



Seals for Fluid Power

Catalog 2007

Your Technology Specialist

simrit[®]

The information in this product catalog is based on the experience gained in decades of research on the development and manufacture of seals and components for vibration control in the Freudenberg group. It represents the current state of our knowledge.

The sealing effect of many products in the catalog is, however, not provided solely by the component. Indeed, in the specific application this effect depends on other parameters such as installation position and contact area, the pressure applied, operating temperature, media to be sealed, lubrication, vibration control-related effects and any ingress of dirt from the outside. This and other, unknown, factors in practical use can have a significant effect on the seals.

Against this background, general statements on the function of the products in the catalog are not possible. Information in this catalog only represents recommended values that are not correct

in every application. We therefore recommend you to discuss your specific application with our advisory service. In cases with high or special loads, for example due to aggressive media, the seal should be selected in collaboration with us; here trials on reliability are often indispensable.

In the context of product optimisation we reserve the right to change, without prior notice, the product range, production sites, products and their manufacturing process as well as the information in this catalog.

All previous issues become invalid on publication of this issue of the catalog.

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Simrit, Your Technology Specialist for Seals and Vibration Control



Simmering®



Fluid Power



Hydraulic Accumulator



O-Rings



Liquid Silicon Products

Lederer



Special Sealing Products



Vibration Control

Our unique service package sets standards in quality, functionality and cost effectiveness throughout the industry.

With its comprehensive product range and large number of services, Simrit provides a service package unique in the market for almost every application. Simrit employs its leading technological expertise so that you benefit: We analyse your entire system and fine-tune the individual components to each other in an optimum way. This means you get exactly the solution that best fulfils your requirements – cost effective and dependable. Reinforced by single sourcing that saves time and costs, you will find that Simrit is your ideal partner for all sealing- and vibration-related applications when it comes to complex systems.

We have been the leading experts in materials for decades, and this is a significant factor for success, exceptional performance and continuous technological advancement of our products. Famous product names such as Simmering®, Merkel, Integral Accumulator, ISC O-Ring or Lederer reflect this. Together with the fields of special sealing products and vibration technology, they are inseparably connected with the Simrit brand name and constitute the world's largest product range for all applications throughout industry.

As part of the Freudenberg Group, we draw upon established research, development and production expertise within the Group to constantly extend our technological lead through innova-

tive solutions for the purposes of – and in the service of – our global customers with their local market requirements. The close international cooperation of Simrit in Europe and America with our Japanese partner, NOK, in Asia provides you with consistent quality standards wherever our solutions are required. And with Simrit Service Centers in all industrial markets, our global sales network supports you and more than 100,000 other customers dependably and on a basis of mutual trust and cooperation at sites in every continent.

The Simrit service package at a glance:

- **World's largest product range**
Comprehensive solutions from a single source
- **Continuous innovations**
Technological prominence for the competitive advantage of our customers
- **Unique expertise in materials and high quality standards**
Leading know-how for safe and cost-effective applications
- **A huge number of integrated services**
Support from development up to continuous product deployment
- **Globality**
Global expertise with the knowledge of local market requirements

Your Simrit Partner





Elastomers with Excellent Characteristics – the Basis of Innovative Solutions

Thorough know-how about materials for more than 60 years

Simrit has now been developing innovative branded products at the highest level for more than 60 years. With in-depth experience on materials, well-founded knowledge of processing and extensive product know-how, again and again we create ideal pre-conditions for your success. However, the quality of the elastomer material is decisive for the optimum operation of seals and components used in vibration control. Therefore, we are particularly proud of our pioneering role worldwide in this sector.

Deliberately targeted development of materials guarantees the highest possible quality and long life

More than 250 engineers and chemists worldwide are developing new materials every day for the highest possible functional requirements in joint development ventures with various research institutions plus leading manufacturers of polymers and chemicals. The materials we develop must fulfil the respective customer-specific requirements and withstand all the loadings feasible in their branch of industry – both with regard to temperature, pressure and resistance to media and in the presence of static or

dynamic loadings. The length of life of our products is constantly being improved by optimising our materials. Constant monitoring on the road to these products becoming mass production materials also guarantees you the highest possible quality.

The Individual Materials We have Developed are Leaders Worldwide

Uniquely wide range of standard materials

We produce more than a billion seals annually from a production volume of more than 15,000 tons. When considered as a whole, a range of material, which is unique in its quality and quantity, is available to you with more than 1,500 mixtures of 850 raw materials for your individual applications in seals and vibration control. A large proportion of these are standardised mixtures. Of course, our competent team of experts will advise and assist you fully – from the selection of the right materials via the test phase to the start of production.



Comprehensive performance package and much more

Materials manufactured individually to your wishes and requirements are unusually important in the comprehensive performance package from Simrit. The use of polymers, based on our own raw materials and tailored to your requirements, enables Simrit to develop high performance materials which satisfy the highest functional demands. We use our global materials database for the selection of application-specific materials, which groups together the know-how

of our experts, working worldwide, to form a network of top technological services which we can call on at any time. Finally, the appropriate material with the optimum characteristics for your application is manufactured using computer-controlled procedures, from the selection of the raw material to the compounding process. Of course, always adhering to the highest standards in quality and processing and complying with ecological guidelines – in the interests of your success and the environment.

Simrit Academy – Secure these Advantages for Your Success



The Simrit Academy offers you seminars which are tailored to your needs in terms of content and specialisation levels. There are numerous advantages for you.

A know-how advantage

You receive information from more than 20 qualified experts with regards to state of the art products and materials. Thus ensuring the correct selection of parts as well as smooth workflows in your production processes.

Individuality

Our seminar programme covers the needs of beginners and pros alike. The selection is extensive, allowing for a choice appropriate to the level of knowledge.

Practical relevance

Reinforcement of theoretical knowledge through practical exercises. At the same time we invite you to view our production and research facilities.

Productivity

With the knowledge that you have gained, you can increase your productivity by appropriately selecting the correct products and materials every time.

Languages

All attendance seminars are offered in both German and English. Simultaneous translation is available at every Innovations Forum.

Sustainability

For each Simrit Academy event, you will also receive comprehensive documentation to accompany the course information. Your participation is substantiated by DIN-ISO 9001 format seminar certificate.

Simrit Seminars

You visit our Academy on location in Weinheim and directly experience all materials and products yourself. In doing so, you can choose one of three different seminar categories.

Simrit Basic Seminar

Participants without previous technical knowledge can get to know the entire Simrit performance package.

Simrit Professional Seminar

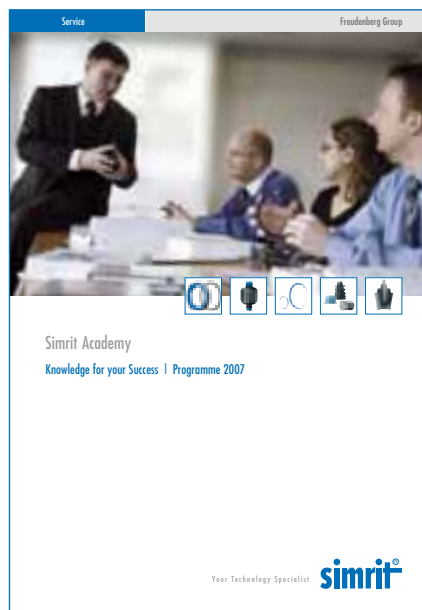
Become an expert on Simrit and obtain detailed knowledge about all products, processes and materials. Both in theory and in practice.

Simrit Seminar Special

The course contents are highly specialised and concentrate on conveying knowledge related to a specific product or material area.

Innovation Forum

Interested parties learn about all the new Simrit innovations in this lecture series, and can exchange knowledge and experience with panels of experts and with other participants.



Registration

You can easily register for Simrit seminars at www.simrit.com/academy. Additional detailed information on registering and on the seminars can be found in the Simrit Academy Programme 2007 brochure, which you can order or download from www.simrit.com.



Merkel Xpress – The 24 hour Express-Service for Seals, Guides and Pivoting Parts

When it has to be there in a hurry: Merkel Xpress from Simrit. Our service delivers the desired seal within 24 hours.

With Merkel Xpress from Simrit you can minimise your machine down-time – and therefore production costs. At the same time, you can reduce the number of spare parts you keep in stock. After all, if you can order it at any time, you don't need to keep it in stock. Ask us: you'll have your seal tomorrow.

The seal you need

Whatever you need at short notice, we can produce it within a few hours using state-of-the-art production technology. Tailor-made to suit your requirements, from single seals for prototypes through to mass production in economical batch sizes. Merkel Xpress saves you shaping costs and minimum order quantities – by using new materials and thanks to our high-speed production and delivery systems.

Merkel Xpress offers you:

- Delivery within 24 hours
- Seals of up to 4 metres in diameter
- From single seals to mass production
- Wide range of profiles
- Original Simrit materials and geometries
- Plus special designs and special materials
- Leading production know-how
- Continuous development of the product range

Tailor-made. Immediately. Economically. The Triple Advantage of Merkel Xpress

Materials

Polyurethane:

SQ-PU
SQ-HPU

Further materials:

- For low-temperature ranges (down to -50°C)
- Self-lubricating properties
- With FDA approval

Elastomers:

SQ-NBR
SQ-HNBR
SQ-FKM (fluorelastomer)
SQ-EPDM*
SQ-SIL*

*Also with FDA approval (food safe)

Plastomers:

SQ-POM
SQ-PA

Fluoroplastic (PTFE):

SQ-WFLON (white, virginal)
SQ-GFLON (with 15% glass fibre, 5% MoS₂)
SQ-BFLON (with 40% bronze, or 60%)
SQ-CFLON (25% carbon)

Further qualities on request.



A flexible production concept for every requirement

With the newest generation of special lathes and software solutions developed to precisely satisfy customer demands, we can produce every machine-manufactured seal possible, quickly and economically. More than 260 pre-programmed seal design types serve as a basis for our efficient and rapid manufacturing processes. In this regard we work with both special materials such as PEEK and

FFKM, Original Simrit polyurethane and, of course, upon request every other market-standard material for your specific application. The perfect solution for:

- Non-standard seal and machined-part spare parts for every manufacturer
- Rapidly required standard seals
- Small-volume series of special seals
- Samples
- Substitute seals
- End-of-life design types whose series production will not be restarted

Further information can be found at www.simrit.com.

Realise Your Objectives
Quickly with www.simrit.com



Simrit Online – more than just a facelift. Thanks to a smart Navigation System – developed exactly to your requirements – the information you are looking for can be found about products and services with just a few mouse clicks.

The new online presence from Simrit, with integrated Smart Navigation, offers you a particularly easy and quick work platform for your Internet research. There's no quicker way for you to achieve your objective of getting solid expertise for your planning. Whether you need product information, material data sheets or want to access 3D-CAD data – in the user-friendly Simrit database you are sure to quickly find what you are looking for.

3D-CAD data – Download added value

With the 3D Download Service from Simrit you can reliably create your designs with visual clarity for your seal or vibration control solution. Including all technical details in three-dimensional display quality.

