller and plain bearings. They are also used as protective seals in front of a hermetical shaft seal. Special sealing properties are required of "FK 6" laminar rings to prevent grease from escaping and dust, dirt and splash water from entering. "FK 6" laminar rings are characterised by uniform radial tension and, unlike "FK 3" laminar rings, have no axial joint gap.

Double wound laminar rings "FK 6 ASKD" and "FK 6 ISKD" are used for grease sealing of roller and plain bearings and, when greased, protect against grease leakage and against dust, dirt and splash water ingress, especially when higher sealing requirements apply. The additional sealing of the groove base diameter optimises sealing as a result of the increased deflection effect.

The "ASD" or "ASKD" arrangement is preferable to the "ISD" or "ISKD" arrangement wherever possible because of easier ring installation in the grooves of the ring carriers. The ring carriers can be made of steel, cast iron, light metal or plastic, depending on the application and technical requirements.

FK 6 ASD

Double laminar sealing rings for bores



Ring materials

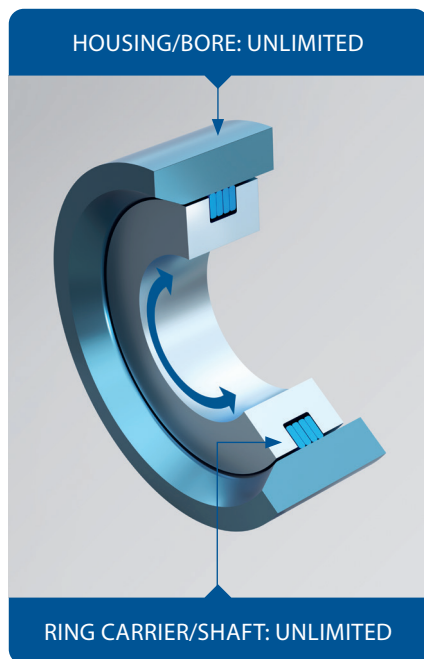
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

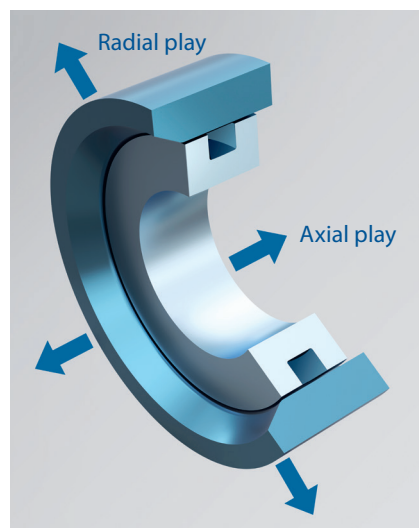
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be reduced by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 6 ASD ring set ⁴⁾

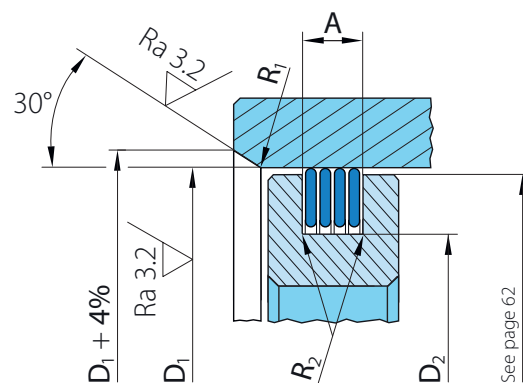
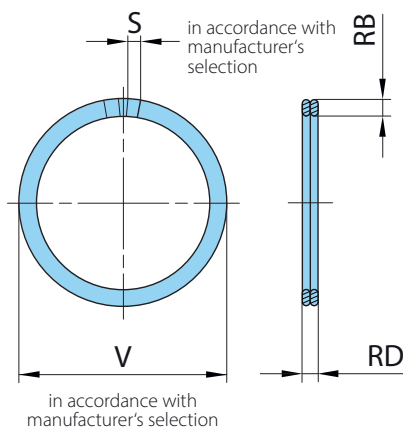
1 set = 2 ASD rings



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the bore diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 2 ASD rings).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		1.3		- 2.6		2.9			
25 - 29.9		1.2		1.3		- 3.0		2.9			
30 - 35.9		1.5		1.3		- 3.6		2.9			
36 - 42.9		1.8		1.3		- 4.2		2.9			
43 - 48.9		2.2		1.45		- 5.0		3.2			
49 - 51.9	H6	2.4	+ 0.1	1.45	+ 0.08	- 5.4	+ 0	3.2	+ 0.1	min. 1	0.1
52 - 59.9	H7	2.6	- 0.1	1.45	- 0.04	- 5.8	- 0.2	3.2	- 0		
60 - 69.9		2.8		1.65		- 6.2		3.6			
70 - 74.9		3.1		1.65		- 6.8		3.6			
75 - 79.9		3.3		1.65		- 7.2		3.6			
80 - 89.9		3.5		1.65		- 7.6		3.6			
90 - 99.9		3.8		1.65		- 8.2		3.6			
100 - 104.9		4.1		1.65		- 8.8		3.6			
105 - 109.9		4.3		1.96		- 9.2		4.3			
110 - 119.9	H7	4.6	+ 0.1	1.96	+ 0.1	- 9.8	+ 0	4.3	+ 0.15	min. 2	0.2
120 - 129.9	H8	5.0	- 0.2	1.96	- 0.06	- 10.8	- 0.25	4.3	- 0		
130 - 149.9		5.5		1.96		- 11.8		4.3			
150 - 170.9		6.0		2.0		- 13.0		4.4			
*150 - 170.9		6.0		3.0		- 13.0		6.5			
171 - 199.9		7.0		2.0		- 15.0		4.4			
*171 - 199.9	H8	7.0	+ 0.15	3.0	+ 0.12	- 15.0	+ 0	6.5	+ 0.2	min. 3	0.3
200 - 259.9	H9	8.0	- 0.3	2.4	- 0.08	- 18.0	- 0.3	5.3	- 0		
*200 - 259.9		8.0		3.0		- 18.0		6.5			
260 - 319.9		9.0		3.0		- 20.0		6.5			
320 - 399.9		10.0		3.0		- 22.0		6.6			
400 - 439.9		11.0		3.0		- 24.0		6.6			
440 - 600.9		12.0		3.0		- 26.0		6.6			
*440 - 600.9		12.0		5.0		- 26.0		10.6			
601 - 699.9	H9	14.0	+ 0.2	5.0	+ 0.14	- 32.0	+ 0	10.8	+ 0.25	min. 4	0.4
700 - 799.9	H10	16.0	- 0.4	5.0	- 0.1	- 36.0	- 0.4	10.8	- 0		
800 - 899.9		18.0		5.0		- 40.0		11.0			
900 - 999.9		20.0		5.0		- 44.0		11.0			
1000 - 1300		22.0		5.0		- 48.0		11.0			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 29, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact bore or housing diameter " D_1 "!

FK 6 ASKD

Double laminar sealing rings combined for bores



Ring materials

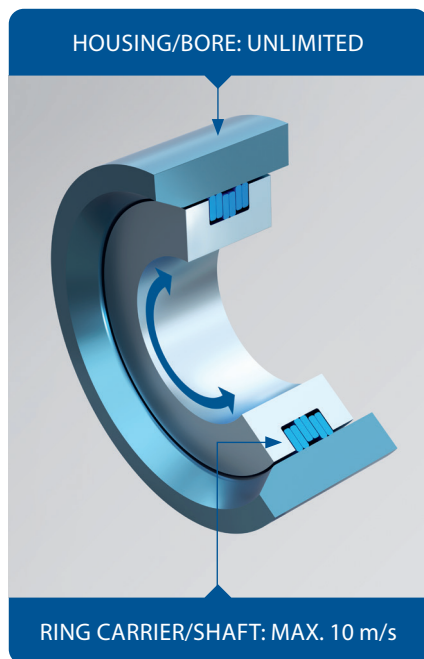
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

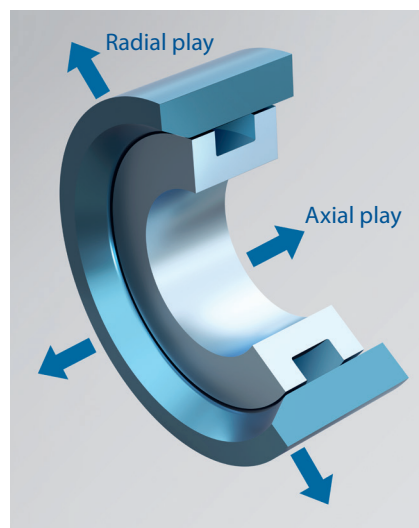
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be reduced by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 6 ASKD ring set ⁴⁾

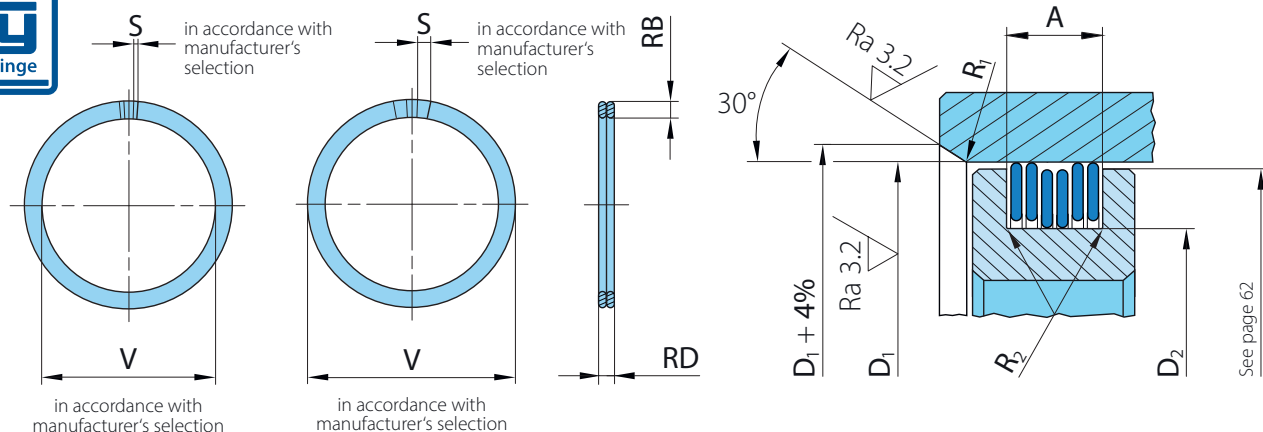
1 set = 2 ASD rings and 1 ISD ring



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the housing or bore diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 2 ASD rings + 1 ISD ring).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		1.3		- 2.6		4.3			
25 - 29.9		1.2		1.3		- 3.0		4.3			
30 - 35.9		1.5		1.3		- 3.6		4.3			
36 - 42.9		1.8		1.3		- 4.2		4.3			
43 - 48.9		2.2		1.45		- 5.0		4.8			
49 - 51.9	H6	2.4	+ 0.1	1.45	+ 0.08	- 5.4	+ 0	4.8	+ 0.1	min. 1	0.1
52 - 59.9	H7	2.6	- 0.1	1.45	- 0.04	- 5.8	- 0.2	4.8	- 0		
60 - 69.9		2.8		1.65		- 6.2		5.4			
70 - 74.9		3.1		1.65		- 6.8		5.4			
75 - 79.9		3.3		1.65		- 7.2		5.4			
80 - 89.9		3.5		1.65		- 7.6		5.4			
90 - 99.9		3.8		1.65		- 8.2		5.4			
100 - 104.9		4.1		1.65		- 8.8		5.4			
105 - 109.9		4.3		1.96		- 9.2		6.4			
110 - 119.9	H7	4.6	+ 0.1	1.96	+ 0.1	- 9.8	+ 0	6.4	+ 0.15	min. 2	0.2
120 - 129.9	H8	5.0	- 0.2	1.96	- 0.06	- 10.8	- 0.25	6.4	- 0		
130 - 149.9		5.5		1.96		- 11.8		6.4			
150 - 170.9		6.0		2.0		- 13.0		6.5			
*150 - 170.9		6.0		3.0		- 13.0		9.6			
171 - 199.9		7.0		2.0		- 15.0		6.5			
*171 - 199.9	H8	7.0	+ 0.15	3.0	+ 0.12	- 15.0	+ 0	9.6	+ 0.2	min. 3	0.3
200 - 259.9	H9	8.0	- 0.3	2.4	- 0.08	- 18.0	- 0.3	7.8	- 0		
*200 - 259.9		8.0		3.0		- 18.0		9.6			
260 - 319.9		9.0		3.0		- 20.0		9.6			
320 - 399.9		10.0		3.0		- 22.0		9.8			
400 - 439.9		11.0		3.0		- 24.0		9.8			
440 - 600.9		12.0		3.0		- 26.0		9.8			
*440 - 600.9		12.0		5.0		- 26.0		15.9			
601 - 699.9	H9	14.0	+ 0.2	5.0	+ 0.14	- 32.0	+ 0	16.2	+ 0.25	min. 4	0.4
700 - 799.9	H10	16.0	- 0.4	5.0	- 0.1	- 36.0	- 0.4	16.2	- 0		
800 - 899.9		18.0		5.0		- 40.0		16.5			
900 - 999.9		20.0		5.0		- 44.0		16.5			
1000 - 1300		22.0		5.0		- 48.0		16.5			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 29, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact bore or housing diameter "D₁"!