The new Simrit eCatalog

Up to 100.000 items accessible online and available within 24 hours. The new eCatalog in the Simrit portal makes it possible. And the best thing about it: The Simrit Product Navigator guides you in the easiest and most straightforward manner directly to the optimum product for your application. Find – compare – select. Convince yourself.

mySimrit – the easy, exclusive offering for smart online users

Register once – benefit continuously. As a registered user of the mySimrit customer area, you benefit from the continuously expanding service advantages. From initial query through product availability to quick CAD downloads and even accessing current news, you receive true added value for a minimum of registration effort. The best thing to do is test us today.



We speak your language:

As a worldwide leading technology specialist, of course we also make our Internet services available to you in your native language. Right from the start, our new online presence is represented in the national language of the most important industrial markets. And, we are continually expanding our portal for you.

Simrit on the Internet – your platform for successful business

- Smart navigation and full-text searches for rapid results
- An extensive eCatalog with more than 100.000 items
- Easy download function for 3D-CAD
- An overview of our brochure service by mouse click
- Availability query
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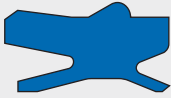
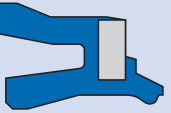


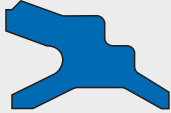

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Pre-Selection Pneumatics

Note:

The information on minimum operating temperatures is to be considered general, as alongside the material, the type of seal, the housing and the operating conditions can also affect the function. The maximum operating temperatures can be exceeded, in this case a reduction in the service life of the seals can be expected. The effect of media (e.g. unsuitable lubricants) can reduce the operating temperature limits.

Type	Material	Hardness Shore A	Pressurised area in MPa (bar)	Temperature range in °C ²⁾	Speed in m/s
Rod Seals					
Merkel Combination Seal AU NIPSL 	AU	94	≤1,2 (12)	-30 ... +90	≤1
Merkel Combination Seal NIPSL 	NBR	72	≤1,2 (12)	-20 ... +100	≤1
	FKM ¹⁾			-5 ... +150	
Merkel Combination Seal NIPSL 200 	NBR	80	≤1,0 (10)	-20 ... +100	≤1
Merkel Combination Seal NIPSL 210 	FKM	75	≤1,0 (10)	-5 ... +150	≤1
Merkel Combination Seal NIPSL 300 	AU	90	≤1,0 (10)	-30 ... +90	≤1
Merkel Combination Seal NIPSL 310 	AU	85	≤1,0 (10)	-30 ... +80	≤1

¹⁾ On request

²⁾ Usual temperature range for pneumatic cylinders: -20 ... +80 °C

Type	Material	Hardness Shore A	Pressurised area in MPa (bar)	Temperature range in °C ²⁾	Speed in m/s
Merkel Combination Seal NIPSL 320 	AU	94	≤1,2 (12)	-30 ... +90	≤1
Merkel Combination Seal NIPSL SF 	NBR	90	≤1,0 (10)	-20 ... +100	≤1
	FKM ¹⁾			-5 ... +150	
Merkel Compact Seal Airzet PR 	NBR	80	≤1,2 (12)	-20 ... +100	≤1
	FKM	75		-5 ... +150	
Piston Seals					
Merkel U-Ring NAP 210 	FKM ¹⁾	75	≤1,2 (12)	-5 ... +200	≤1
	NBR	80		-25 ... +100	
Merkel U-Ring NAP 300 	AU	80	≤1,2 (12)	-35 ... +80	≤1
Merkel U-Ring NAP 310 	AU	80	≤1,2 (12)	-35 ... +80	≤1
Merkel U-Ring NAPN 	NBR	80	≤1 (10)	-20 ... +100	≤1
	FKM ¹⁾			-5 ... +150	

¹⁾ On request²⁾ Usual temperature range for pneumatic cylinders: -20 ... +80 °C

Type	Material	Hardness Shore A	Pressurised area in MPa (bar)	Temperature range in °C ²⁾	Speed in m/s
Merkel Compact Seal Airzet PK 	NBR	80	≤1,2 (12)	-20 ... +100	≤1
	FKM	75		-5 ... +150	
Merkel Compact Seal KDN 	NBR	72	≤1,2 (12)	-20 ... +100	≤1
Merkel Complete Piston NADUOP 	NBR	72	≤1 (10)	-20 ... +100	≤1
Merkel Complete Piston Pneuko G 	NBR + PA	72	≤1 (10)	-20 ... +100	≤1
Merkel Complete Piston Pneuko M 210 Merkel Complete Piston Pneuko M 310 	FKM	75	≤1,2 (12)	-5 ... +150	≤1
	AU	80		-25 ... +80	
Merkel Complete Piston TDUOP 	NBR	72	≤1,2 (12)	-20 ... +100	≤1
	FKM ¹⁾			-5 ... +150	
Merkel Complete Piston TDUOP with Venting Passages 	NBR	72	≤1,2 (12)	-20 ... +100	≤1

¹⁾ On request

²⁾ Usual temperature range for pneumatic cylinders: -20 ... +80 °C

Type	Material	Hardness Shore A	Pressurised area in MPa (bar)	Temperature range in °C ²⁾	Speed in m/s
Merkel Complete Piston TDUOP M 	NBR	72	≤1,2 (12)	-20 ... +80	≤1
Damper Seals					
Merkel Damper Seal AU DIP 	AU	94	≤2,5 (25)	-30 ... +90	≤1
Merkel Damper Seal DIP 	NBR	90	≤1,6 (16)	-30 ... +100	≤1
	FKM ¹⁾			-5 ... +150	
Guides					
Merkel Guide Ring EKF 	PA	–	–	-30 ... +100	≤1
Merkel Guide Strip KF 	PTFE	–	–	-40 ... +200	≤1
Merkel Guide Strip SF 	PTFE	–	–	-40 ... +200	≤1

¹⁾ On request²⁾ Usual temperature range for pneumatic cylinders: -20 ... +80 °C

Merkel Combination Seal AU NIPSL

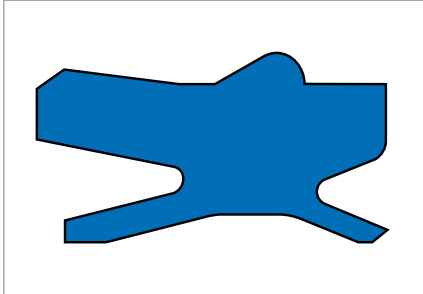


Fig. 1 Merkel Combination Seal AU NIPSL

Product description

Merkel combination wiper seal without metal reinforcement with special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards
- The component needs no additional element (circlip) for axial fixing within the housing
- Long service life
- Robust design.

Application

Rod seal e.g. for ISO cylinders.

Material

Material	Code	Hardness
High performance polyurethane	94 AU 925	94 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-30 ... +90 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm	<0,5
	tp (25% R _{max}) = 50 ... 75%	
Groove base	≤10 μm	<0,5

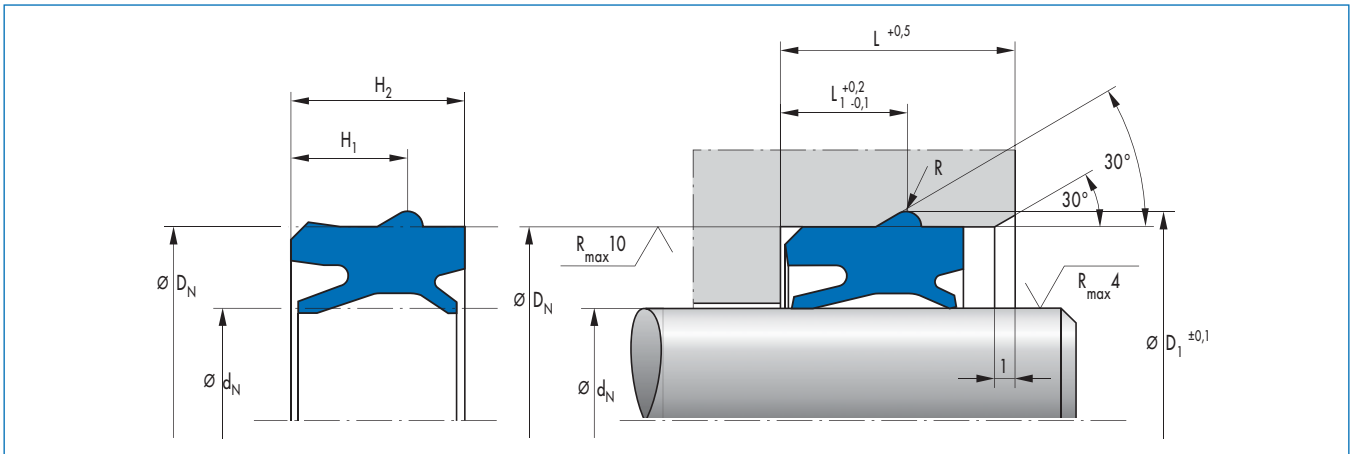
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Combination Seal AU NIPSL is pressed into the housing from outside. The bead on the outside diameter snaps into the circlip groove and fixes the seal in the housing.

Article list



d_N	D_N	H_1	H_2	D_1	L	L_1	R	Material	Article No.	
12	20	7	10,4	22,2	13	7,7	1,1	94 AU 925	431469	●
12	22	7	10,4	24,2	13	7,7	1,1	94 AU 925	407284	●
14	24	7	10,4	26,2	13	7,7	1,1	94 AU 925	431468	●
16	26	7	10,4	28,2	13	7,7	1,1	94 AU 925	407285	●
18	26	7	10,4	28,2	13	7,7	1,1	94 AU 925	431467	●
18	28	7	10,4	30,2	13	7,7	1,1	94 AU 925	431465	●
20	30	7	10,4	32,2	13	7,7	1,1	94 AU 925	407287	●
22	32	7,3	10,4	34,8	13	8	1,4	94 AU 925	431464	●
25	35	7,3	10,4	37,8	13	8	1,4	94 AU 925	407288	●
30	40	7,3	10,4	42,8	13	8	1,4	94 AU 925	431462	●
32	42	7,3	10,4	44,8	13	8	1,4	94 AU 925	407290	●
40	50	7,3	10,4	52,8	13	8	1,4	94 AU 925	398274	●
50	60	7,7	10,4	63,6	13	8,6	1,8	94 AU 925	398275	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Combination Seal NIPSL

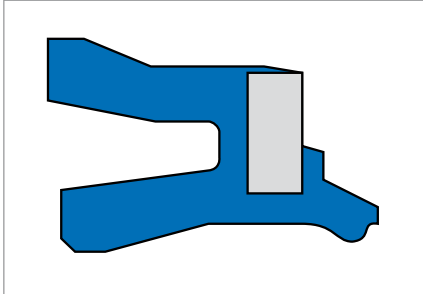


Fig. 1 Merkel Combination Seal NIPSL

Product description

Combination wiper seal with metal reinforcement and special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards.
- The component can be replaced from the outside (without dismantling the equipment)
- Broad supply range.

Application

Rod seal for pneumatic cylinders.

Material

Material	Code	Hardness	Base plate
Acrylonitrile-butadiene rubber	72 NBR 708	72 Shore A	mild steel according to DIN 1624

FKM on enquiry.

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-20 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

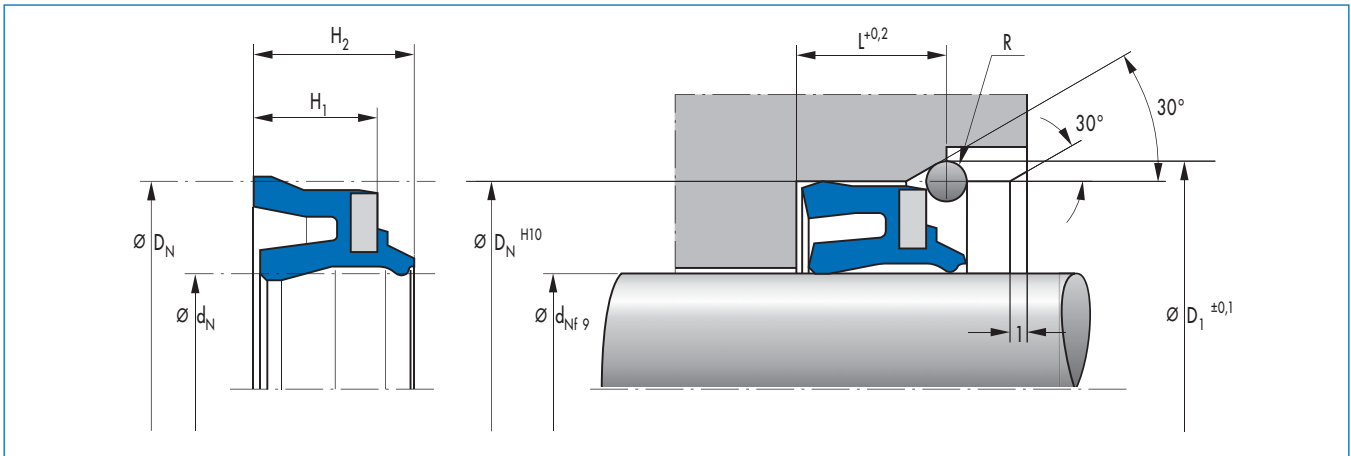
Surface roughness	R _{max}	R _p /R _z
Rod	≤4 µm tp (25% R _{max}) = 50 ... 75%	<0,5
Groove base	≤10 µm	<0,5

→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual. The Merkel Combination Seal NIPSL is pressed into the housing from outside. The back is supported by a circlip (DIN 7993). To remove the seal, it is advisable to provide an axial cut-out in the ring groove that allows the circlip to be easily removed.

Article list



d_N	D_N	H_1	H_2	D_1	L	R	Material	Article No.	
8	16	7	9,5	18	8,5	1,1	72 NBR 708	419272	●
10	20	7	9,5	22	8,5	1,1	72 NBR 708	419273	●
12	20	6	8,5	22	7,5	1,1	72 NBR 708	419274	●
12	22	7	9,5	24	8,5	1,1	72 NBR 708	104779	●
14	24	7	9,5	26	8,5	1,1	72 NBR 708	419275	●
16	26	7	9,5	28	8,5	1,1	72 NBR 708	104780	●
18	26	6	8,5	28	7,5	1,1	72 NBR 708	390006	●
18	28	7	9,5	30	8,5	1,1	72 NBR 708	121453	●
20	30	7	9,5	32	8,5	1,1	72 NBR 708	104781	●
22	32	7	9,5	34,5	8,8	1,4	72 NBR 708	404837	●
25	35	7	9,5	37,5	8,8	1,4	72 NBR 708	104782	●
30	40	7	9,5	42,5	8,8	1,4	72 NBR 708	361502	●
32	42	7	9,5	44,5	8,8	1,4	72 NBR 708	419276	●
40	50	7	9,5	52,5	8,8	1,4	72 NBR 708	419277	●
50	60	6,5	9	62,5	8,3	1,4	72 NBR 708	433162	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Combination Seal NIPSL 200

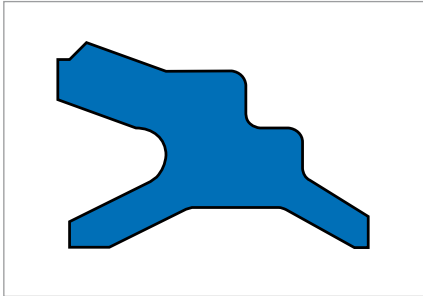


Fig. 1 Merkel Combination Seal NIPSL 200

Product description

Combination wiper seal without metal reinforcement with special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film.

Application

Small cylinders.

Material

Material	Code	Hardness
NBR rubber	80 NBR 4005	80 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1 MPa (10 bar)
Temperature T	-20 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

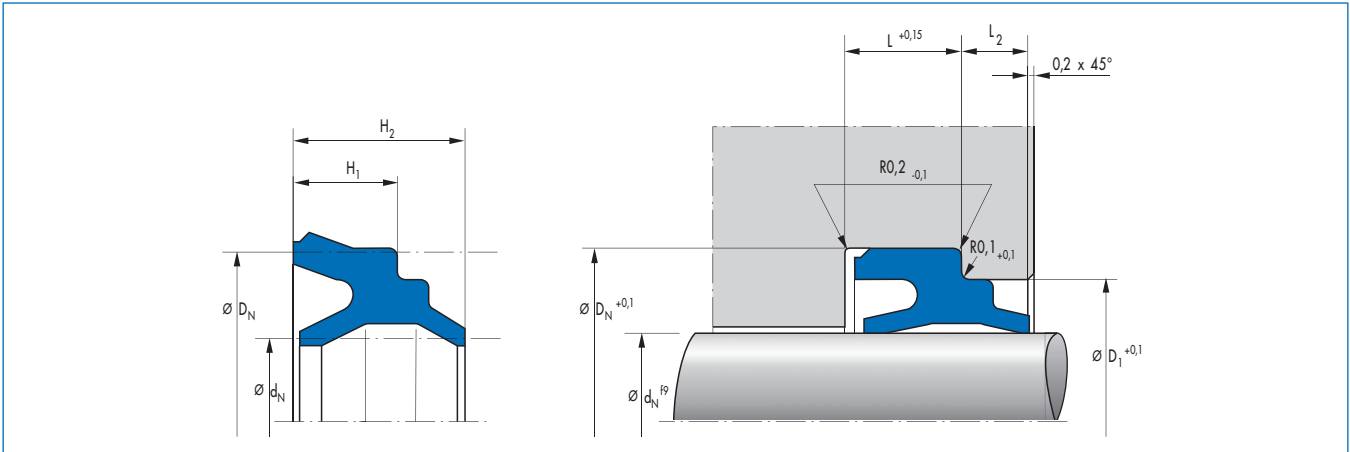
Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm	<0,5
	tp (25% R _{max}) = 50 ... 75%	
Groove base	≤10 μm	<0,5

→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual. The Merkel Combination Seal NIPSL 200 for small cylinders can be snapped by hand into the housing grooves provided, with the piston rod removed.

Article list



d_N	D_N	H_1	H_2	D_1	L	L_2	Material	Article No.	
4	8,2	2,5	4,2	6,7	3	0,8	80 NBR 4005	472544	●
6	11,2	3,2	5,2	9,1	3,6	1	80 NBR 4005	472545	●
8	14,2	3,2	5,2	12,1	3,6	1	80 NBR 4005	472546	●
10	16,2	3,8	6,2	14,1	4,2	1,2	80 NBR 4005	472547	●
12	18,2	3,8	6,2	15,5	4,2	1,2	80 NBR 4005	472548	●
16	23	3,8	6,2	18,8	4,2	1,2	80 NBR 4005	472549	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Combination Seal NIPSL 210

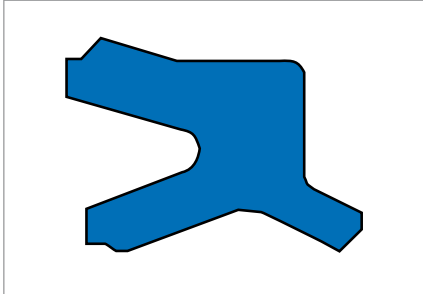


Fig. 1 Merkel Combination Seal NIPSL 210

Product description

Compact combination wiper seal without metal reinforcement with special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film.
- Suitable for high-temperature applications.

Application

Small cylinders, compact cylinders.

Material

Material	Code	Hardness
FKM rubber	75 FKM 181327	75 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1 MPa (10 bar)
Temperature T	-5 ... +150 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm tp (25% R _{max}) = 50 ... 75%	-
Groove base	≤10 μm	<0,5

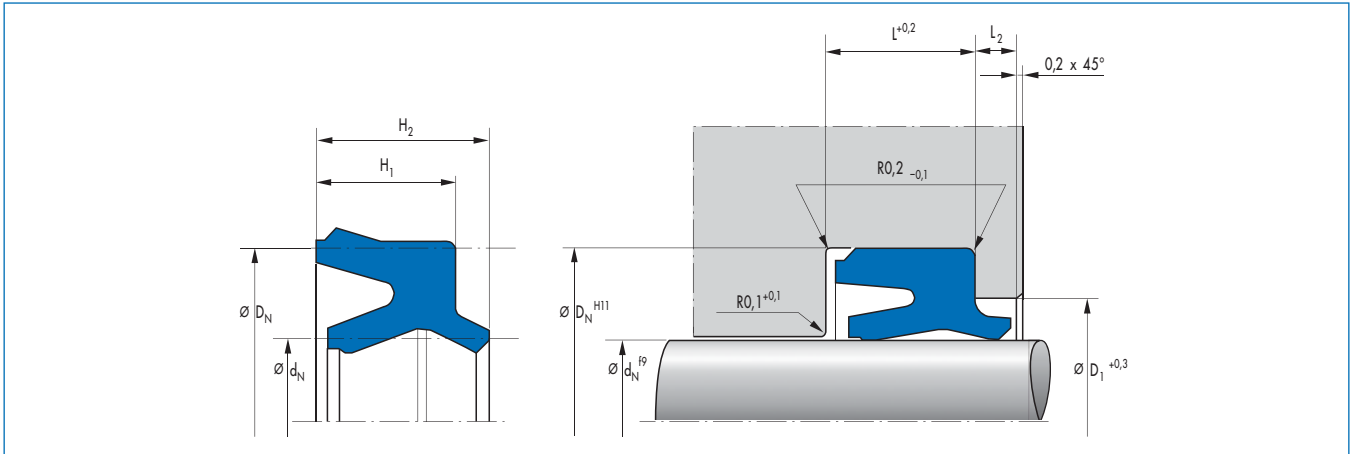
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Combination Seal NIPSL 210 for small cylinders can be snapped by hand into the housing grooves provided, with the piston rod removed.