Ring materials

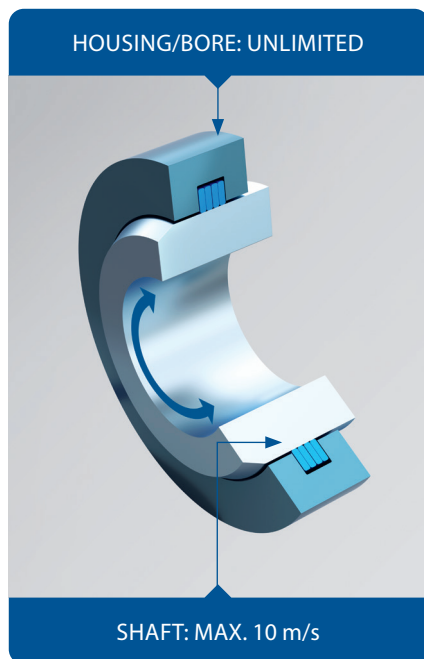
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

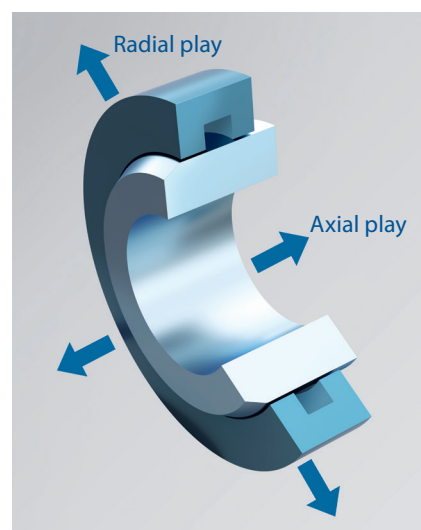
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be increased by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 6 ISD ring set ⁴⁾

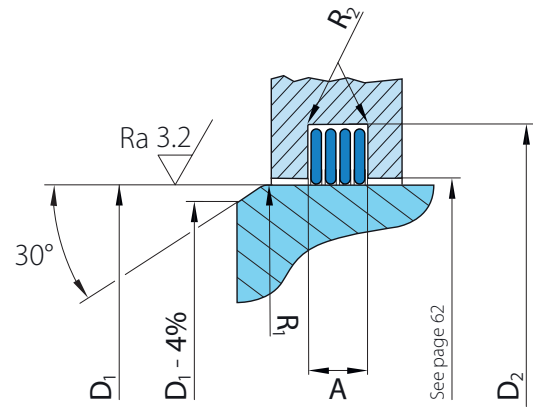
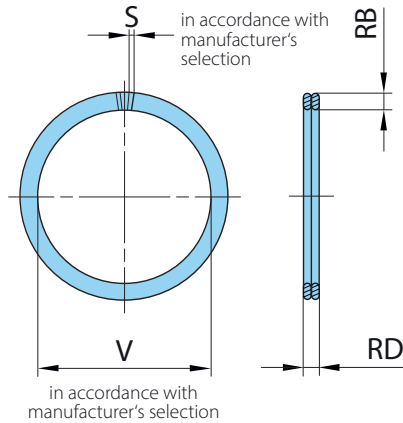
1 set = 2 ISD rings



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the shaft diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 2 ISD rings).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ plus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		1.3		+ 2.6		2.9			
25 - 29.9		1.2		1.3		+ 3.0		2.9			
30 - 35.9		1.5		1.3		+ 3.6		2.9			
36 - 42.9		1.8		1.3		+ 4.2		2.9			
43 - 48.9		2.2		1.45		+ 5.0		3.2			
49 - 51.9	h6	2.4	+ 0.1	1.45	+ 0.08	+ 5.4	+ 0.2	3.2	+ 0.1	min. 1	0.1
52 - 59.9	h7	2.6	- 0.1	1.45	- 0.04	+ 5.8	- 0	3.2	- 0		
60 - 69.9		2.8		1.65		+ 6.2		3.6			
70 - 74.9		3.1		1.65		+ 6.8		3.6			
75 - 79.9		3.3		1.65		+ 7.2		3.6			
80 - 89.9		3.5		1.65		+ 7.6		3.6			
90 - 99.9		3.8		1.65		+ 8.2		3.6			
100 - 104.9		4.1		1.65		+ 8.8		3.6			
105 - 109.9		4.3		1.96		+ 9.2		4.3			
110 - 119.9	h7	4.6	+ 0.1	1.96	+ 0.1	+ 9.8	+ 0.25	4.3	+ 0.15	min. 2	0.2
120 - 129.9	h8	5.0	- 0.2	1.96	- 0.06	+ 10.8	- 0	4.3	- 0		
130 - 149.9		5.5		1.96		+ 11.8		4.3			
150 - 170.9		6.0		2.0		+ 13.0		4.4			
*150 - 170.9		6.0		3.0		+ 13.0		6.5			
171 - 199.9		7.0		2.0		+ 15.0		4.4			
*171 - 199.9	h8	7.0	+ 0.15	3.0	+ 0.12	+ 15.0	+ 0.3	6.5	+ 0.2	min. 3	0.3
200 - 259.9	h9	8.0	- 0.3	2.4	- 0.08	+ 18.0	- 0	5.3	- 0		
*200 - 259.9		8.0		3.0		+ 18.0		6.5			
260 - 319.9		9.0		3.0		+ 20.0		6.5			
320 - 399.9		10.0		3.0		+ 22.0		6.6			
400 - 439.9		11.0		3.0		+ 24.0		6.6			
440 - 600.9		12.0		3.0		+ 26.0		6.6			
*440 - 600.9		12.0		5.0		+ 26.0		10.6			
601 - 699.9	h9	14.0	+ 0.2	5.0	+ 0.14	+ 32.0	+ 0.4	10.8	+ 0.25	min. 4	0.4
700 - 799.9	h10	16.0	- 0.4	5.0	- 0.1	+ 36.0	- 0	10.8	- 0		
800 - 899.9		18.0		5.0		+ 40.0		11.0			
900 - 999.9		20.0		5.0		+ 44.0		11.0			
1000 - 1300		22.0		5.0		+ 48.0		11.0			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 29, 62, 63, 64 and 65 (questionnaire).

Please specify the exact shaft diameter " D_1 " for enquiries and/or orders!

Ring materials

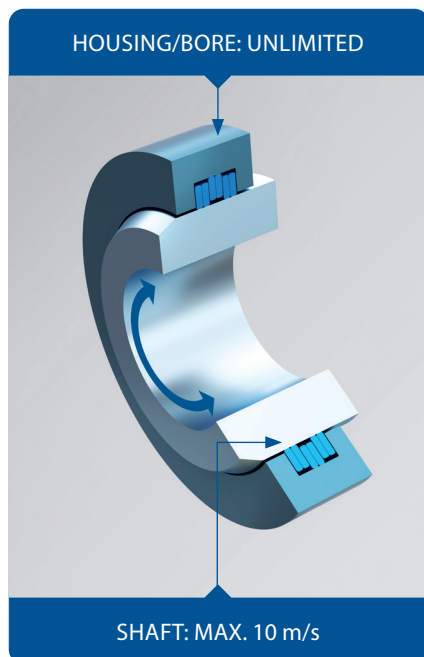
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

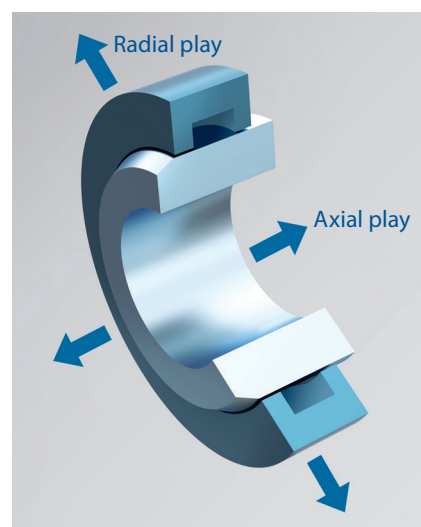
Please note: For rotation speeds above 1000 rpm, increase groove widths by at least 10% and use GLEITMO 980.



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired sealing effects can be achieved.

Axial and/or radial play ³⁾



Axial and/or radial play ³⁾:

If axial play occurs in the area of the rings, the groove width "A" must be increased by twice the play. If radial play occurs, the groove base diameter "D₂" must be increased by the radial play. If this is not observed, damage will occur to the rings and the surrounding components. It is advisable to apply the groove width tolerances, especially in the event of thermal expansion.

FK 6 ISKD ring set ⁴⁾

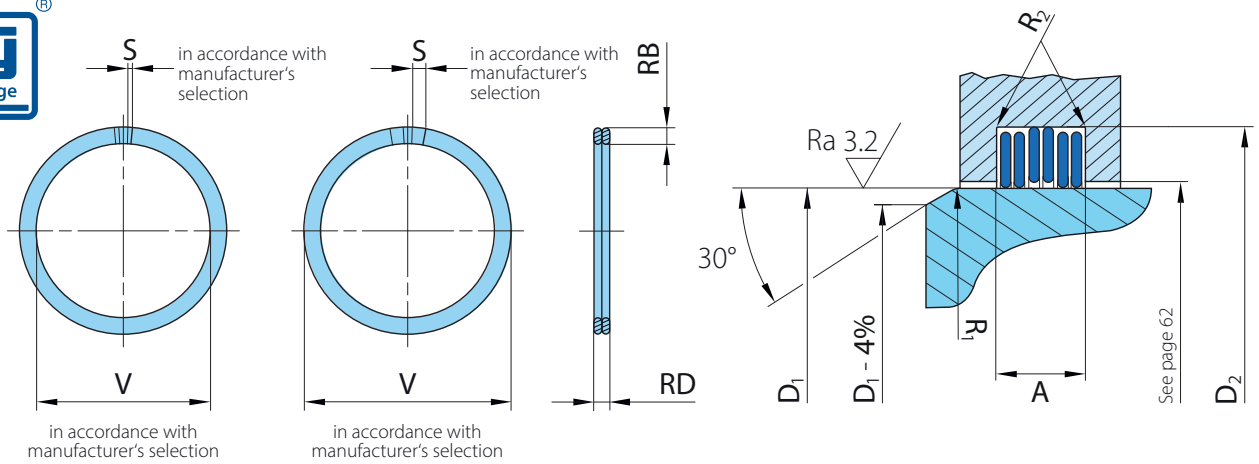
1 set = 2 ISD rings and 1 ASD ring



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the shaft diameter (nominal dimension) "D₁" exactly. The rings can be ordered individually or in sets (1 set = 2 ISD rings + 1 ASD ring).

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ plus}$	Tolerance	A	Tolerance	R_1	R_2
15 - 24.9		1.0		1.3		+ 2.6		4.3			
25 - 29.9		1.2		1.3		+ 3.0		4.3			
30 - 35.9		1.5		1.3		+ 3.6		4.3			
36 - 42.9		1.8		1.3		+ 4.2		4.3			
43 - 48.9		2.2		1.45		+ 5.0		4.8			
49 - 51.9	h6	2.4	+ 0.1	1.45	+ 0.08	+ 5.4	+ 0.2	4.8	+ 0.1	min. 1	0.1
52 - 59.9	h7	2.6	- 0.1	1.45	- 0.04	+ 5.8	- 0	4.8	- 0		
60 - 69.9		2.8		1.65		+ 6.2		5.4			
70 - 74.9		3.1		1.65		+ 6.8		5.4			
75 - 79.9		3.3		1.65		+ 7.2		5.4			
80 - 89.9		3.5		1.65		+ 7.6		5.4			
90 - 99.9		3.8		1.65		+ 8.2		5.4			
100 - 104.9		4.1		1.65		+ 8.8		5.4			
105 - 109.9		4.3		1.96		+ 9.2		6.4			
110 - 119.9	h7	4.6	+ 0.1	1.96	+ 0.1	+ 9.8	+ 0.25	6.4	+ 0.15	min. 2	0.2
120 - 129.9	h8	5.0	- 0.2	1.96	- 0.06	+ 10.8	- 0	6.4	- 0		
130 - 149.9		5.5		1.96		+ 11.8		6.4			
150 - 170.9		6.0		2.0		+ 13.0		6.5			
*150 - 170.9		6.0		3.0		+ 13.0		9.6			
171 - 199.9		7.0		2.0		+ 15.0		6.5			
*171 - 199.9	h8	7.0	+ 0.15	3.0	+ 0.12	+ 15.0	+ 0.3	9.6	+ 0.2	min. 3	0.3
200 - 259.9	h9	8.0	- 0.3	2.4	- 0.08	+ 18.0	- 0	7.8	- 0		
*200 - 259.9		8.0		3.0		+ 18.0		9.6			
260 - 319.9		9.0		3.0		+ 20.0		9.6			
320 - 399.9		10.0		3.0		+ 22.0		9.8			
400 - 439.9		11.0		3.0		+ 24.0		9.8			
440 - 600.9		12.0		3.0		+ 26.0		9.8			
*440 - 600.9		12.0		5.0		+ 26.0		15.9			
601 - 699.9	h9	14.0	+ 0.2	5.0	+ 0.14	+ 32.0	+ 0.4	16.2	+ 0.25	min. 4	0.4
700 - 799.9	h10	16.0	- 0.4	5.0	- 0.1	+ 36.0	- 0	16.2	- 0		
800 - 899.9		18.0		5.0		+ 40.0		16.5			
900 - 999.9		20.0		5.0		+ 44.0		16.5			
1000 - 1300		22.0		5.0		+ 48.0		16.5			

All dimensions in mm, *reinforced ring design

Note: Please refer to the information on pages 29, 62, 63, 64 and 65 (questionnaire).

Please specify the exact shaft diameter " D_1 " for enquiries and/or orders!

FK 7 ESB / ESW and DSB / DSW / DMS

single and double laminar retaining rings
for bores and shafts



FK 7 ESB / ESW and DSB / DSW / DMS

FK 7 ESB single retaining ring for bore

FK 7 ESW single retaining ring for shaft

The range of applications for the "FK 7 ESB" single wound laminar retaining rings for bores and the "FK 7 ESW" rings for shafts includes practically anywhere where components need to be axially limited, fixed and clamped securely, e.g. in gear manufacturing, in construction and agricultural machinery, for fixing elements in automotive and mechanical engineering, in the roller and plain bearing industry, in shipbuilding and aircraft construction, in conveyor belt systems, winches, pulleys, etc. Assembly and/or disassembly aids (semi-circular cut-outs at the ring ends) are special designs for single wound laminar retaining rings.

FK 7 DSB double retaining ring for bore

FK 7 DSW double retaining ring for shaft

The double wound laminar retaining rings "FK 7 DSB" for bores and "FK 7 DSW" for shafts are a valuable addition to the "FK 7 ESB" and "FK 7 ESW" single wound laminar retaining rings. The range of applications for double wound laminar retaining rings for bores/shafts includes practically anywhere where components need to be axially limited, fixed and clamped securely, e.g. in gear manufacturing, in construction and agricultural machinery, for fixing elements in automotive and mechanical engineering, in the roller and plain bearing industry, in shipbuilding and aircraft construction, in conveyor belt systems, winches, pulleys, etc.

FK 7 DMS double laminar retaining rings with centrifugal force protection

These rings can be used for rotation speeds that "FK 7 DSW" retaining rings cannot cope with.