Article list



d_N	D_N	H_1	H_2	D_1	L	L_2	Material	Article No.	
4	7	2,2	2,8	5,4	2,6	1	75 FKM 181327	476707	●
6	9	2,2	2,8	7,2	2,6	1	75 FKM 181327	49022141	●
8	11,5	2,5	3,2	9,2	2,9	1	75 FKM 181327	473868	●
10	14	2,8	3,7	11,4	3,2	1	75 FKM 181327	473869	●
12	16,5	3,2	4	13,7	3,6	1,2	75 FKM 181327	471228	●
16	20,5	3,2	4	17,7	3,6	1,2	75 FKM 181327	471885	●
20	25	3,6	4,6	21,9	4	1,2	75 FKM 181327	471375	●
25	30	3,6	4,6	26,9	4	1,2	75 FKM 181327	471734	●
32	37,5	4	5	34,1	4,4	1,2	75 FKM 181327	475939	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Combination Seal NIPSL 300

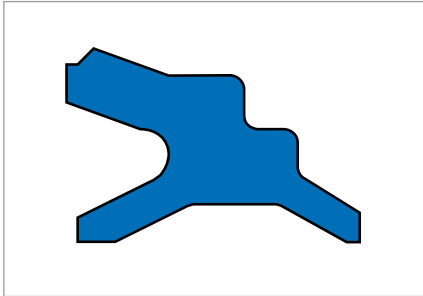


Fig. 1 Merkel Combination Seal NIPSL 300 (previous code: AUNIPSL SF)

Product description

Combination wiper seal without metal reinforcement with special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film.
- Material with high wear resistance.

Application

Small cylinders.

Material

Material	Code	Hardness
High performance polyurethane	85 AU 20991	85 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1 MPa (10 bar)
Temperature T	-30 ... +90 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm tp (25% R _{max}) = 50 ... 75%	<0,5
Groove base	≤10 μm	<0,5

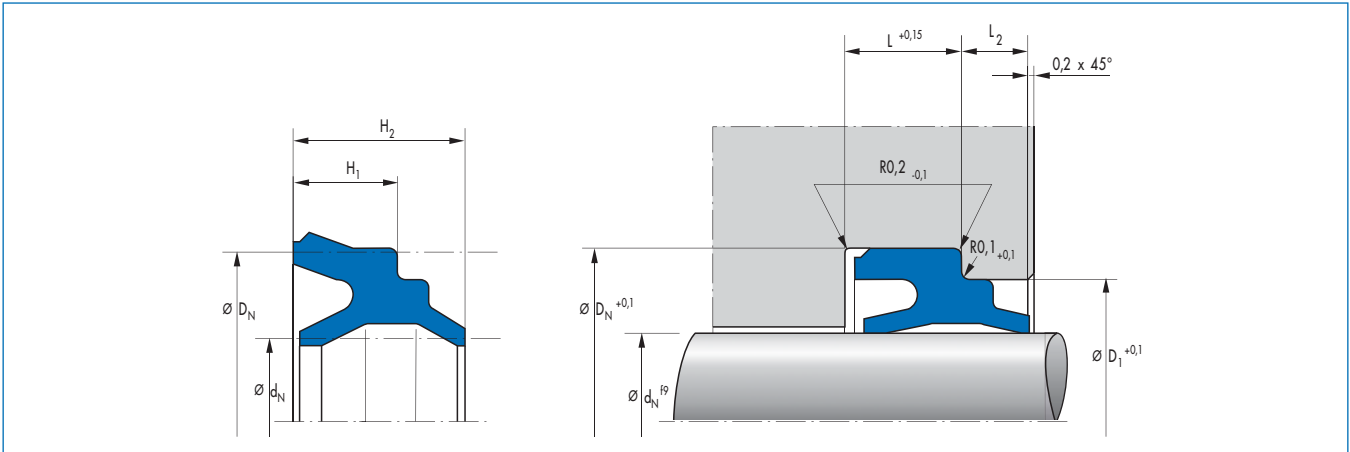
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Combination Seal NIPSL 300 for small cylinders can be snapped by hand into the housing grooves provided, with the piston rod removed.

Article list



d_N	D_N	H_1	H_2	D_1	L	L_2	Material	Article No.	
4	8,2	2,5	4,2	6,7	3	0,8	90 AU 924	418315	●
6	11,2	3,2	5,2	9,1	3,6	1	90 AU 924	418316	●
8	14,2	3,2	5,2	12,1	3,6	1	90 AU 924	416230	●
10	16,2	3,8	6,2	14,1	4,2	1,2	90 AU 924	418317	●
12	18,1	3,8	6,2	15,5	4,2	1,2	90 AU 924	434919	●
16	23	3,8	6,2	18,8	4,2	1,2	90 AU 924	434920	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Combination Seal NIPSL 310

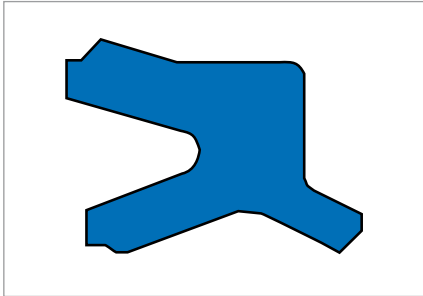


Fig. 1 Merkel Combination Seal NIPSL 310

Product description

Compact combination wiper seal without metal reinforcement with special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film.
- Material with high wear resistance.

Application

Small cylinders, compact cylinders.

Material

Material	Code	Hardness
High performance polyurethane	85 AU 20991	85 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1 MPa (10 bar)
Temperature T	-30 ... +80 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm tp (25% R _{max}) = 50 ... 75%	-
Groove base	≤10 μm	<0,5

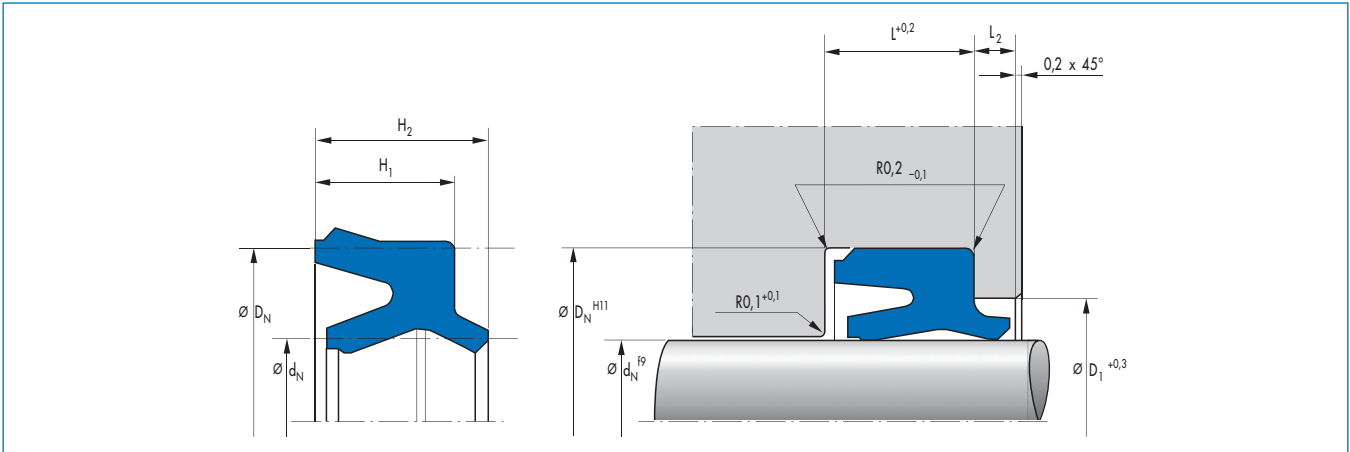
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Combination Seal NIPSL 310 for small cylinders can be snapped by hand into the housing grooves provided, with the piston rod removed.

Article list



d_N	D_N	H_1	H_2	D_1	L	L_2	Material	Article No.	
4	7	2,2	2,8	5,4	2,6	1	85 AU 20991	476708	●
6	9	2,2	2,8	7,2	2,6	1	85 AU 20991	468066	●
8	11,5	2,5	3,2	9,2	2,9	1	85 AU 20991	468065	●
10	14	2,8	3,7	11,4	3,2	1	85 AU 20991	468061	●
12	16,5	3,2	4	13,7	3,6	1,2	85 AU 20991	468060	●
16	20,5	3,2	4	17,7	3,6	1,2	85 AU 20991	468120	●
20	25	3,6	4,6	21,9	4	1,2	85 AU 20991	470526	●
25	30	3,6	4,6	26,9	4	1,2	85 AU 20991	471728	●
32	37,5	4	5	34,1	4,4	1,2	85 AU 20991	476906	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Combination Seal NIPSL 320

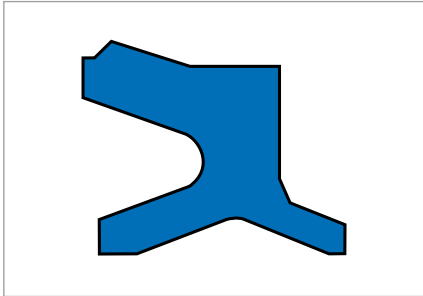


Fig. 1 Merkel Combination Seal NIPSL 320

Product description

Combination wiper seal without metal reinforcement with special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film.
- Material with high wear resistance.

Application

Small cylinders, compact cylinders.

Material

Material	Code	Hardness
High performance polyurethane	94 AU 925	94 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-30 °C ... +90 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm tp (25% R _{max}) = 50 ... 75%	-
Groove base	≤10 μm	<0,5

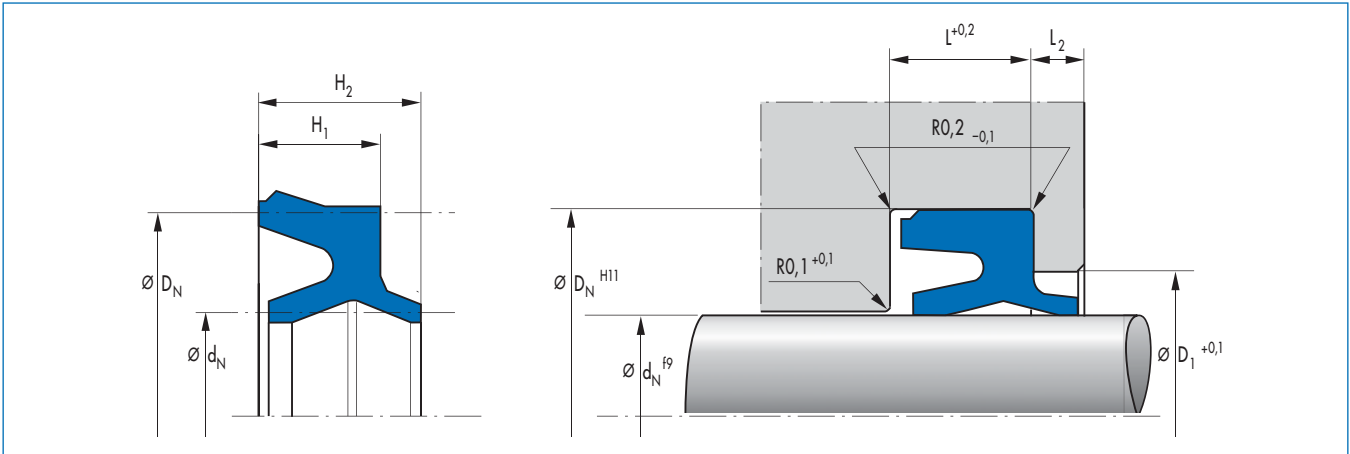
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Combination Seal NIPSL 320 for small cylinders and compact cylinders can be snapped by hand into the housing grooves provided, with the piston rod removed.