Advantages of the double-wound laminar retaining rings:

- **Roundness of the closed helix over 360° ensures firm contact with the groove base and full circumferential closure**
- **Uniform dynamic weight during rotation**
- **Higher axial load capacity compared to the "FK 7 ESB" and "FK 7 ESW" single wound laminar retaining rings**

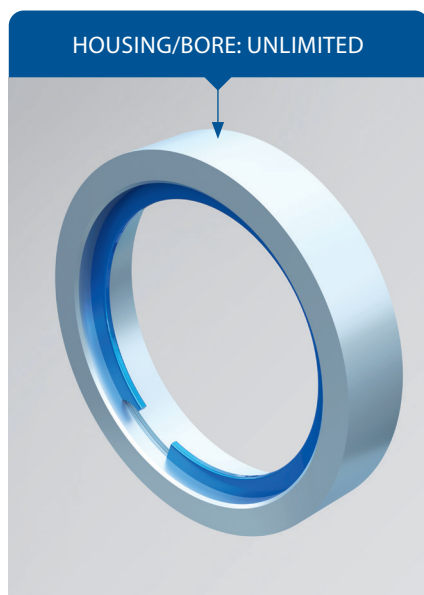
Ring materials

STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

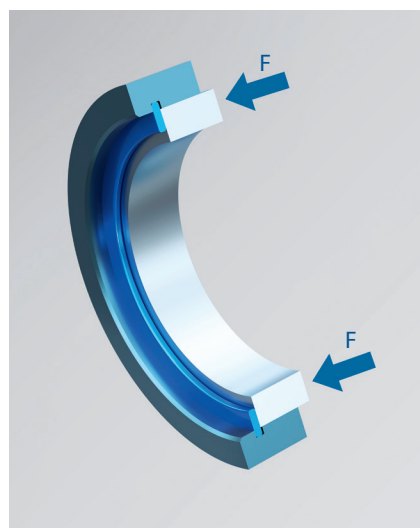
Permissible circumferential speed



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the retaining rings can withstand the required stress.

Axial load ³⁾



Axial load ³⁾:

In order to determine the axial load capacity of the retaining rings, shear tests must be carried out under operating conditions. If there are uncontrollable axial impacts between the surrounding components and the laminar rings during operation (coupling effect) or extreme vibration of the components, the secure position of the retaining rings in the groove cannot be guaranteed.

FK 7 ESB ring ⁴⁾

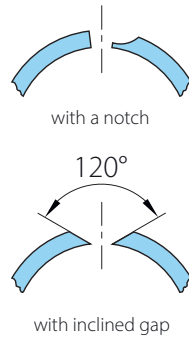


Order information ⁴⁾:

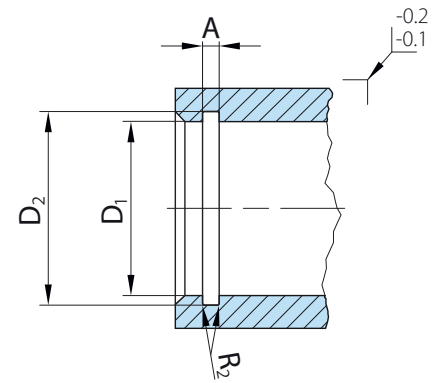
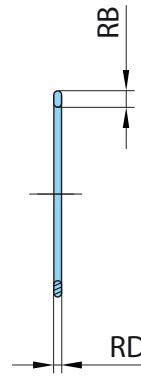
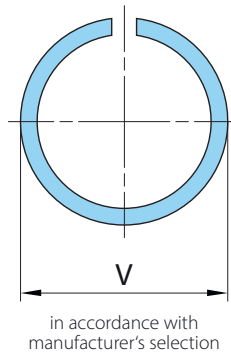
For enquiries and/or orders, please specify the exact bore diameter "D₁", the operating temperature and rotation speed!

Fitting instructions and installation tips can be found on pages 62 and 63.

On request
special design
assembly/disassembly feature



Standard design
(ring end straight)



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS				
Bore D ₁	Tolerance	RB	Tolerance	RD	Tolerance	D ₂ = D ₁ plus	Tolerance	A	Tolerance	R ₂
15 - 20.9		1.5		0.65		+ 0.8		0.75		
21 - 29.9		1.8		0.65		+ 0.9		0.75		
30 - 35.9		2.2		0.72		+ 1.2		0.85		
36 - 42.9		2.8		0.82	+ 0.05	+ 1.6	+ 0.1	0.95	+ 0.05	0.1
43 - 51.9	H6	3.1		0.82	- 0.02	+ 1.8	- 0	0.95	- 0	
52 - 59.9	H7	3.5	+ 0.1	0.82		+ 2.0		0.95		
60 - 69.9		3.8	- 0.2	0.82		+ 2.0		0.95		
70 - 74.9		4.1		0.82		+ 2.5		0.95		
75 - 79.9		4.3		0.98		+ 2.5		1.1		
80 - 89.9		4.6		0.98	+ 0.06	+ 2.8	+ 0.2	1.1	+ 0.1	0.1
90 - 99.9		5.0		0.98	- 0.03	+ 3.0	- 0	1.1	- 0	
100 - 109.9		5.5		0.98		+ 3.0		1.1		
110 - 129.9	H7	6.0	+ 0.1 / -0.2	1.0	+ 0.06 / -0.03	+ 3.5		1.15	+ 0.1 / -0	0.2
130 - 149.9	H8	6.0	+ 0.15 / -0.3	1.5	+ 0.08 / -0.04	+ 3.5		1.65	+ 0.15 / -0	
150 - 169.9		7.0		1.5		+ 4.0		1.65		
170 - 199.9		8.0		1.5		+ 5.0		1.65		
200 - 259.9		9.0	+ 0.15	1.5	+ 0.08	+ 5.0	+ 0.3	1.65	+ 0.15	0.3
260 - 319.9	H8	10.0	- 0.3	1.5	- 0.04	+ 5.5	- 0	1.65	- 0	
320 - 399.9	H9	11.0		1.5		+ 6.0		1.65		
400 - 439.9		12.0		1.5		+ 7.0		1.65		
440 - 599.9		12.0		2.5		+ 7.0		2.7		
600 - 699.9		14.0		2.5		+ 8.0		2.7		
700 - 799.9		16.0	+ 0.2	2.5	+ 0.1	+ 9.0	+ 0.4	2.7	+ 0.2	0.4
800 - 899.9		18.0	- 0.4	2.5	- 0.05	+ 10.0	- 0	2.7	- 0	
900 - 999.9	H9	20.0		2.5		+ 11.0		2.7		
1000 - 1300	H10	22.0		2.5		+ 12.0		2.7		

All dimensions in mm

Note: Please refer to the information on pages 39, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact bore diameter "D₁", the operating temperature and rotation speeds!

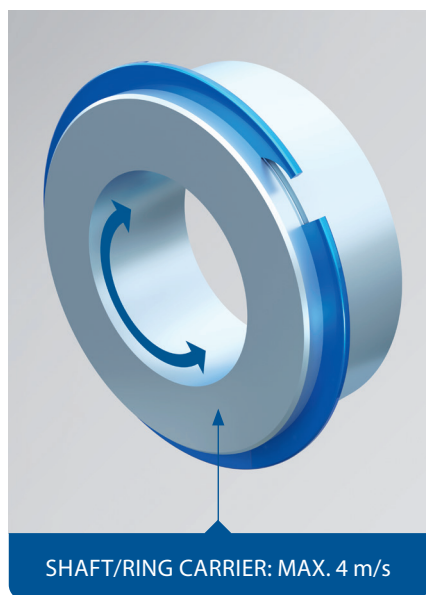
Ring materials

STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

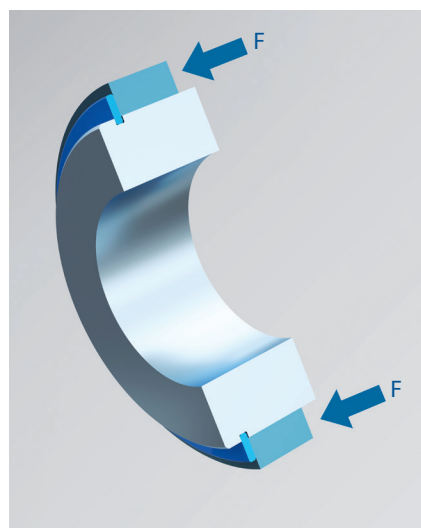
Permissible circumferential speed



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the retaining rings can withstand the required stress.

Axial load ³⁾



Axial load ³⁾:

In order to determine the axial load capacity of the retaining rings, shear tests must be carried out under operating conditions. If there are uncontrollable axial impacts between the surrounding components and the laminar rings during operation (coupling effect) or extreme vibration of the components, the secure position of the retaining rings in the groove cannot be guaranteed.

FK 7 ESW ring ⁴⁾

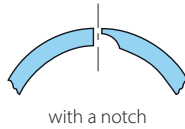


Order information ⁴⁾:

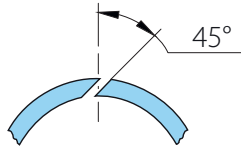
For enquiries and/or orders, please specify the exact bore diameter " D_1 ", the operating temperature and shaft rotation speed!

Fitting instructions and installation tips can be found on pages 62 and 63.

On request
special design
assembly/disassembly feature

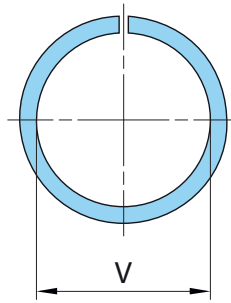


with a notch

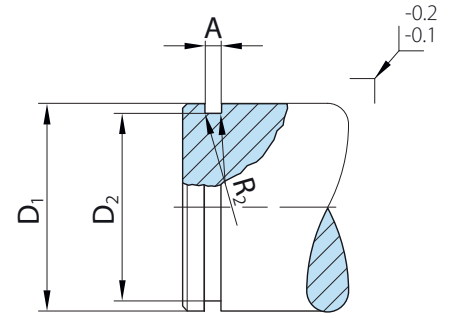
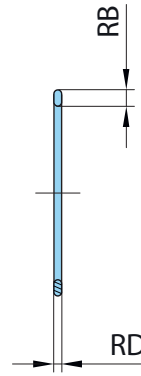


with inclined gap

Standard design
(ring end straight)



in accordance with
manufacturer's selection



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS				
Shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	R_2
15 - 20.9		1.5		0.65		- 0.8		0.75		
21 - 29.9		1.8		0.65		- 0.9		0.75		
30 - 35.9		2.2		0.72		- 1.2		0.85		
36 - 42.9		2.8		0.82	+ 0.05	- 1.6	+ 0	0.95	+ 0.05	0.1
43 - 51.9	h6	3.1		0.82	- 0.02	- 1.8	- 0.1	0.95	- 0	
52 - 59.9	h7	3.5	+ 0.1	0.82		- 2.0		0.95		
60 - 69.9		3.8	- 0.2	0.82		- 2.0		0.95		
70 - 74.9		4.1		0.82		- 2.5		0.95		
75 - 79.9		4.3		0.98		- 2.5		1.1		
80 - 89.9		4.6		0.98	+ 0.06	- 2.8	+ 0	1.1	+ 0.1	0.1
90 - 99.9		5.0		0.98	- 0.03	- 3.0	- 0.2	1.1	- 0	
100 - 109.9		5.5		0.98		- 3.0		1.1		
110 - 129.9	h7	6.0	+ 0.1 / - 0.2	1.0	+ 0.06 / - 0.03	- 3.5		1.15	+ 0.1 / - 0	0.2
130 - 149.9	h8	6.0	+ 0.15 / - 0.3	1.5	+ 0.08 / - 0.04	- 3.5		1.65	+ 0.15 / - 0	
150 - 169.9		7.0		1.5		- 4.0		1.65		
170 - 199.9		8.0		1.5		- 5.0		1.65		
200 - 259.9		9.0	+ 0.15	1.5	+ 0.08	- 5.0	+ 0	1.65	+ 0.15	0.3
260 - 319.9	h8	10.0	- 0.3	1.5	- 0.04	- 5.5	- 0.3	1.65	- 0	
320 - 399.9	h9	11.0		1.5		- 6.0		1.65		
400 - 439.9		12.0		1.5		- 7.0		1.65		
440 - 599.9		12.0		2.5		- 7.0		2.7		
600 - 699.9		14.0		2.5		- 8.0		2.7		
700 - 799.9		16.0	+ 0.2	2.5	+ 0.1	- 9.0	+ 0	2.7	+ 0.2	0.4
800 - 899.9		18.0	- 0.4	2.5	- 0.05	- 10.0	- 0.4	2.7	- 0	
900 - 999.9	h9	20.0		2.5		- 11.0		2.7		
1000 - 1300	h10	22.0		2.5		- 12.0		2.7		

All dimensions in mm

Note: Please refer to the information on pages 39, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact shaft diameter " D_1 ", the operating temperature and shaft rotation speed!

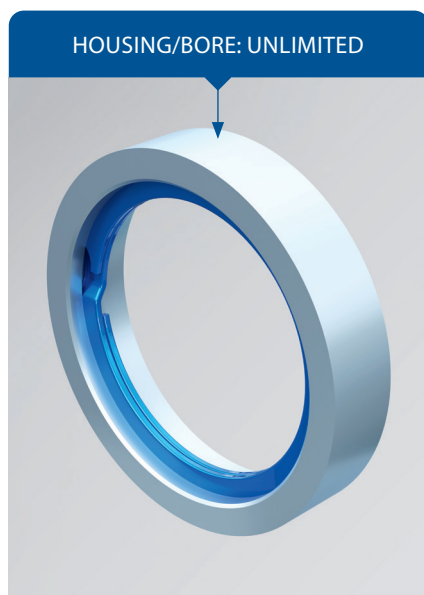
Ring materials

STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

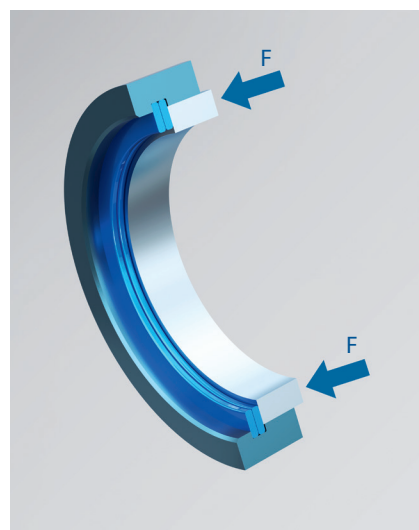
Permissible circumferential speed



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the retaining rings can withstand the required stress.