Article list



d_N	D_N	H_1	H_2	D_1	L	L_2	Material	Article No.	
10	16	3,6	4,8	12,5	4	1,5	94 AU 925	433063	●
12	18	3,6	4,8	14,5	4	1,5	94 AU 925	433064	●
16	22	3,6	4,8	18,5	4	1,5	94 AU 925	433065	●
20	26	3,6	4,8	22,5	4	1,5	94 AU 925	433068	●
25	31	3,6	4,8	27,5	4	1,5	94 AU 925	468023	●
32	40	4,5	5,8	35	5	1,5	94 AU 925	467972	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Combination Seal NIPSL SF

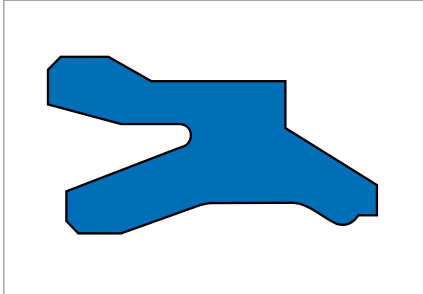


Fig. 1 Merkel Combination Seal NIPSL SF

Product description

Combination wiper seal without metal reinforcement with special pneumatic sealing edge.

Product advantages

- Combination seal with minimal space requirements, which seals inwards and wipes outwards
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film.
- Optimal material for high loads.

Application

Small cylinders.

Material

Material	Code	Hardness
Acrylonitrile-butadiene rubber	90 NBR 108	90 Shore A

FKM on enquiry.

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1 MPa (10 bar)
Temperature T	-20 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm	<0,5
	tp (25% R _{max}) = 50 ... 75%	
Groove base	≤10 μm	<0,5

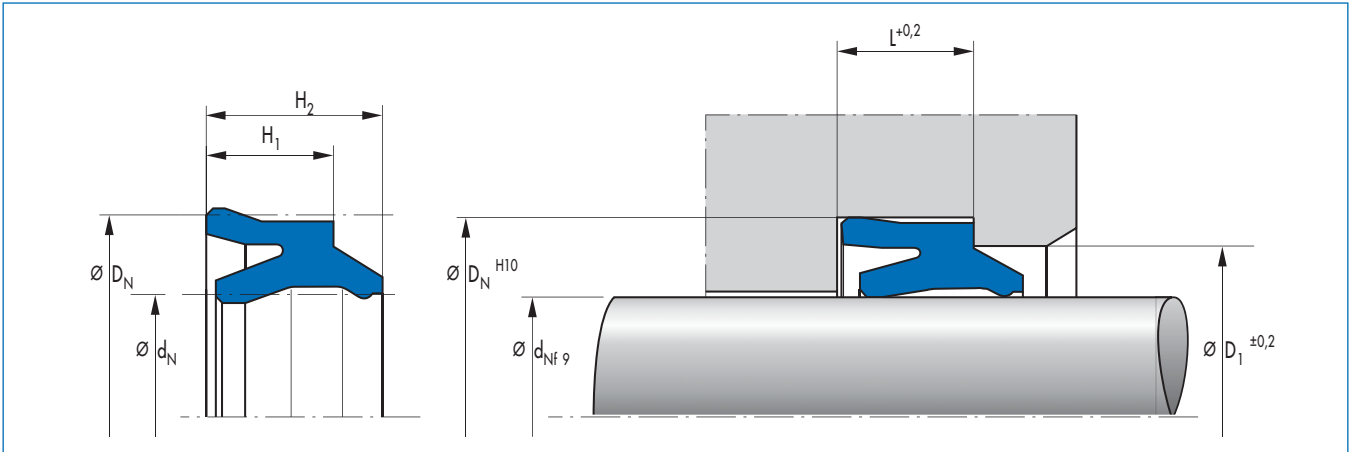
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Combination Seal NIPSL SF for small cylinders can be snapped by hand into the housing grooves provided, with the piston rod removed.

Article list



d _N	D _N	H ₁	H ₂	D ₁	L	Material	Article No.	
4	8,2	2,6	4	6,5	3	90 NBR 108	406294	●
6	11,2	3,6	5	9	4	90 NBR 108	406296	●
8	14,2	3,6	5	12	4	90 NBR 108	406300	●
10	16,2	4	5,5	14	4,5	90 NBR 108	406301	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Compact Seal Airzet PR

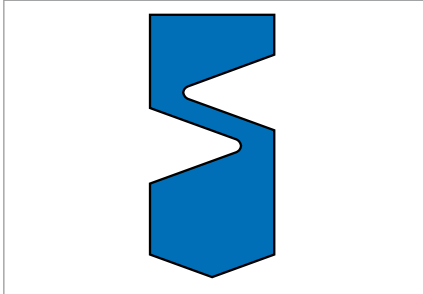


Fig. 1 Merkel Compact Seal Airzet PR

Product description

Merkel Compact Seal can be pressurised on both sides with grooves on the front side for pressure activation.

Product advantages

- The compact design permits short cylinder cover designs
- The rounded sealing profile and the flexible centre part give good tightness with low friction and maintain an effective lubricating film
- Widely proven design
- Large supply range available.
- Very good tribological properties (wear, friction and long service life).

Application

- Short cylinders
- Short solution for cylinders (short stroke) and valves for high-temperature applications (only FKM).

Material

Material	Code	Hardness
NBR rubber	80 NBR 186349	80 Shore A
Fluoro elastomer	75 FKM 230553	75 Shore A

Operating conditions

Material	NBR	FKM
Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)	
Operating pressure p	≤1,2 MPa (12 bar)	
Temperature T	-20 ... +100 °C	-5 ... +150 °C
Running speed v	≤1 m/s	

Design notes

Surfaces

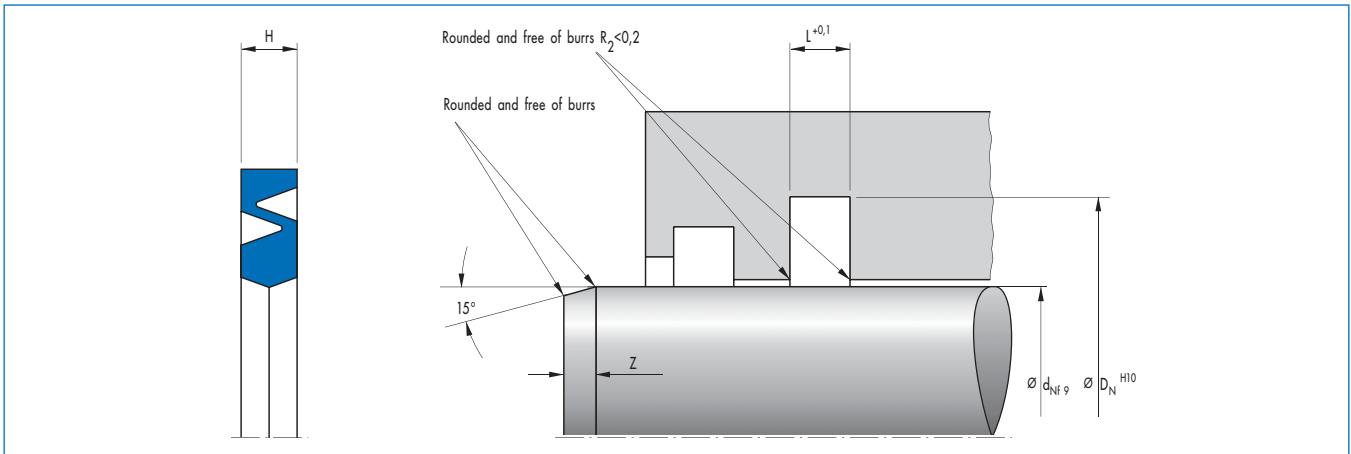
Surface roughness	R _{max}	R _p /R _z
Rod	≤4 µm tp (25% R _{max}) = 50 ... 70%	<0,5
Groove base	≤10 µm	<0,5

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal → Technical Manual.

The Merkel Compact Seal Airzet PR is snapped over the de-burred housing edge into the housing groove. An axially-accessible housing is required for rod diameters less than 15 mm.

Article list



d_N	D_N	L	H	Z	Material	Article No.	
6	13	2,5	2,3	1,2	80 NBR 186349	49017399	●
6	13	2,5	2,3	1,2	75 FKM 230553	49041787	○
8	15	2,5	2,3	1,2	80 NBR 186349	49017400	●
8	15	2,5	2,3	1,2	75 FKM 230553	49042524	●
10	17	2,5	2,3	1,2	80 NBR 186349	49017401	●
10	17	2,5	2,3	1,2	75 FKM 230553	49042525	●
12	19	2,5	2,3	1,2	80 NBR 186349	49017996	●
12	19	2,5	2,3	1,2	75 FKM 230553	49041788	●
15	22	2,5	2,3	1,2	80 NBR 186349	49017905	●
15	22	2,5	2,3	1,2	75 FKM 230553	49042526	●
16	25	3	2,8	2,2	80 NBR 186349	49017904	●
16	25	3	2,8	2,2	75 FKM 230553	49041789	●
20	29	3	2,8	2,2	75 FKM 230553	49030235	●
20	29	3	2,8	2,2	80 NBR 186349	49017906	●
25	34	3	2,8	2,2	80 NBR 186349	49030179	●
25	34	3	2,8	2,2	75 FKM 230553	49042527	●
30	39	3	2,8	2,2	80 NBR 186349	49030180	●
30	39	3	2,8	2,2	75 FKM 230553	49041790	●
40	49	3	2,8	2,2	80 NBR 186349	49017968	●
40	49	3	2,8	2,2	75 FKM 230553	49042528	●
42	51	3	2,8	2,2	80 NBR 186349	49030174	●
42	51	3	2,8	2,2	75 FKM 230553	49042529	●
50	59	3	2,8	2,2	80 NBR 186349	49030181	●
50	59	3	2,8	2,2	75 FKM 230553	49042530	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Damper Seal AU DIP

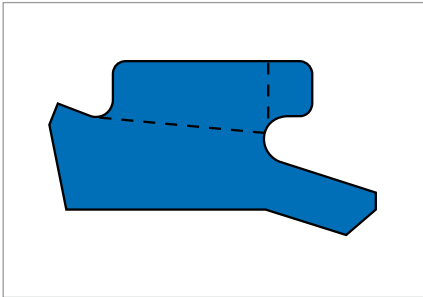


Fig. 1 Merkel Damper Seal AU DIP

Product description

Merkel Damper Seal AU DIP with spacer lug and flow passages. Integrated non-return valve function due to axial seal, spacer lugs and flow passages.

Product advantages

- Constant, reliable damping function due to automatic centring.

Application

Damping element e.g. for ISO cylinders.

Material

Material	Code	Hardness
High performance polyurethane	90 AU 924 all $\varnothing \leq 10$	90 Shore A
	94 AU 925 $\varnothing > 10$	94 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	$\leq 2,5$ MPa (25 bar)
Temperature T	-30 ... +90 °C
Running speed v	≤ 1 m/s

Design notes

Surfaces

Surface roughness	R_{max}	R_p/R_z
Rod	$\leq 4 \mu m$	$< 0,5$
	$tp (25\% R_{max}) = 50 \dots 75\%$	
Groove base	$\leq 10 \mu m$	

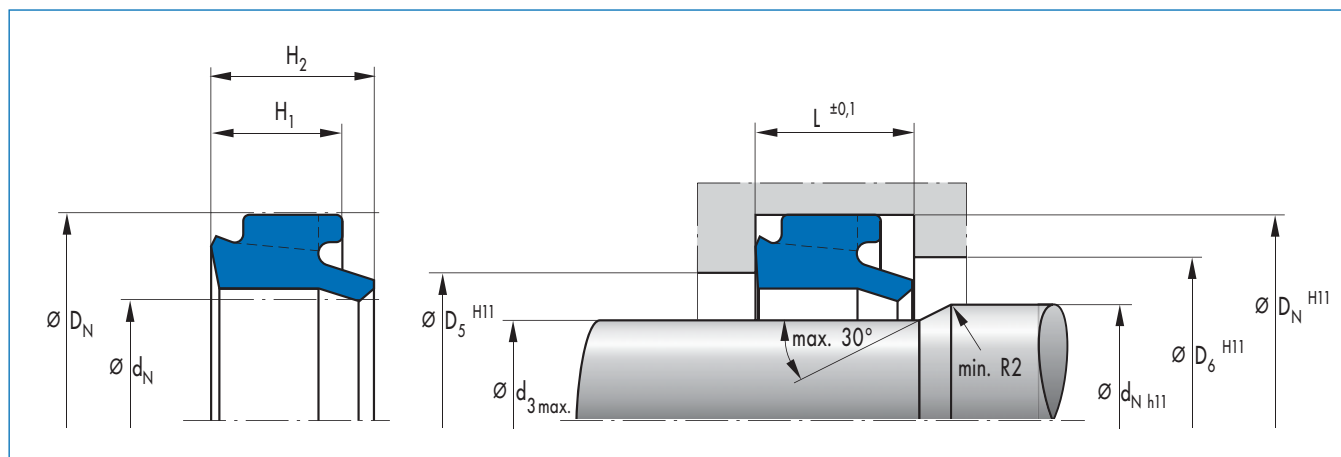
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

Merkel damper seals can be snapped by hand into the housing grooves provided.

Article list



d_N	D_N	D_5	D_6	$d_{3 \text{ max.}}$	H_1	H_2	L	Material	Article No.	
8	11,6	8,5	10	4	2,7	3,5	3,3	90 AU 924	467110	●
9,5	15	10	12	5,5	3,9	5	4,5	90 AU 924	434735	●
10	18	11	15	6	6,2	8	7	90 AU 924	425536	●
12	18	13	15,5	8	4,2	5,2	4,8	94 AU 925	425483	●
12	20	13	17	8	6,2	8	7	94 AU 925	425497	○
14	22	15	19	10	6,2	8	7	94 AU 925	425538	●
16	22	17	19,5	12	4,4	5,6	5,2	94 AU 925	425499	●
16	24	17	21	12	6,2	8	7	94 AU 925	425498	●
18	26	19	23	14	6,2	8	7	94 AU 925	425509	●
20	28	21	24	21	6,2	8	7	94 AU 925	464942	●
22	30	23	26	18	6,2	8	7	94 AU 925	425511	●
24	32	25	28	20	6,2	8	7	94 AU 925	425513	●
25	33	26	29	21	6,2	8	7	94 AU 925	425514	●
28	36	29	32	24	6,2	8	7	94 AU 925	425515	●
30	40	31,5	35	26	6,2	8	7	94 AU 925	425520	●
36	46	37,5	41	32	6,2	8	7	94 AU 925	432656	●
40	50	41,5	45	36	6,2	8	7	94 AU 925	425521	●
50	60	51,5	55	46	6,2	8	7	94 AU 925	425523	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Damper Seal DIP

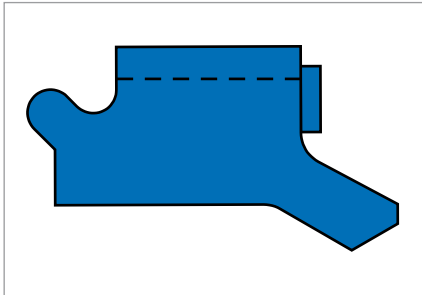


Fig. 1 Merkel Damper Seal DIP

Product description

Merkel Damper Seal DIP with spacer lug and flow passages.

Product advantages

- Integrated non-return valve function through axial seal, spacer lugs and flow passages
- Constant, reliable damping function due to automatic centring.

Application

Damper seal e.g. for ISO cylinders.

Material

Material	Code	Hardness
Acrylonitrile-butadiene rubber	90 NBR 109	90 Shore A

FKM on enquiry.

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,6 MPa (16 bar)
Temperature T	-30 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod	≤4 μm	<0,5
	tp (25% R _{max}) = 50 ... 75%	
Groove base	≤10 μm	<0,5

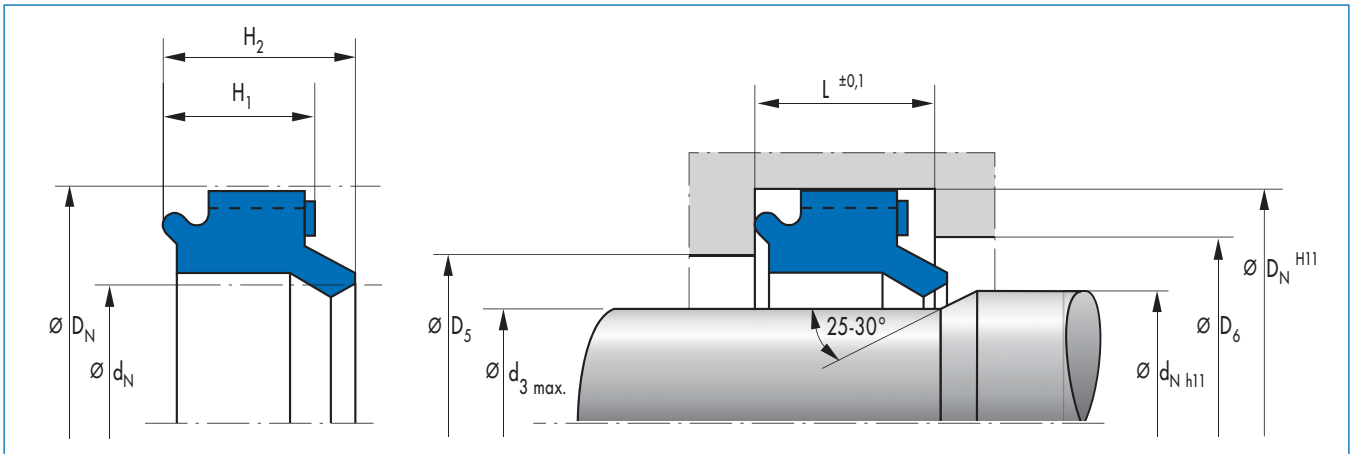
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

Merkel damper seals can be snapped by hand into the housing grooves provided.

Article list



d_N	D_N	D_5	D_6	$d_{3 \text{ max.}}$	H_1	H_2	L	Material	Article No.	
14	22	15	19	10	6,5	8	7	90 NBR 109	406509	●
16	24	17	21	12	6,5	8	7	90 NBR 109	408706	●
20	28	21	24	16	6,5	8	7	90 NBR 109	408714	●
22	30	23	26	18	6,5	8	7	90 NBR 109	408747	●
25	33	26	29	21	6,5	8	7	90 NBR 109	408750	●
28	36	29	32	24	6,5	8	7	90 NBR 109	408753	●
30	40	31,5	35	26	6,5	8	7	90 NBR 109	408756	●
40	50	41,5	45	36	6,5	8	7	90 NBR 109	408759	●
50	60	51,5	55	46	6,5	8	7	90 NBR 109	408761	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel U-Ring NAP 210

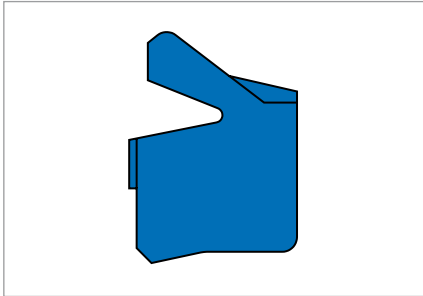


Fig. 1 Merkel U-Ring NAP 210

Product description

Compact Merkel U-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip.

Product advantages

- The asymmetrical profile with the longer and thicker static sealing lip ensures secure seating in the bottom of the groove
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film.
- Large range
- Minimal axial space requirements
- Integrated pressure relief to prevent an intermediate pressure build-up.

Application

- Piston seal for pneumatic cylinders
- Piston seal for high-temperature cylinders (only FKM).

Material

Material	Code	Hardness
Acrylonitrile-butadiene rubber	80 NBR 99079	80 Shore A
Fluoro elastomer	75 FKM 99104	75 Shore A

Operating conditions

Material	NBR	FKM
Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)	
Operating pressure p	≤1,2 MPa (12 bar)	
Temperature T	-25 ... +100 °C	-5 ... +200 °C
Running speed v	≤1 m/s	

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Rod/cylinder barrel	≤4 μm tp (25% R _{max}) = 50 ... 75%	<0,5
Groove base	≤10 μm tp (25% R _{max}) = 50 ... 75%	<0,5

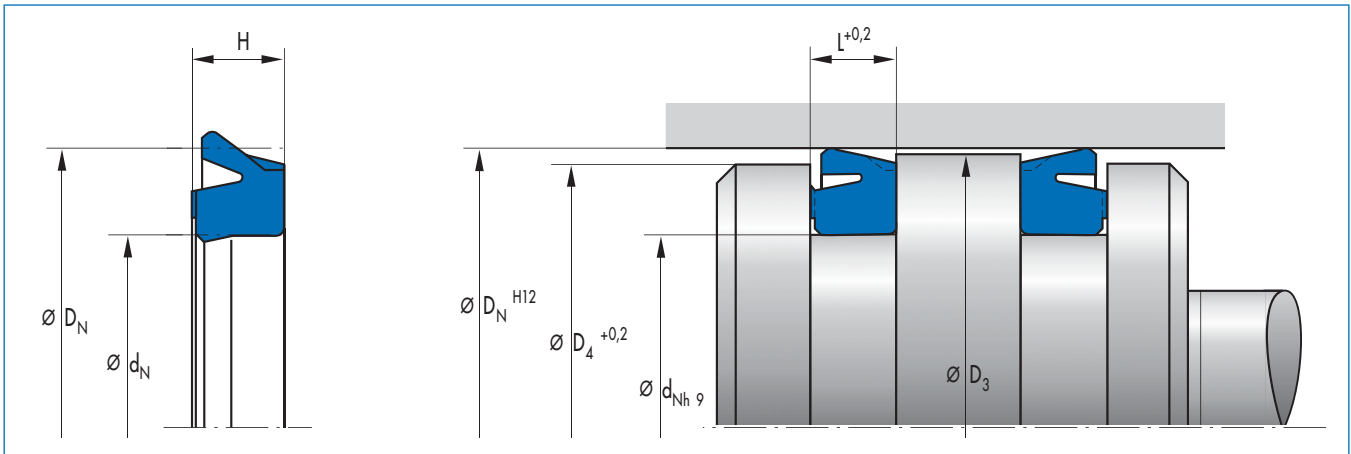
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

Pneumatic U-rings can be snapped by hand into the housing grooves provided.