Axial load ³⁾



Axial load ³⁾:

In order to determine the axial load capacity of the retaining rings, shear tests must be carried out under operating conditions. If there are uncontrollable axial impacts between the surrounding components and the laminar rings during operation (coupling effect) or extreme vibration of the components, the secure position of the retaining rings in the groove cannot be guaranteed.

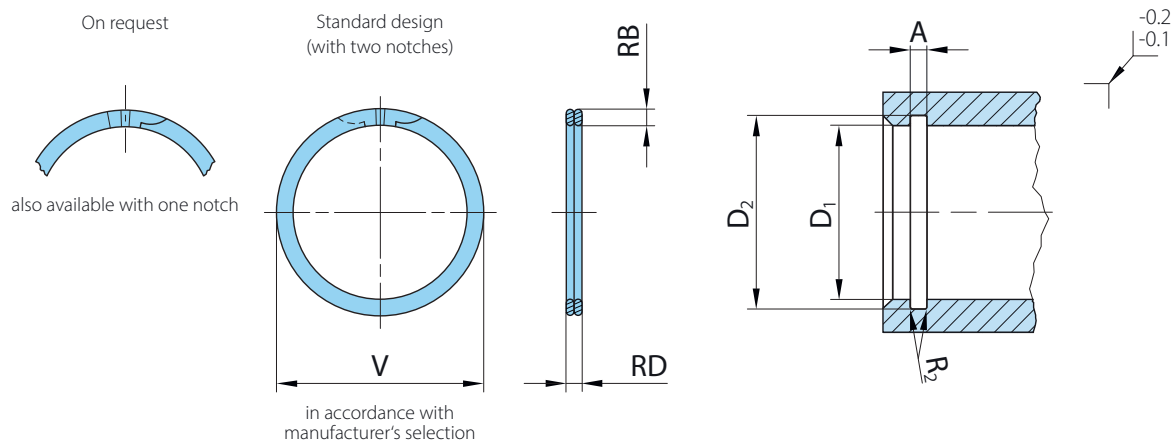
FK 7 DSB ring ⁴⁾



Order information ⁴⁾:

For enquiries and/or orders, please specify the exact bore diameter "D₁", the operating temperature and rotation speed!

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS				
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ plus}$	Tolerance	A	Tolerance	R_2
15 - 20.9		1.5		1.3		+ 0.8		1.45		
21 - 29.9		1.8		1.3		+ 0.9		1.45		
30 - 35.9		2.2		1.45		+ 1.2		1.6		
36 - 42.9		2.8		1.65	+ 0.1	+ 1.6	+ 0.1	1.8	+ 0.05	0.1
43 - 51.9	H6	3.1		1.65	- 0.04	+ 1.8	- 0	1.8	- 0	
52 - 59.9	H7	3.5	+ 0.1	1.65		+ 2.0		1.8		
60 - 69.9		3.8	- 0.2	1.65		+ 2.0		1.8		
70 - 74.9		4.1		1.65		+ 2.5		1.8		
75 - 79.9		4.3		1.98		+ 2.5		2.15		
80 - 89.9		4.6		1.98	+ 0.12	+ 2.8	+ 0.2	2.15	+ 0.1	0.1
90 - 99.9		5.0		1.98	- 0.06	+ 3.0	- 0	2.15	- 0	
100 - 109.9		5.5		1.98		+ 3.0		2.15		
110 - 129.9	H7	6.0	+ 0.1 / - 0.2	2.0	+ 0.12 / - 0.06	+ 3.5		2.2	+ 0.1 / - 0	0.2
130 - 149.9	H8	6.0	+ 0.15 / - 0.3	3.0	+ 0.15 / - 0.08	+ 3.5		3.2	+ 0.15 / - 0	
150 - 169.9		7.0		3.0		+ 4.0		3.2		
170 - 199.9		8.0		3.0		+ 5.0		3.2		
200 - 259.9		9.0	+ 0.15	3.0	+ 0.15	+ 5.0	+ 0.3	3.2	+ 0.15	0.3
260 - 319.9	H8	10.0	- 0.3	3.0	- 0.08	+ 5.5	- 0	3.2	- 0	
320 - 399.9	H9	11.0		3.0		+ 6.0		3.2		
400 - 439.9		12.0		3.0		+ 7.0		3.2		
440 - 599.9		12.0		5.0		+ 7.0		5.3		
600 - 699.9		14.0		5.0		+ 8.0		5.3		
700 - 799.9		16.0	+ 0.2	5.0	+ 0.2	+ 9.0	+ 0.4	5.3	+ 0.2	0.4
800 - 899.9		18.0	- 0.4	5.0	- 0.1	+ 10.0	- 0	5.3	- 0	
900 - 999.9	H9	20.0		5.0		+ 11.0		5.3		
1000 - 1300	H10	22.0		5.0		+ 12.0		5.3		

All dimensions in mm

Note: Please refer to the information on pages 39, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact shaft diameter " D_1 ", the operating temperature and shaft rotation speed!

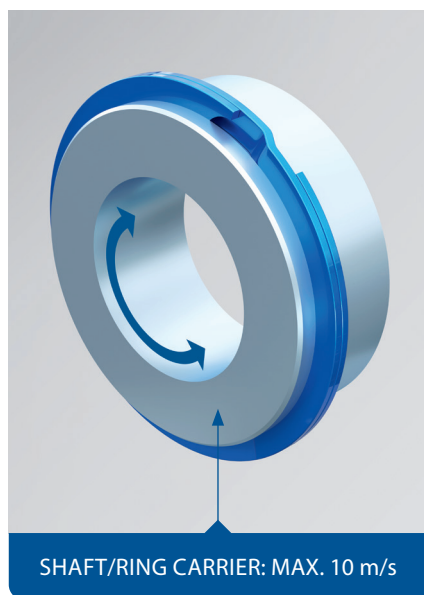
Ring materials

STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bruish to brownish/black.

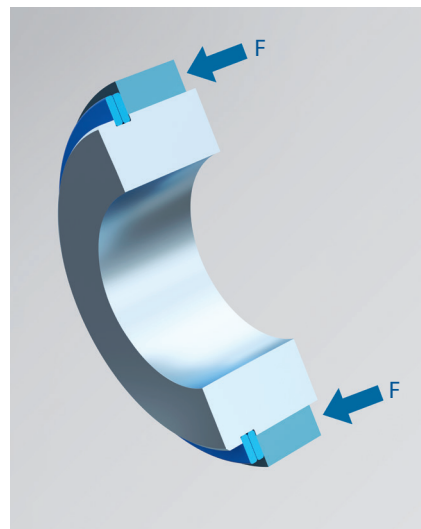
Permissible circumferential speed



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the retaining rings can withstand the required stress.

Axial load ³⁾



Axial load ³⁾:

In order to determine the axial load capacity of the retaining rings, shear tests must be carried out under operating conditions. If there are uncontrollable axial impacts between the surrounding components and the laminar rings during operation (coupling effect) or extreme vibration of the components, the secure position of the retaining rings in the groove cannot be guaranteed.

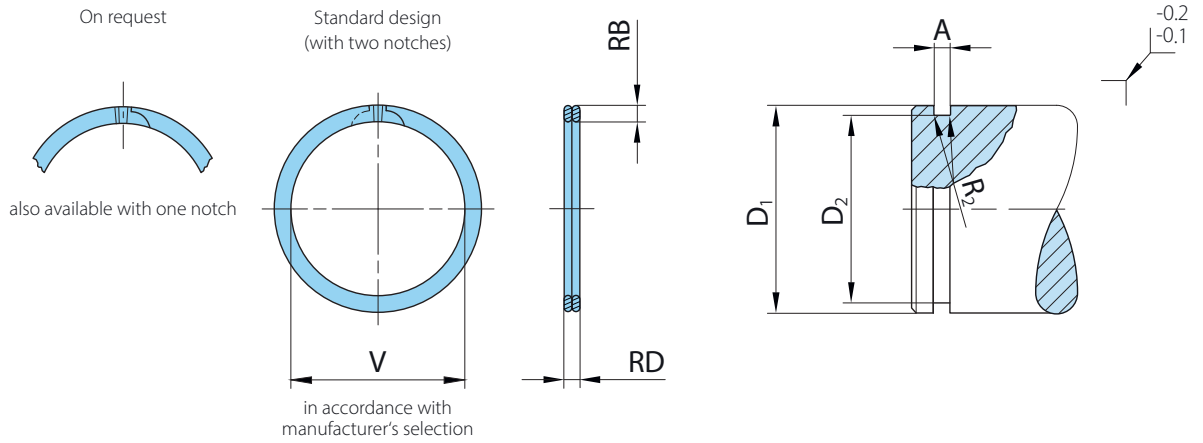
FK 7 DSW ring ⁴⁾



Order information ⁴⁾:

For enquiries and/or orders, please specify the exact shaft diameter "D₁", the operating temperature and shaft rotation speed!

Fitting instructions and installation tips can be found on pages 62 and 63.



NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS				
Shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	R_2
15 - 20.9		1.5		1.3		- 0.8		1.45		
21 - 29.9		1.8		1.3		- 0.9		1.45		
30 - 35.9		2.2		1.45		- 1.2		1.6		
36 - 42.9		2.8		1.65	+ 0.1	- 1.6	+ 0	1.8	+ 0.05	0.1
43 - 51.9	h6	3.1		1.65	- 0.04	- 1.8	- 0.1	1.8	- 0	
52 - 59.9	h7	3.5	+ 0.1	1.65		- 2.0		1.8		
60 - 69.9		3.8	- 0.2	1.65		- 2.0		1.8		
70 - 74.9		4.1		1.65		- 2.5		1.8		
75 - 79.9		4.3		1.98		- 2.5		2.15		
80 - 89.9		4.6		1.98	+ 0.12	- 2.8	+ 0	2.15	+ 0.1	0.1
90 - 99.9		5.0		1.98	- 0.06	- 3.0	- 0.2	2.15	- 0	
100 - 109.9		5.5		1.98		- 3.0		2.15		
110 - 129.9	h7	6.0	+ 0.1 / - 0.2	2.0	+ 0.12 / - 0.06	- 3.5		2.2	+ 0.1 / - 0	0.2
130 - 149.9	h8	6.0	+ 0.15 / - 0.3	3.0	+ 0.15 / - 0.08	- 3.5		3.2	+ 0.15 / - 0	
150 - 169.9		7.0		3.0		- 4.0		3.2		
170 - 199.9		8.0		3.0		- 5.0		3.2		
200 - 259.9		9.0	+ 0.15	3.0	+ 0.15	- 5.0	+ 0	3.2	+ 0.15	0.3
260 - 319.9	h8	10.0	- 0.3	3.0	- 0.08	- 5.5	- 0.3	3.2	- 0	
320 - 399.9	h9	11.0		3.0		- 6.0		3.2		
400 - 439.9		12.0		3.0		- 7.0		3.2		
440 - 599.9		12.0		5.0		- 7.0		5.3		
600 - 699.9		14.0		5.0		- 8.0		5.3		
700 - 799.9		16.0	+ 0.2	5.0	+ 0.2	- 9.0	+ 0	5.3	+ 0.2	0.4
800 - 899.9		18.0	- 0.4	5.0	- 0.1	- 10.0	- 0.4	5.3	- 0	
900 - 999.9	h9	20.0		5.0		- 11.0		5.3		
1000 - 1300	h10	22.0		5.0		- 12.0		5.3		

All dimensions in mm

Note: Please refer to the information on pages 39, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact shaft diameter " D_1 ", the operating temperature and shaft rotation speed!

FK 7 DMS

Double laminar retaining rings for shafts
(with centrifugal force protection)



Ring materials

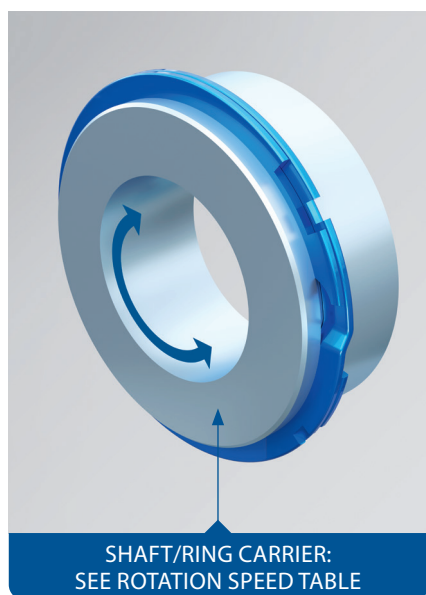
STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
51CrV4	max. +400°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Bright and dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section, measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of thermal treatment from silver/bluish to brownish/black.

Permissible circumferential speed

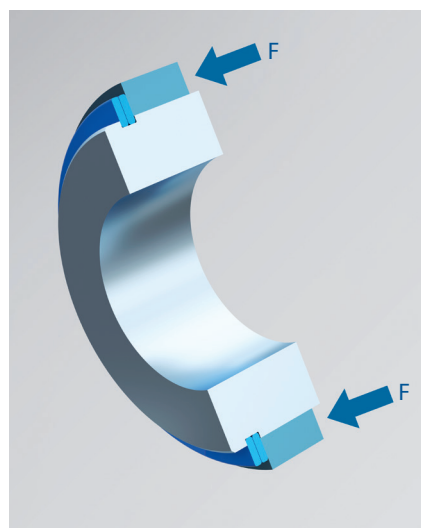
Please note: Be sure to observe the speed table on page 49!



Running and assembly tests:

Before our laminar rings are used in series production, running and assembly tests must always be carried out under operating conditions to determine whether the retaining rings can withstand the required stress.

Axial load ³⁾



Axial load ³⁾

In order to determine the axial load capacity of the retaining rings, shear tests must be carried out under operating conditions. If there are uncontrollable axial impacts between the surrounding components and the laminar rings during operation (coupling effect) or extreme vibration of the components, the secure position of the retaining rings in the groove cannot be guaranteed.

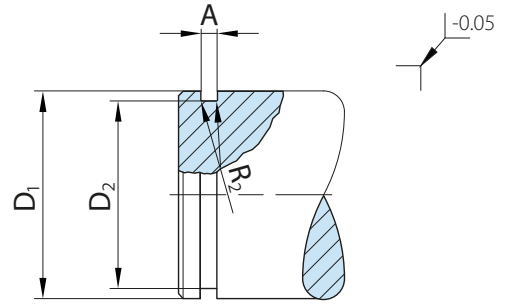
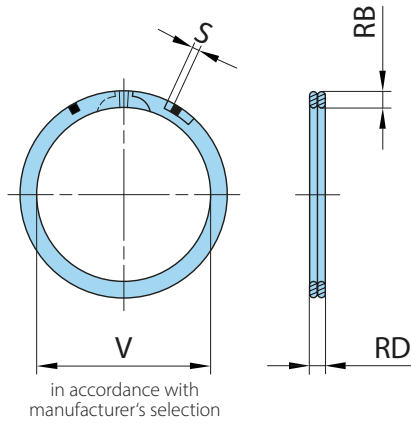
FK 7 DMS ring ⁴⁾



Order information ⁴⁾:

For enquiries and/or orders, the ring diameter specification must correspond to the shaft diameter "D₁" exactly.