Article list



D_N	d_N	D_3 min	D_4 min	H	L	Material	Article No.	
8	4,8	7,85	7,6	2,45	2,7	80 NBR 99079	463761	●
8	4,8	7,85	7,6	2,45	2,7	75 FKM 99104	465838	●
10	6	9,85	9,6	2,45	2,7	80 NBR 99079	463763	●
10	6	9,85	9,6	2,45	2,7	75 FKM 99104	465839	●
12	7	11,85	11,6	2,45	2,7	80 NBR 99079	463764	●
12	7	11,85	11,6	2,45	2,7	75 FKM 99104	465841	●
16	10	15,85	15,6	2,45	2,7	80 NBR 99079	463765	●
16	10	15,85	15,6	2,45	2,7	75 FKM 99104	465842	●
18	12	17,85	17,6	2,45	2,7	75 FKM 99104	501192	●
18	12	17,85	17,6	2,45	2,7	80 NBR 99079	501500	●
20	14	19,85	19,5	2,45	2,7	80 NBR 99079	463766	●
20	14	19,85	19,5	2,45	2,7	75 FKM 99104	465843	●
25	19	24,85	24,4	3,3	3,5	80 NBR 99079	463767	●
25	19	24,85	24,4	3,3	3,5	75 FKM 99104	465844	●
32	24	31,7	31,4	3,3	3,5	80 NBR 99079	463768	●
32	24	31,7	31,4	3,3	3,5	75 FKM 99104	465846	●
40	32	39,7	39,4	3,3	3,5	80 NBR 99079	463769	●
40	32	39,7	39,4	3,3	3,5	75 FKM 99104	465847	●
50	42	49,7	49,4	3,3	3,5	80 NBR 99079	463770	●
50	42	49,7	49,4	3,3	3,5	75 FKM 99104	465848	●
63	53	62,7	62,4	4,3	4,5	80 NBR 99079	463771	●
63	53	62,7	62,4	4,3	4,5	75 FKM 99104	465849	●
80	70	79,7	79,4	4,3	4,5	80 NBR 99079	463772	●
80	70	79,7	79,4	4,3	4,5	75 FKM 99104	465850	●
100	90	99,7	99,4	4,3	4,5	80 NBR 99079	463773	●
100	90	99,7	99,4	4,3	4,5	75 FKM 99104	465851	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel U-Ring NAP 300

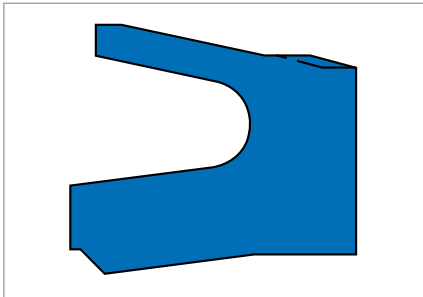


Fig. 1 Merkel U-Ring NAP 300

Product description

Merkel U-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip.

Product advantages

- The asymmetrical profile with the longer and thicker static sealing lip ensures secure seating in the bottom of the groove
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film
- Material with high wear resistance
- Good low temperature properties.

Application

Piston seal e.g. for ISO pneumatic cylinders.

Material

Material	Code	Hardness
High performance polyurethane	80 AU 941	80 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-35 ... +80 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 μm	<0,5
	tp (25% R _{max}) = 50 ... 75%	
Groove base	≤10 μm	<0,5

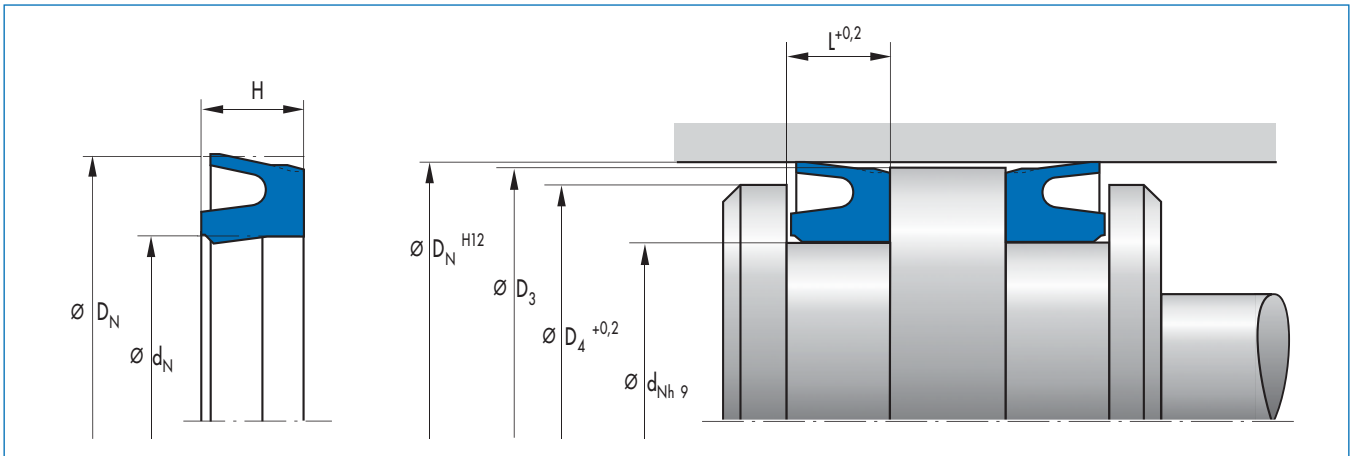
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

Pneumatic U-rings can be snapped by hand into the housing grooves provided.

Article list



D_N	d_N	D_3 min	D_4 min	H	L	Material	Article No.	
25	17	24,8	24	5,5	6	80 AU 941	432441	●
32	24	31,7	30,5	5,5	6	80 AU 941	433688	●
40	30	39,7	38,5	7	7,5	80 AU 941	433689	●
50	40	49,6	48,5	7	7,5	80 AU 941	406396	●
63	53	62,6	61,5	7	7,5	80 AU 941	406408	●
80	68	79,6	78,5	8,5	9,5	80 AU 941	406412	●
100	88	99,5	98	8,5	9,5	80 AU 941	433761	●
125	110	124,3	123	10	11	80 AU 941	406415	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel U-Ring NAP 310

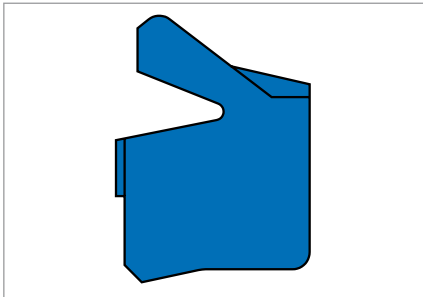


Fig. 1 Merkel U-Ring NAP 310

Product description

Compact Merkel U-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip.

Product advantages

- The asymmetrical profile with the longer and thicker static sealing lip ensures secure seating in the bottom of the groove
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film
- Material with high wear resistance
- Good low temperature properties.

Application

Piston seal e.g. for ISO pneumatic cylinders.

Material

Material	Code	Hardness
High performance polyurethane	80 AU 20994	80 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-35 ... +80 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 μm tp (25% R _{max}) = 50 ... 75%	<0,5
Groove base	≤10 μm tp (25% R _{max}) = 50 ... 75%	<0,5

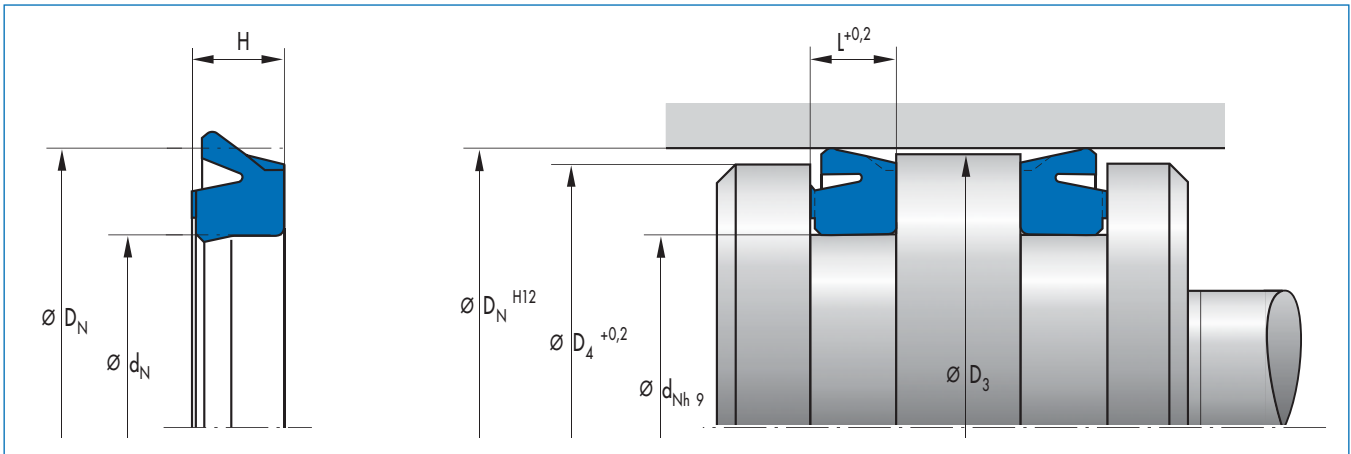
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

Pneumatic U-rings can be snapped by hand into the housing grooves provided.

Article list



D_N	d_N	$D_3 \text{ min}$	$D_4 \text{ min}$	H	L	Material	Article No.	
8	4,8	7,85	7,6	2,45	2,7	80 AU 20994	49042868	●
10	6	9,85	9,6	2,45	2,7	80 AU 20994	433199	●
12	7	11,85	11,6	2,45	2,7	80 AU 20994	433200	●
16	10	15,85	15,6	2,45	2,7	80 AU 20994	415664	●
20	14	19,85	19,5	2,45	2,7	80 AU 20994	433202	●
25	19	24,85	24,4	4	4,2	80 AU 20994	415663	●
25	19	24,85	24,4	3,3	3,5	80 AU 20994	458854	●
32	24	31,7	31,4	3,3	3,5	80 AU 20994	433205	●
40	32	39,7	39,4	3,3	3,5	80 AU 20994	49041162	●
50	42	49,7	49,4	3,3	3,5	80 AU 20994	49041163	●
63	53	62,7	62,4	4,3	4,5	80 AU 20994	433212	●
80	70	79,7	79,4	4,3	4,5	80 AU 20994	433213	●
100	90	99,7	99,4	4,3	4,5	80 AU 20994	433214	●
125	105	124,75	123,7	8,1	8,5	80 AU 20994	422004	●
160	140	159,75	158,7	8,1	8,5	80 AU 20994	438908	●
200	180	199,75	198,7	8,1	8,5	80 AU 20994	438913	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel U-Ring NAPN

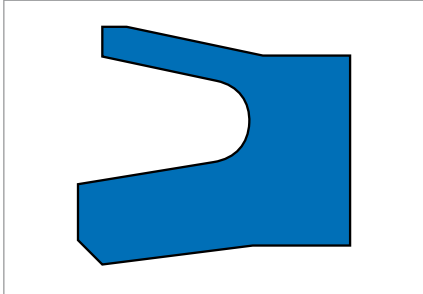


Fig. 1 Merkel U-Ring NAPN

Product description

Merkel U-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip.