Fitting instructions and installation tips can be found on pages 62 and 63.

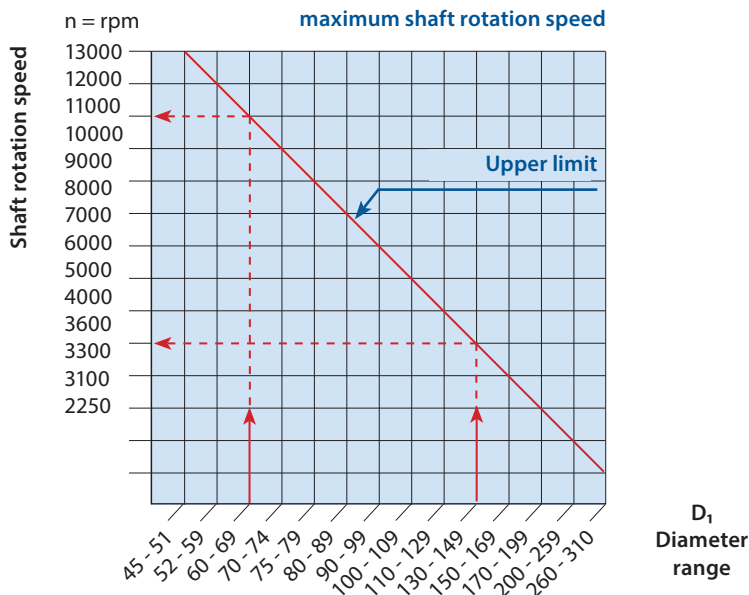


NOMINAL DIMENSION		RING DIMENSIONS				GROOVE DIMENSIONS					
Shaft D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	S	R_2
45 - 51.9		3.5		1.65		- 2.0		1.8			
52 - 59.9		3.5	+ 0.1	1.65		- 2.0		1.8			
60 - 69.9		3.8	- 0.1	1.65		- 2.0		1.8			
70 - 74.9		4.1		1.65		- 2.5		1.8			
75 - 79.9		4.3		1.98		- 2.5		2.15			
80 - 89.9		4.6		1.98		- 2.8		2.15			
90 - 99.9	h7	5.0	+ 0.1	1.98	+ 0.1	- 3.0	+ 0	2.15	+ 0.05	max. 1.0	max. 0.1
100 - 109.9		5.5	- 0.2	1.98	- 0	- 3.0	- 0.05	2.15	- 0		
110 - 129.9		6.0		2.0		- 3.5		2.15			
130 - 149.9		6.0		3.0		- 3.5		3.15			
150 - 169.9		7.0		3.0		- 4.0		3.15			
170 - 199.9		8.0	+ 0.15	3.0		- 5.0		3.15			
200 - 259.9		9.0	- 0.3	3.0		- 5.0		3.15			
260 - 310		10.0		3.0		- 5.5		3.15			

All dimensions in mm

Note: Please refer to the information on pages 2, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please specify the exact shaft diameter " D_1 ", the operating temperature and shaft rotation speed!



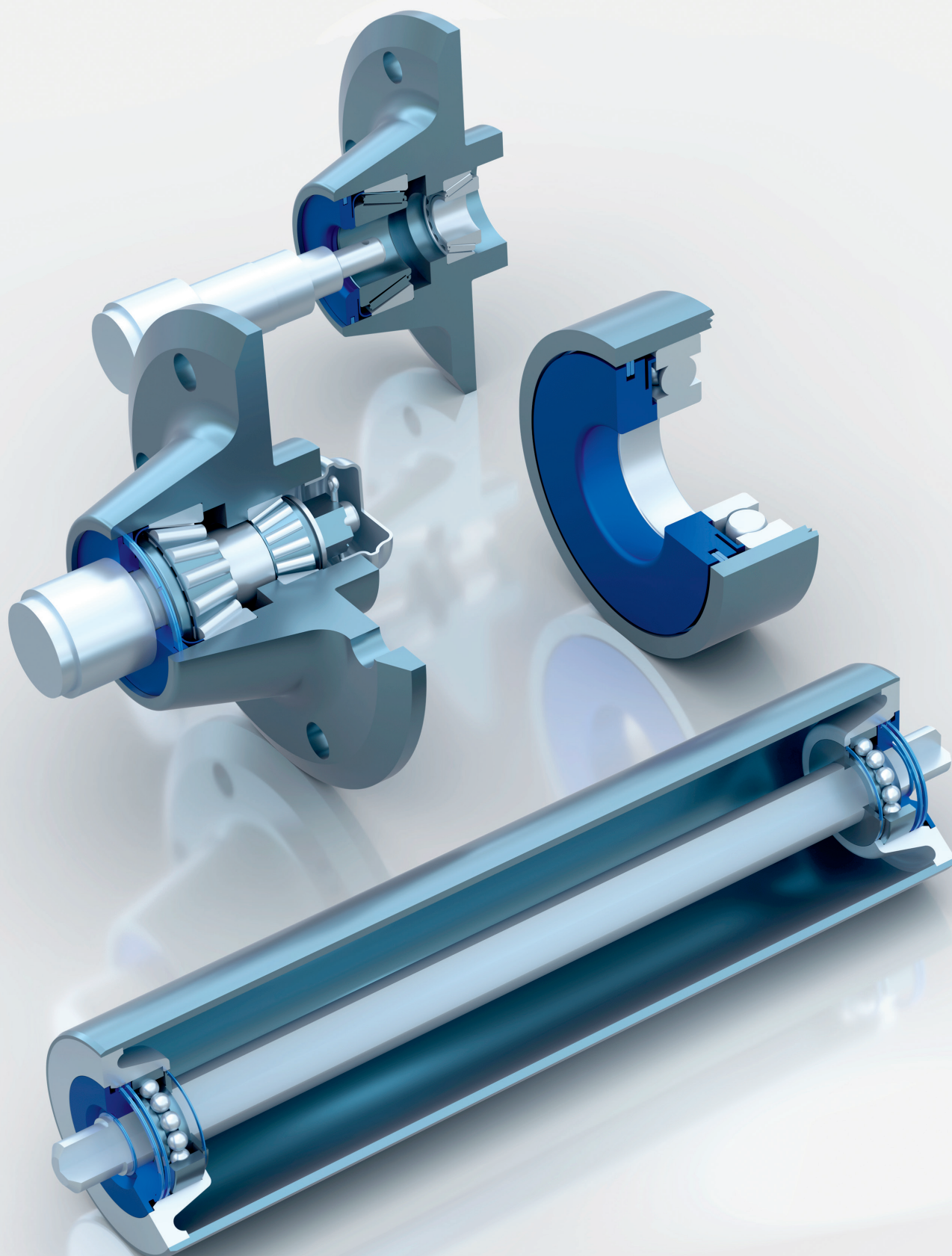
Important note:

If there are uncontrollable axial impacts of the surrounding components against the laminar rings during operation (coupling effect) or extreme vibration of the shafts, the secure position of the "FK 7 DMS" rings in the groove cannot be guaranteed.

In addition to the stated max. permissible shaft rotation speed, installation and long term run tests must be performed under operating conditions.

FK 8

Plastic laminar ring carrier seals as bearing stop and spacer for grease-lubricated roller bearings



FK 8

Plastic laminar ring carrier seal

The ring carrier seals made of polyamide 6 (PA6) are also available with mineral/glass fibre reinforcement and are used to seal roller bearings against grease leakage and dirt and splash water ingress in vehicle axles, rollers and wheels of all kinds (e.g. transport technology) and in various movement sequences in construction and agricultural machinery.

Ring carrier seals in versions 01 and 02 are equipped with resilient, flexible sealing lips.

This is advantageous if a lot of splash water is expected in the sealing area.

Plastic laminar ring carrier seals are also suitable as protective seals in front of the shaft seal.

FK 8

Plastic laminar ring carrier seals as bearing stop and spacer for grease-lubricated roller bearings

Ring materials

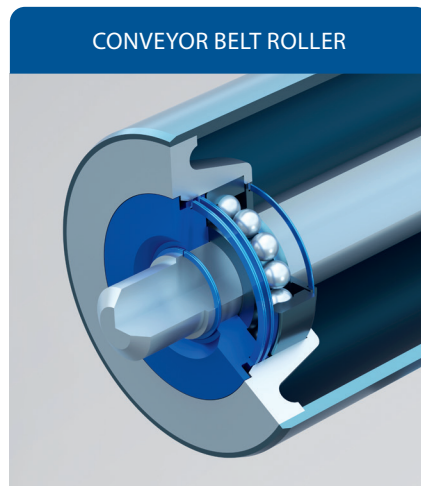
PLASTIC GRADE	REINFORCED VERSION	OPERATING TEMPERATURE	LAMINAR RING MATERIAL
PA6 (polyamide 6)	-	-40°C to +120°C ¹⁾	C75 ³⁾ 1.4310 ³⁾
PA6 ²⁾ (polyamide 6)	Mineral fibre reinforced	-40°C to +120°C ¹⁾	1.4571 ³⁾

¹⁾ Temperature resistance at -40°C to +120°C unlimited, short-term temperature resistance at max. +150°C.

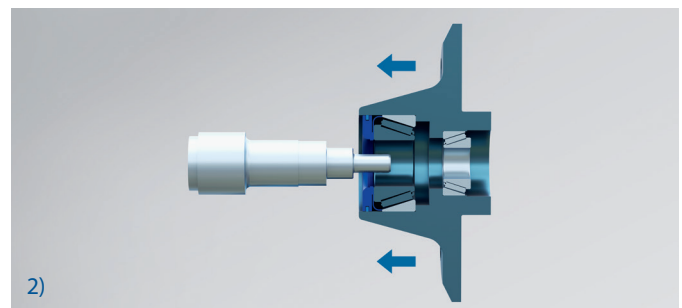
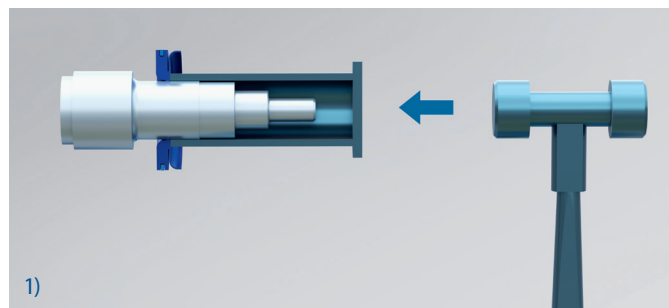
²⁾ Not all ring carrier sizes are available in a reinforced version; please contact our technical office about this.

³⁾ These laminar ring materials are available depending on the requirements; please specify the laminar ring material on the order.

Sample applications:



Fitting:



In general, ring carriers can be pushed onto the axle stub by hand or with a light tap from a mallet (1). If an assembly chamfer is not required or is only small, the ring carrier should first be inserted into the hub (2) by hand.

Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our ring carrier seals can begin to determine whether the desired sealing effects can be achieved.

Design 01:

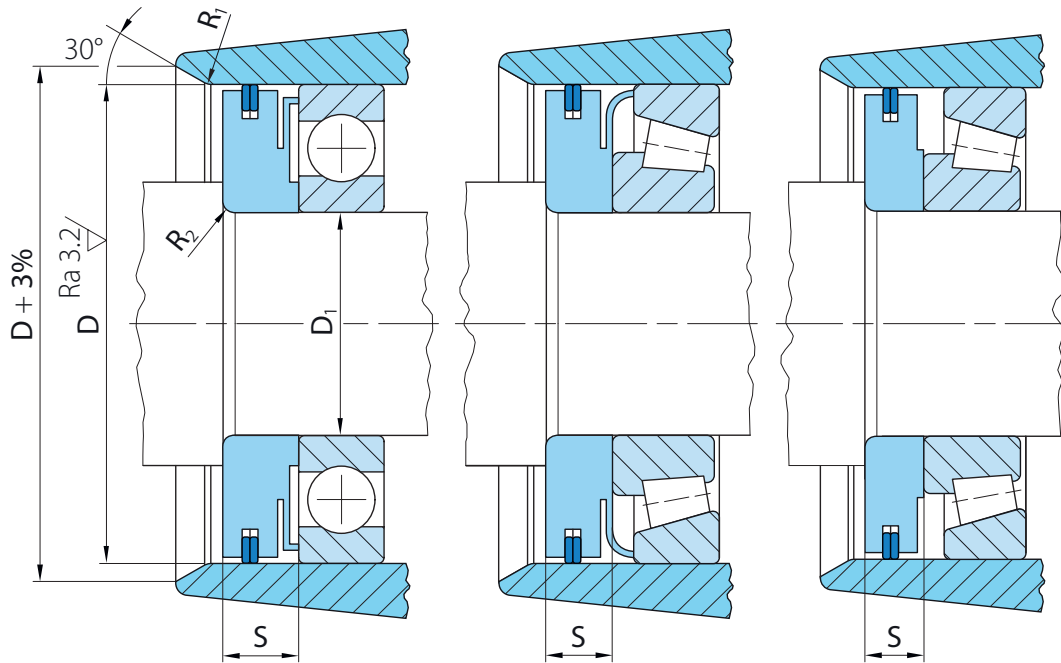
Ring carrier with a short sealing lip for symmetrical roller bearings

Design 02:

Ring carrier with a long sealing lip for tapered roller bearings

Design 03:

Ring carrier without sealing lip



VERSION			BORE		SHAFT		RING CARRIER		ORDER INFORMATION
01	02	03	D	R ₁	D ₁	R ₂	S	Werkstoff	Artikelnummer
•			47	1	25	2	7.7	PA6 (polyamid 6)	472577 R1
•			52		25		6		52256 R2
	•		52		25		6		52256 K1
	•		55		30	3	7		55307 K1
	•		62		30		7		62307 K1
	•		62		35		7		62357 K1
	•		72	2	35		7		72357 K1
	•		80		40	3.5	7		80407
	•		85		45	4	7		85457
	•		90		50	4	7.5		905075
	•		100		55		8		100558
	•		120		65	4.5	9		120659
	•		125	3	70		10		1257010
	•		125		80	5	10		1258010
	•		140		80		9		140809

OTHER DIMENSIONS AVAILABLE ON REQUEST

PLEASE CONTACT OUR
TECHNICAL OFFICE!

All dimensions in mm

Note: Please refer to the information on pages 51, 62, 63, 64 and 65 (questionnaire).

For enquiries and/or orders, please state the exact bore diameter "D" and the item number; in addition, details of the operating temperatures must be provided.

FK 9 WF

Wave spring as axial length compensation (axial spring)
for static applications



FK 9 WF

FK 9 wave spring

The wave spring is a compact axial spring that gets its spring properties from its wave shape.

The FK 9 wave spring is primarily used for tensioning and adjustment in applications with high temperatures. This makes it suitable for use in exhaust gas connectors, for example. An FK 5-HFL Fey laminar ring can be clamped in place here to cover the sealing gap of the plug-in connector. The resulting double sealing line can reduce leakage.

Axial movements due to thermal expansion are offset by the spring movement. Use of this sealing technology is limited to static applications.

FK 9 WF

Wave spring as axial length compensation (axial spring)
for static applications



Ring materials

STEEL GRADE	SPRING RESISTANT UP TO	HARDNESS VALUE	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	Dry	Varies ²⁾
1.4571	max. +500°C	On request ¹⁾	Dry	Varies ²⁾
1.4980	max. +700°C	On request ¹⁾	Dry	Varies ²⁾

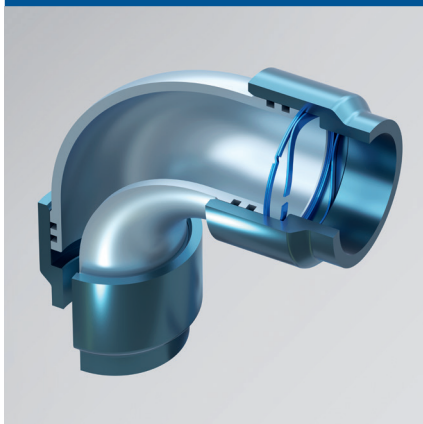
¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section measured in Rockwell HRA or HRC.

²⁾ The surface colour can vary depending on the type of heat treatment from bright silver/bruish colour to brownish/black.

Sample applications:

Please note: The use of FK 9 wave springs is limited to static applications only!

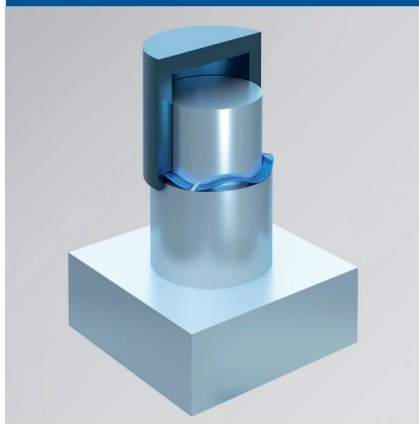
PLUG CONNECTION



Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the selected installation space is sufficiently large, based on the assumed thermal expansion.

DAMPER



Thermal expansions:

Temperature and material-dependent thermal expansions and, in some cases, geometric deformations of the components must be taken into account and included in the design. These values must be known in order to prevent the parts from blocking during operation. For more information, please contact our technical office.

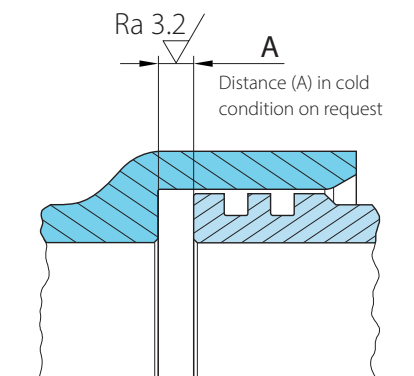
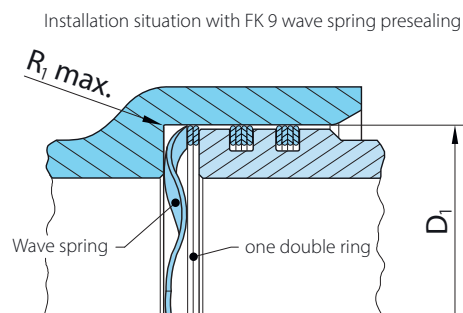
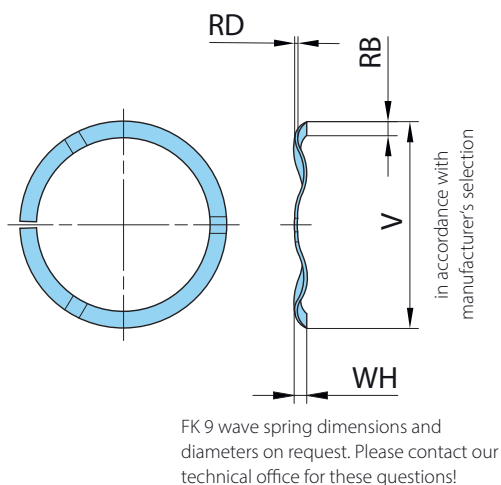
FK 9 PRE-SEAL 1 PIECE FK 9 WF + 1 PIECE FK 5-HFL ASD



Order information:

For enquiries and/or orders, the ring diameter specification must correspond to the housing or bore diameter "D₁" exactly. Sealing units each consist of an FK 9 wave spring and a sealing ring (e.g. 1 piece FK 9 WF + 1 piece FK 5-HFL ASD).

Fitting instructions and installation tips can be found on pages 62 and 63.



Wave height WH:

For the design of FK 9 wave springs, please always contact our technical office.

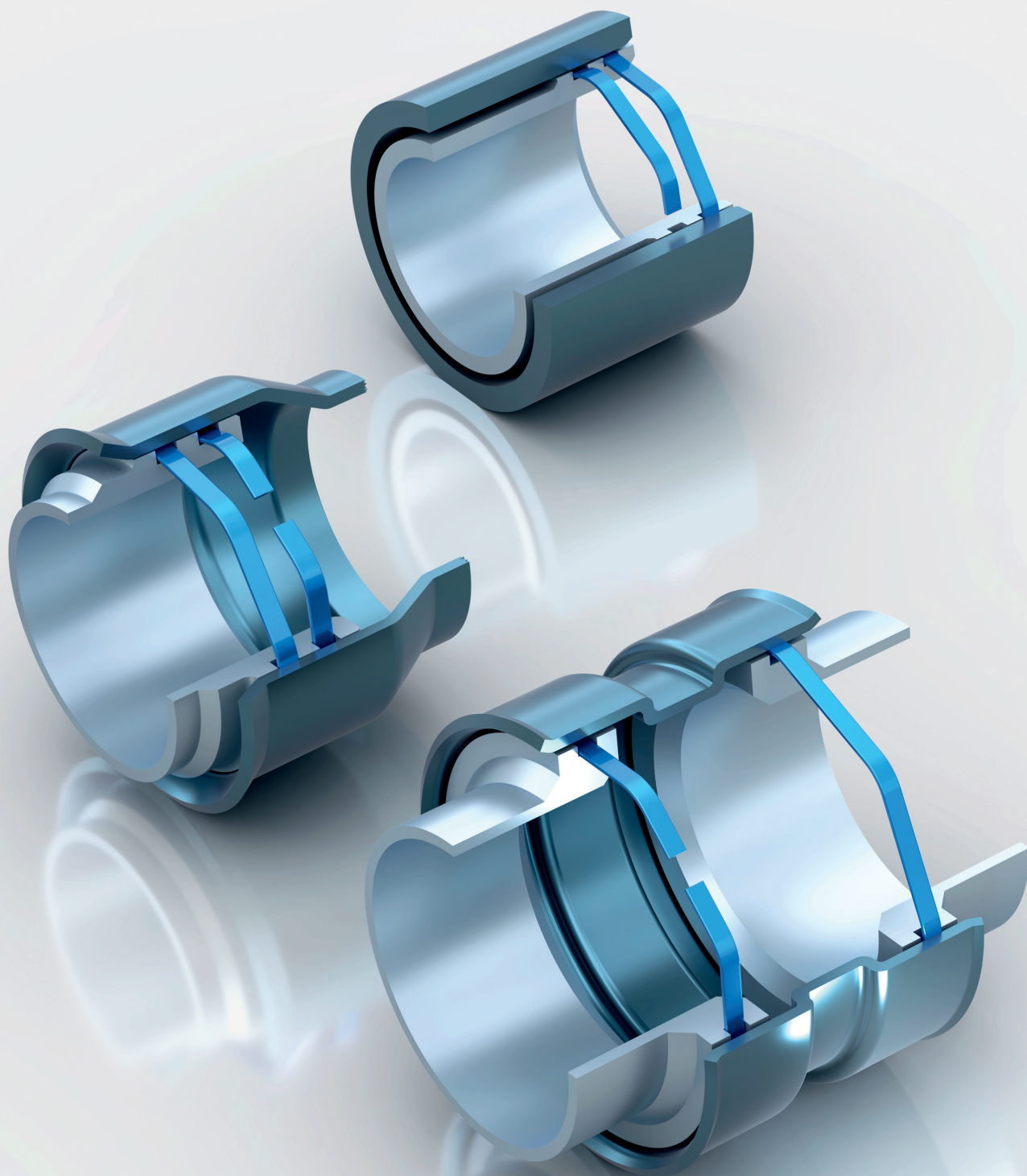
NOMINAL DIMENSION		RING DIMENSIONS				DIMENSIONS		
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	A	Tolerance	R_1 max.
30 - 49.9		2.2		1.45		DIMENSIONS ON REQUEST PLEASE CONTACT OUR TECHNICAL OFFICE!		
50 - 59.9		2.6		1.45				
60 - 69.9		2.8	+ 0.1	1.65				
70 - 84.9		3.3	- 0.1	1.65	+0.06			
85 - 94.9	H7	3.8		1.65	- 0.04			
95 - 104.9		4.1		1.65				
105 - 119.9		4.5	+ 0.1	1.95				
120 - 150		5.0	- 0.2	1.95				

All dimensions in mm

Note: Please refer to the information on pages 55, 62, 63, 64 and 65 (questionnaire).
For enquiries and/or orders, please specify the exact bore or housing diameter!

FK 10 EXP

Expander (polygon ring) as element for radial
centring of static components



FK 10 EXP

FK 10 expander (polygon ring)

The FK 10 expander is a support element with spring properties that is bent into shape from flat steel strip.

The expander ring can be used to centre rotationally symmetrical components inside one another. This ensures that the components are evenly aligned and reduces vibration-related noise effectively.

The field of application of the FK 10 expander is limited to static applications. Examples can be found in pipe connections such as exhaust manifolds and cooling systems.

FK 10 EXP

Expander (polygon ring) as element for radial centring of static components



Ring materials

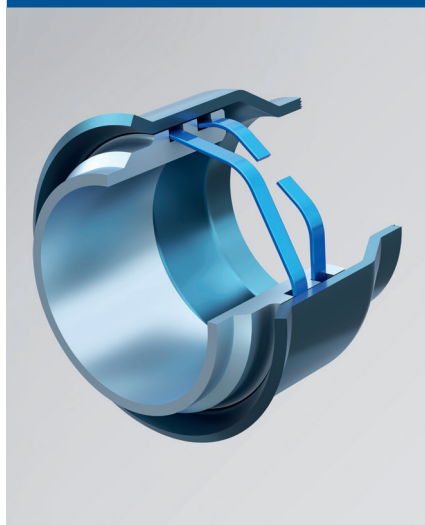
STEEL GRADE	SPRING-RESISTANT UP TO	HARDNESS VALUE	SURFACE TREATMENT	SURFACE PROTECTION	SURFACE COLOUR
C75	max. +300°C	On request ¹⁾	-	Oiled	Varies ²⁾
C60S	max. +300°C	On request ¹⁾	-	Oiled	Varies ²⁾
1.4310	max. +450°C	On request ¹⁾	-	Dry	Varies ²⁾
1.4571	max. +500°C	On request ¹⁾	-	Dry	Varies ²⁾
1.4980	max. +700°C	On request ¹⁾	-	Dry	Varies ²⁾

¹⁾ Varies depending on the type of thermal treatment! Hardness values depending on ring cross-section measured in Rockwell HRA or HRC.

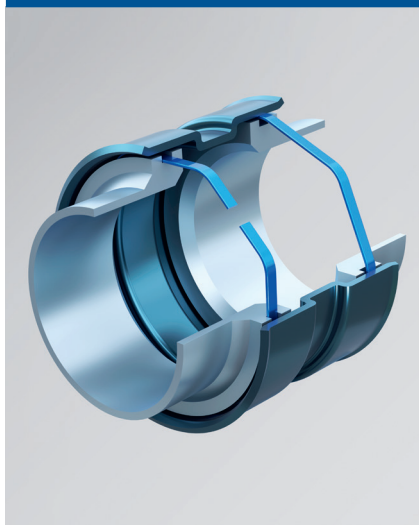
²⁾ The surface colour can vary depending on the type of heat treatment from bright silver/bluish colour to brownish/black.

Sample applications:

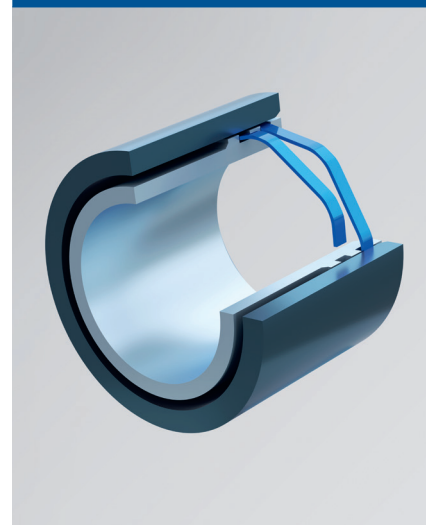
SINGLE-SIDED METAL PIPE CONNECTION



DOUBLE-SIDED METAL PIPE CONNECTION



PIPE-IN-PIPE CENTRING



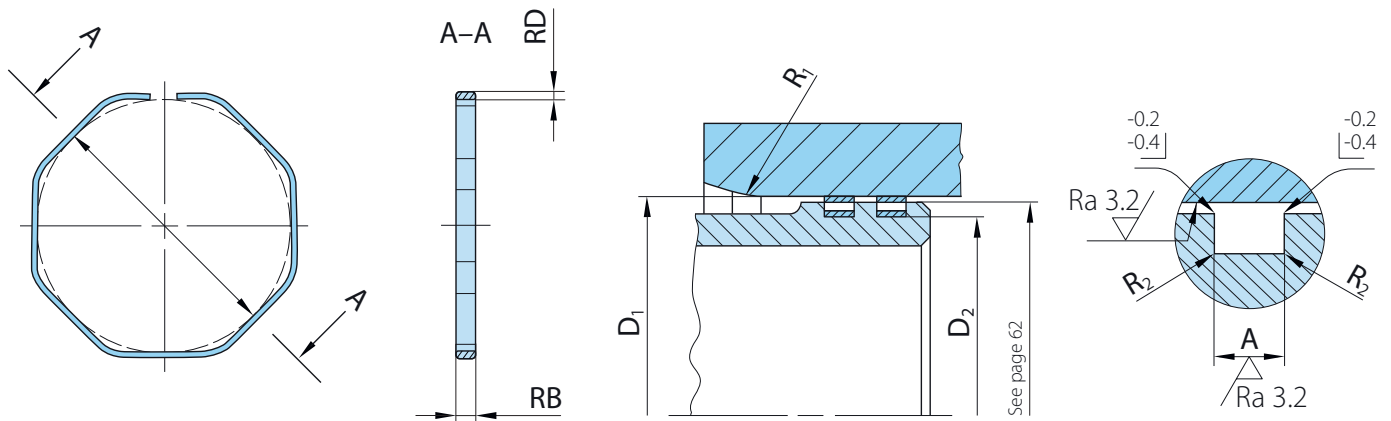
Run and installation tests:

Run and installation tests under operating conditions must be performed in each case before standard production of our laminar rings can begin to determine whether the desired support function can be achieved.

Order information:

Expander rings are application-specific components and must be individually designed by our technical office, which will provide you with all the relevant information.

Fitting instructions and installation tips can be found on pages 62 and 63.



Design of the FK 10 expander:

The available installation space and the operating parameters must be taken into account in the design. The ring material is selected based on the specifications.

NOMINAL DIMENSION		RING DIMENSIONS				DIMENSIONS					
Bore D_1	Tolerance	RB	Tolerance	RD	Tolerance	$D_2 = D_1 \text{ minus}$	Tolerance	A	Tolerance	R_1	R_2
50 - 69.9	H7	1.8	$+0.1$ -0.1	0.65	$+0.04$ -0.02	GROOVE DIMENSIONS ON REQUEST PLEASE CONTACT OUR TECHNICAL OFFICE!					
70 - 89.9		2.8		0.82							
90 - 109.9		3.3		0.82							
110 - 129.9		3.8		0.82							
130 - 160		4.6		0.95							

All dimensions in mm

Note: Please refer to the information on pages 59, 62, 63, 64 and 65 (questionnaire).
For enquiries and/or orders, please specify the exact Fey item number!

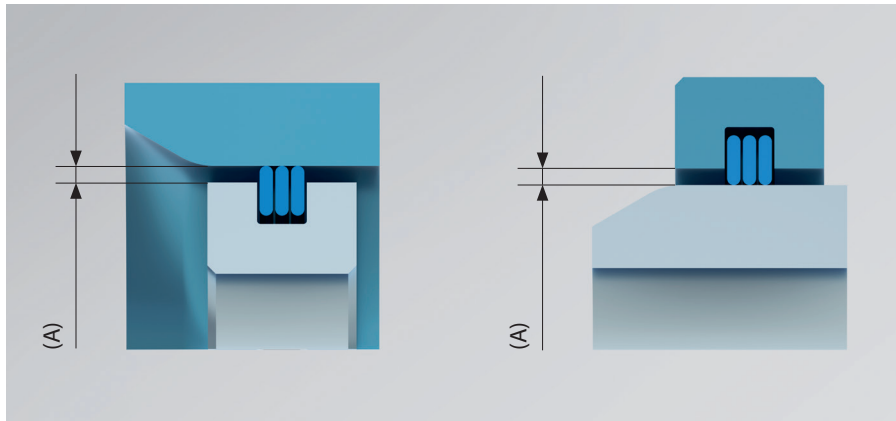


Fig. 1

The circumferential gap dimension (A) should be kept as small as possible in the design. The smaller the gap, the greater the labyrinth or sealing effect.

If radial play and/or tilting movements occur, please observe the information on the respective data sheets for the various ring arrangements under "Axial and/or radial play"!

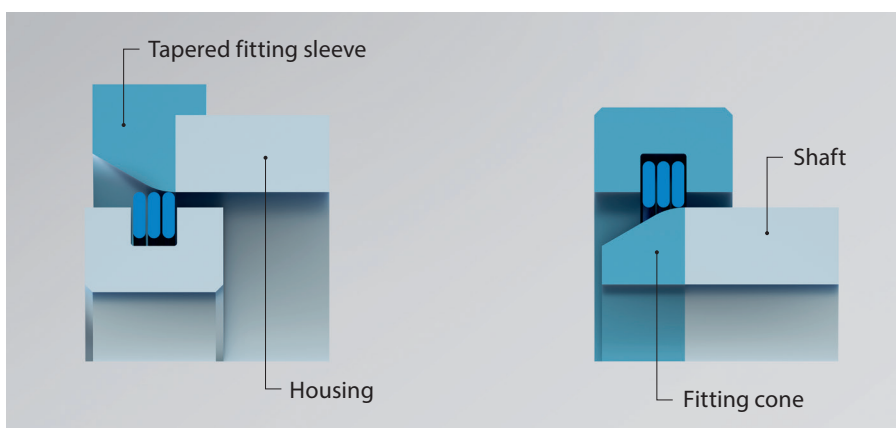


Fig. 2

If prescribed fitting chamfers on the housing or shaft are not possible due to limited space, attachable tapered fitting sleeves or fitting strips should be used for housings and removable fitting cones should be used for shafts.

When assembling the parts fitted with rings, do not simply press them on, but also move them radially and tap them axially to overcome the slip resistance.

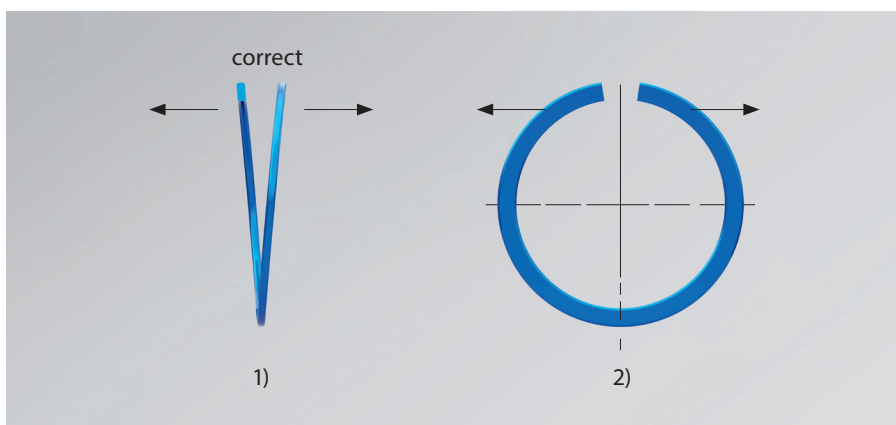


Fig. 3

- 1) Single and double wound laminar rings are spiralled into the grooves by axial expansion of the rings.
- 2) If rings have to be fitted over a shaft into a groove, do not overstretch the rings radially as they will be permanently deformed!

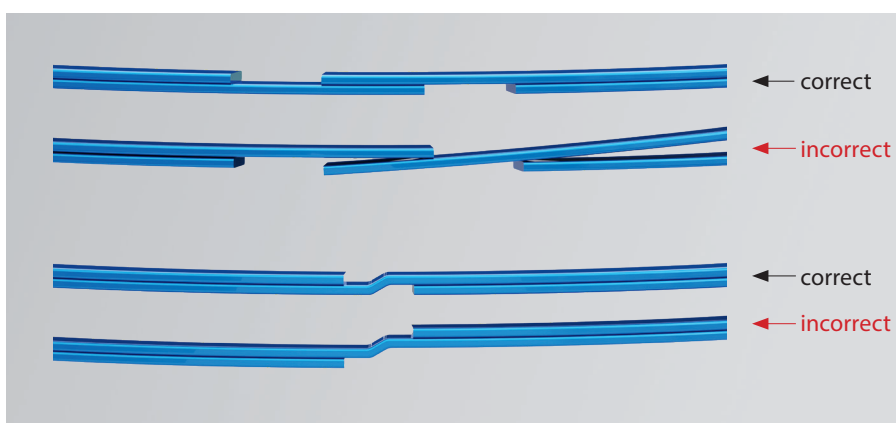


Fig. 4

When spiralling the single wound laminar rings into the grooves, do not twist the ring ends into one another or entangle them!

When spiralling the double wound laminar rings into the grooves, do not slide the ring ends or windings over one another!

Please follow our
fitting instructions L.00.138 (D/E)

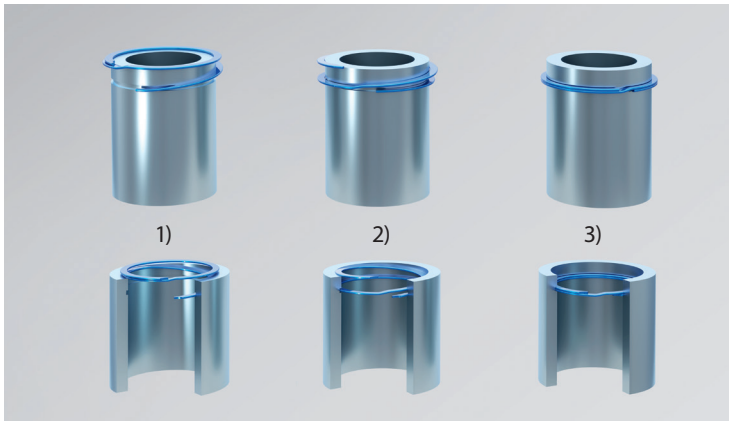


Fig. 5

Fitting of inside and outside clamping laminar rings can be carried out by hand as shown.

Spread ring slightly axially

- 1) Insert one ring end into the groove.
- 2) Twist the rest of the ring in.
- 3) Check that the ring is securely held in the groove.

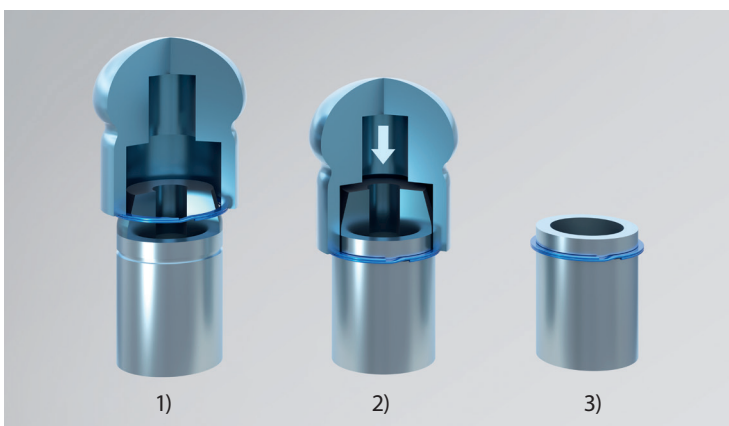


Fig. 6

Instead of spiralling the retaining rings (for the shaft) by hand, they can be fitted using tools as shown in the illustrations.

- 1) Position the fitting cone and retaining ring.
- 2) Push the retaining ring over the fitting cone using the pressure sleeve.
- 3) Check that the ring is securely held in the groove.

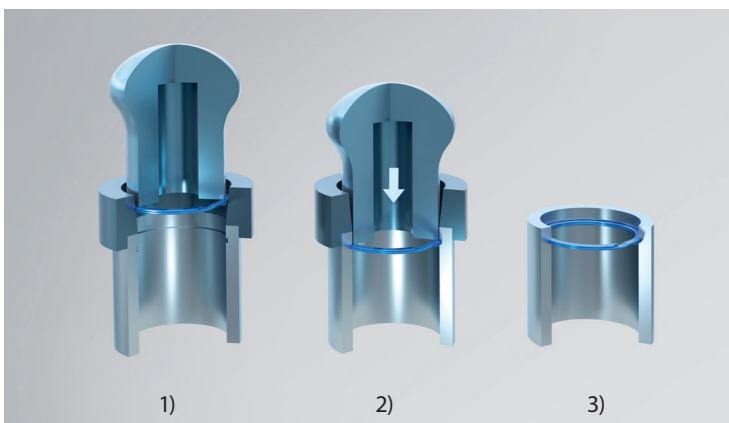


Fig. 7

Instead of spiralling the retaining rings (for the bore) by hand, they can be fitted using tools as shown in the illustrations.

- 1) Position the tapered fitting sleeve and retaining ring.
- 2) Push the retaining ring through the tapered fitting sleeve using the pressure sleeve.
- 3) Check that the ring is securely held in the groove.



Fig. 8

Remove the retaining rings using a slotted screwdriver. To do this, insert the screwdriver into the disassembly recess and lever one end of the retaining ring out of the groove with a slight twisting motion. The ring is then removed from the groove in a spiral.

General information about greasing:

Laminar rings that are greased have a better sealing effect than dry-running rings. A greased laminar ring seal is required in particular when sealing against splash water, dirt and scale. Grease pressed in from the bearing has difficulty passing a laminar ring seal. Grease overpressure is only released when the surrounding components move or rotate over the rings. It is better to fit grease relief holes. Appropriately arranged holes – preferably four around the circumference with a diameter of 3 to 5 mm – supply the rings with grease, including via the groove base, and also

enable easy replacement of used grease with new grease.

Greasing variants:

Three different, tried and tested lubrication variants using lubrication holes or grease relief holes are shown below and can be used depending on the space available. There is no risk of leakage in from the outside as the holes are filled with grease.

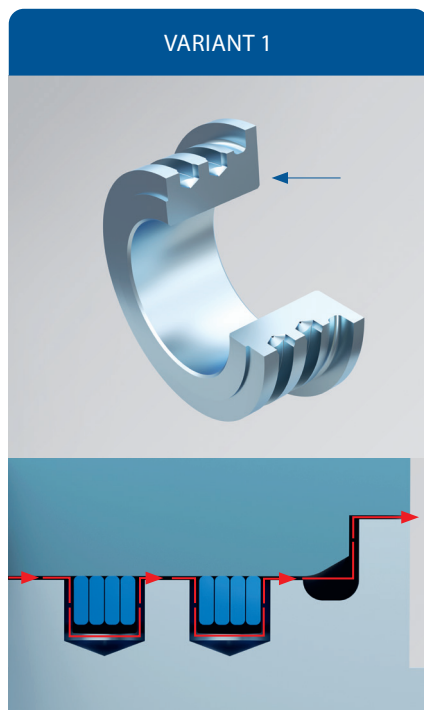
Lubricant recommendation:

Recommendations about the choice of lubricant

and information about lubrication intervals cannot be provided. The type and quantity of a suitable lubricant must be determined and specified by the customer in accordance with the operating conditions such as rotation speeds, operating temperatures, degree of contamination and environmental conditions. Roller bearing manufacturers and lubricant manufacturers can provide information in this connection.

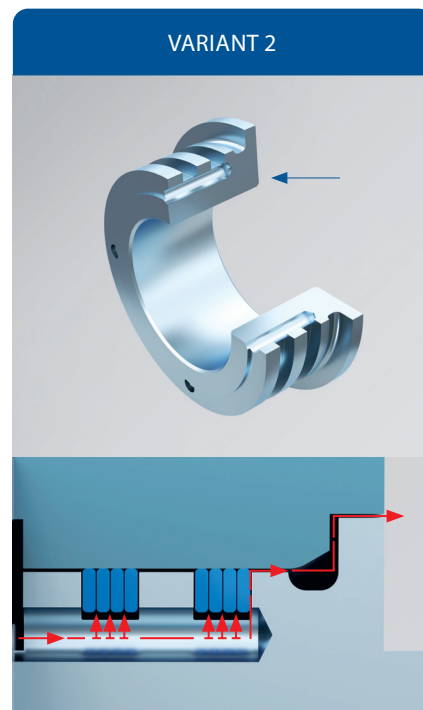
Please note:

The “FK 5-HFL” ring types are an exception when it comes to greasing. They must be installed dry and without any additional lubricants. The surrounding components that come into contact with the laminar rings must not be greased either. Due to the high operating temperatures, the lubricants tend to carburise and the laminar rings fail.



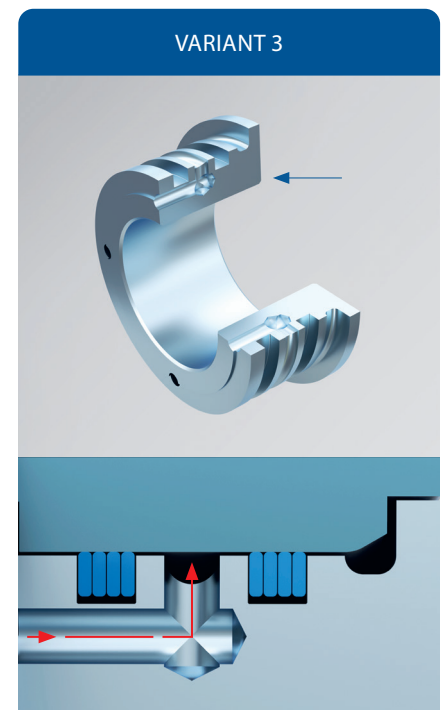
Variant 1:

Grease relief holes provided vertically in relation to the groove base, four per groove, 90° apart around the circumference. The bore diameter depends on the groove width. The grease pressed in on the bearing side can enter next to the rings and escape upwards past the rings.



Variant 2:

Grease relief holes provided horizontally in relation to the base of the groove, four per groove, 90° apart around the circumference. The bore diameter should be between 3 and 5 mm. The grease pressed in on the bearing side can escape under the rings (groove base diameter) and upwards past the rings.



Variant 3:

This lubrication design is a combination of the two preceding variants 1 and 2. Here, a so-called “grease chamber” is created between the two sealing ring sets. Experience has shown that this can then hold the grease in the grease groove for a relatively long time and thus optimise the sealing effect.

Company address _____

Processed by _____ Department _____

Telephone _____ Fax _____

Email _____ Date _____

Machine type _____ Project no. _____

What type of sealing are laminar rings intended to provide?

- | | | | |
|---|---|--|---------------------------------------|
| ☐ Splash water ingress | ☐ Coarse dirt ingress | ☐ Cooling lubricant ingress | ☐ Dust ingress |
| ☐ Oil leakage | ☐ Grease leakage | ☐ Other media: _____ | |
| Protection of other seals | ☐ yes / please specify ☐ no | _____ | |
| Operating temperature | (in the ring area °C) | _____ | |
| Housing speed | (rpm / direction of rotation) | _____ | |
| Shaft rotation speed | (rpm / direction of rotation) | _____ | |
| Axial movement | ☐ yes / in mm ☐ no | _____ | |
| Radial movement | ☐ yes / in mm ☐ no | _____ | |
| Tilting movements | ☐ yes / in ° ☐ no | _____ | |
| Operating pressure (medium) | ☐ yes / in bar ☐ no | _____ | |
| Relubrication option | ☐ yes / please specify ☐ no | _____ | |
| Stainless laminar rings | ☐ yes ☐ no | _____ | |
| Housing material (tempered) | ☐ yes / hardness ☐ no | _____ | |
| Shaft material (tempered) | ☐ yes / hardness ☐ no | _____ | |
| New construction | ☐ yes ☐ no | _____ | |
| Changeover to laminar rings | ☐ yes ☐ no | _____ | |

What type of seal has been used previously?

- Permissible leakage _____
- Service life _____
- What would be the demand: ☐ one-off (piece/set) _____
- ☐ monthly (piece/set) _____
- ☐ annual (piece/set) _____

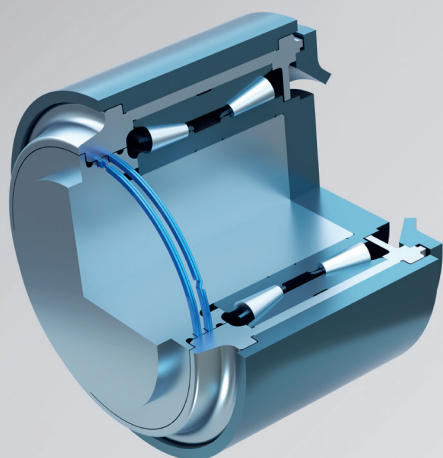
Additional questions about the use of Fey retaining rings:

Are the retaining rings tensioned axially? (against) _____

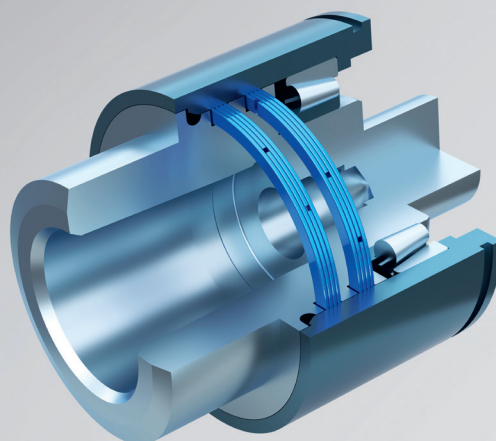
How high is the axial load on the rings? (in N) _____

Are disassembly cut-outs required? _____

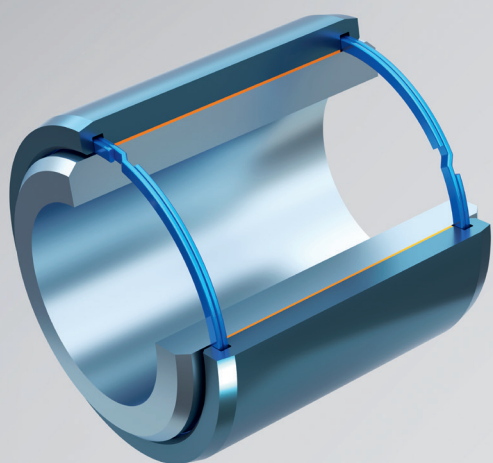
Please provide us with a CAD drawing or dimensioned sketch in order to assess the installation situation!



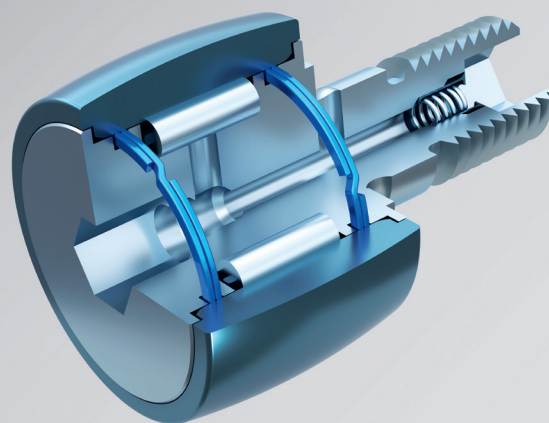
E.g. 01



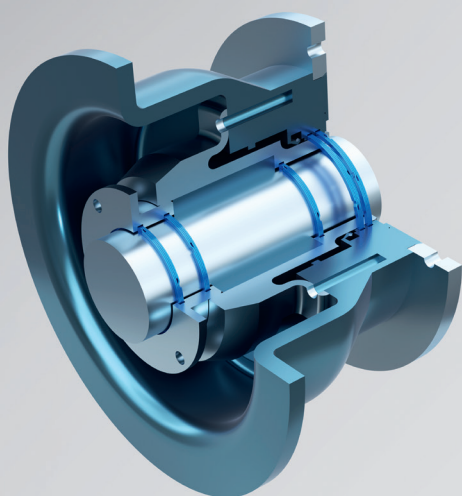
E.g. 02



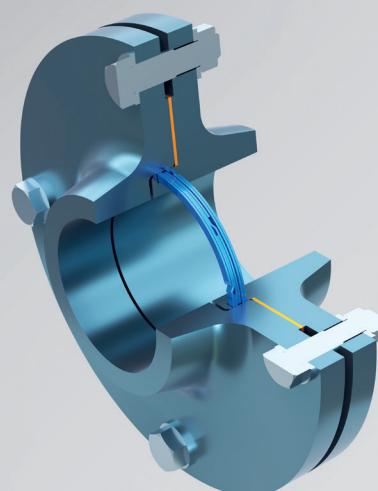
E.g. 03



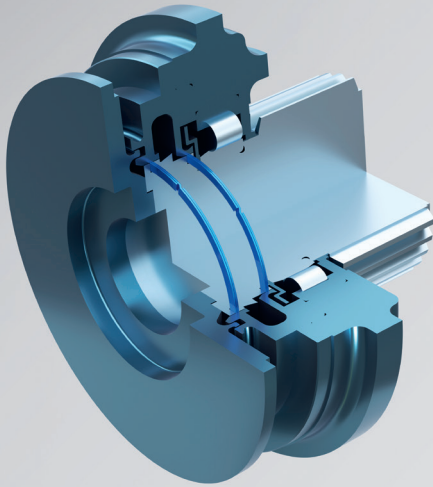
E.g. 04



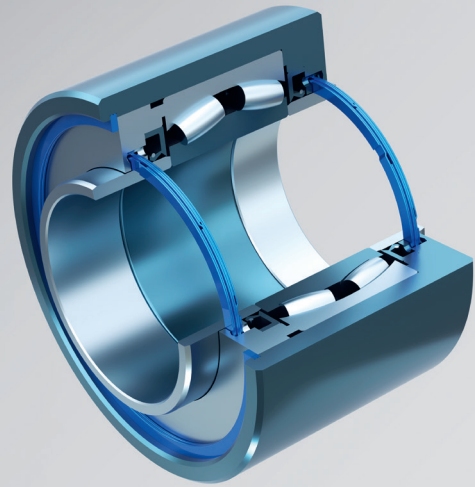
E.g. 05



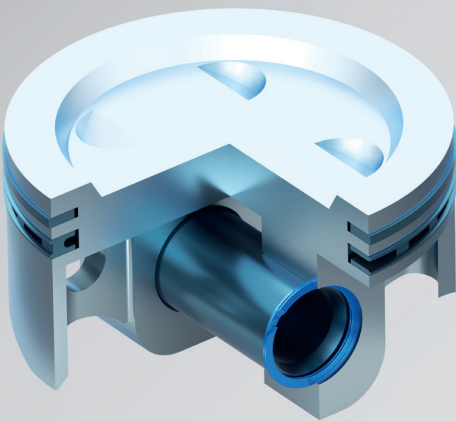
E.g. 06



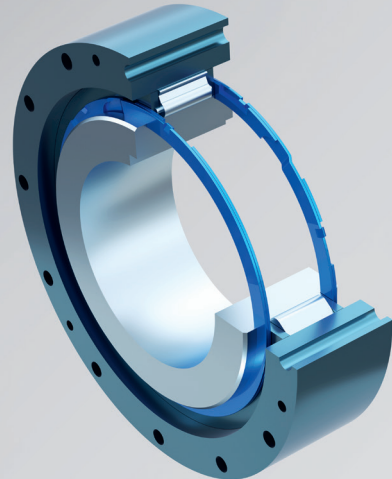
E.g. 07



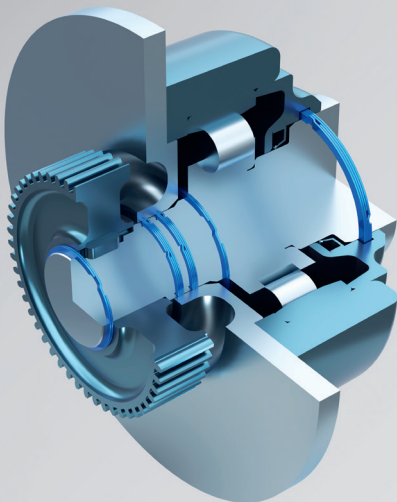
E.g. 08



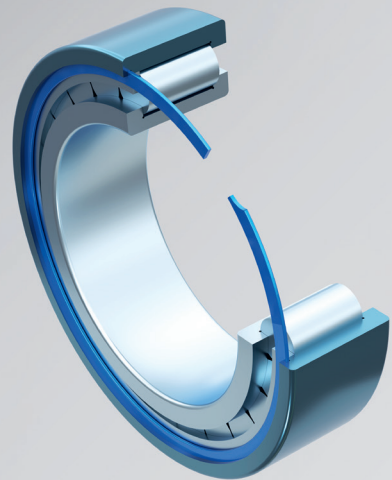
E.g. 09



E.g. 10



E.g. 11



E.g. 12

We are there to support you worldwide through 20 agencies

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