Product advantages

- The asymmetrical profile with the longer and thicker static sealing lip ensures secure seating in the bottom of the groove
- The special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film
- Widely proven design
- Large supply range available
- Very good tribological properties (wear, friction and long service life).

Application

Piston seal e.g. in the ISO cylinder (only FKM: for high-temperature applications).

Material

Material	Code	Hardness
Acrylonitrile-butadiene rubber	80 NBR 186349	80 Shore A
Fluoro elastomer	75 FKM 230553	75 Shore A

Operating conditions

Material	NBR	FKM
Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)	
Operating pressure p	≤1 MPa (10 bar)	
Temperature T	-20 ... +100 °C	-5 ... +150 °C
Running speed v	≤1 m/s	

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 μm	<0,5
	tp (25% R _{max}) = 50 ... 75%	
Groove base	≤10 μm	<0,5

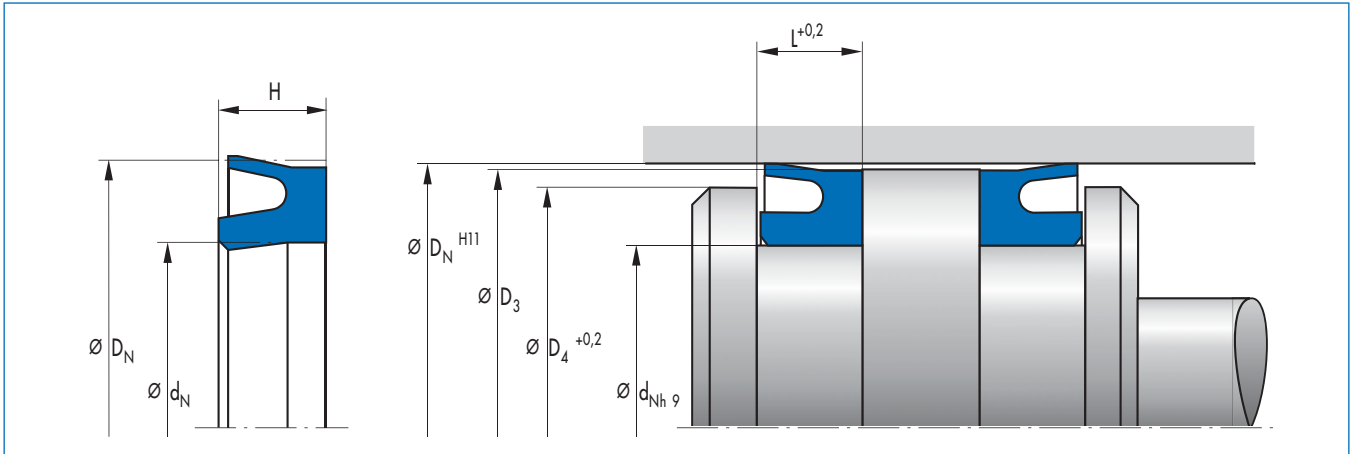
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal → Technical Manual.

Pneumatic U-rings can be snapped by hand into the housing grooves provided.

Article list



D_N	d_N	$D_3 \text{ min}$	$D_4 \text{ min}$	H	L	Material	Article No.	
6	2	5,85	5	3,5	4	80 NBR 186349	49024487	●
8	4,8	7,85	7	3	3,5	80 NBR 186349	49012343	●
10	5	9,85	9	3	3,5	80 NBR 186349	49024489	●
12	7	11,85	11	4	4,5	80 NBR 186349	49024486	●
16	10	15,85	15	4,5	5	80 NBR 186349	49024490	●
25	17	24,8	24	5	5,5	80 NBR 186349	49024491	●
32	24	31,8	30,8	5,5	6	80 NBR 186349	49022834	●
32	24	31,8	30,8	5,5	6	75 FKM 230553	49041663	●
40	30	40,8	38,5	7	7,5	80 NBR 186349	49022833	●
40	30	40,8	38,5	7	7,5	75 FKM 230553	49041664	●
50	40	49,8	48,5	7	7,5	80 NBR 186349	49022832	●
50	40	49,8	48,5	7	7,5	75 FKM 230553	49041665	●
63	53	62,75	61,5	7	7,5	80 NBR 186349	49018551	●
63	53	62,75	61,5	7	7,5	75 FKM 230553	49041666	●
80	68	79,75	78,5	8,4	9,4	80 NBR 186349	49022821	●
80	68	79,75	78,5	8,4	9,4	75 FKM 230553	49041667	●
100	88	99,75	98	8,4	9,4	80 NBR 186349	49022820	●
100	88	99,75	98	8,4	9,4	75 FKM 230553	49041668	●
125	110	124,6	123	10	11	80 NBR 186349	49022819	●
125	110	124,6	123	10	11	75 FKM 230553	49041669	●
160	145	159,8	152	10	11	80 NBR 709	434788	●
200	180	199,75	189	14,4	15	80 NBR 709	522405	●
250	225	249,7	237	18	19	80 NBR 709	434802	●
250	230	249,7	242	14	15	80 NBR 709	460914	●
320	295	319,6	307	18	19	80 NBR 709	434804	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Compact Seal Airzet PK

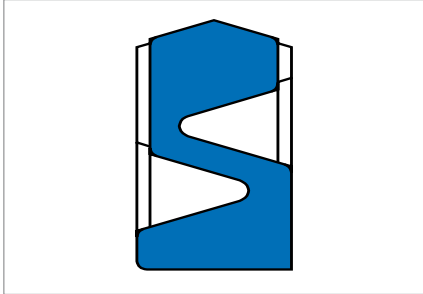


Fig. 1 Merkel Compact Seal Airzet PK

Product description

Merkel Compact Seal Airzet PK can be pressurised on both sides with grooves on the front side for pressure activation.

Product advantages

- The compact design permits short piston designs
- The rounded sealing profile and the flexible centre part give good tightness with low friction and maintain an effective lubricating film
- Widely proven design
- Large supply range available
- Very good tribological properties (wear, friction and long service life).

Application

- Short-stroke cylinders
- Valves and cylinders, especially short-stroke cylinders for high-temperature applications (only FKM).

Material

Material	Code	Hardness
NBR rubber	80 NBR 186349	80 Shore A
Fluoro elastomer	75 FKM 230553	75 Shore A

Operating conditions

Material	NBR	FKM
Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)	
Operating pressure p	≤1,2 MPa (12 bar)	
Temperature T	-20 ... +100 °C	-5 ... +150 °C
Running speed v	≤1 m/s	

Design notes

Surfaces

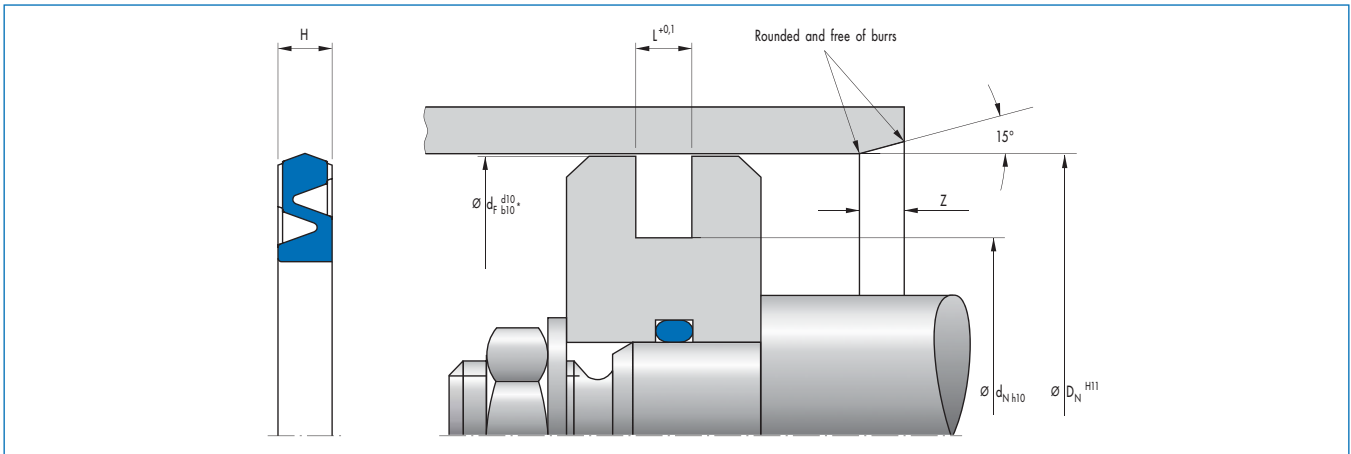
Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 µm tp (25% R _{max}) = 50 ... 70%	<0,5
Groove base	≤10 µm	<0,5

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel compact seal Airzet PK is snapped over the de-burred housing edge into the housing groove.

Article list



D_N	d_N	L	H	Z	Material	Article No.	
12	7	2,5	2,2	1,2	80 NBR 186349	49017990	●
12	7	2,5	2,2	1,2	75 FKM 230553	49042426	●
16	9	2,5	2,4	1,2	80 NBR 186349	49017991	●
16	9	2,5	2,4	1,2	75 FKM 230553	49030236	●
20	13	2,5	2,3	2,2	75 FKM 230553	49041727	●
20	13	2,5	2,4	2,2	80 NBR 186349	49017992	●
25	18	2,5	2,4	2,2	80 NBR 186349	49017969	●
25	18	2,5	2,4	2,2	75 FKM 230553	49041728	●
30	21	3	2,9	2,2	80 NBR 186349	49017970	●
30	21	3	2,9	2,2	75 FKM 230553	49041729	●
32	23	3	2,9	2,2	80 NBR 186349	49017971	●
32	23	3	2,9	2,2	75 FKM 230553	49030262	●
35	26	3	2,9	2,2	80 NBR 186349	49030175	●
35	26	3	2,9	2,2	75 FKM 230553	49042427	●
40	31	3	2,9	2,2	80 NBR 186349	49017982	●
40	31	3	2,9	2,2	75 FKM 230553	49030238	●
42	35	2,5	2,4	2,2	75 FKM 230553	49042428	●
45	36	3	2,8	2,2	80 NBR 186349	49017983	●
45	36	3	2,8	2,2	75 FKM 230553	49042429	●
50	41	3	2,9	2,2	80 NBR 186349	49017984	●
50	41	3	2,9	2,2	75 FKM 230553	49030241	●
60	48	4	3,9	2,2	80 NBR 186349	49017985	●
60	48	4	3,9	2,2	75 FKM 230553	49030239	●
63	51	4	3,9	2,2	80 NBR 186349	49017986	●
63	51	4	3,9	2,2	75 FKM 230553	49030240	●
70	58	4	3,9	2,2	80 NBR 186349	49030177	●
70	58	4	3,9	2,2	75 FKM 230553	49042430	●
80	68	4	3,9	2,2	80 NBR 186349	49017987	●
80	68	4	3,9	2,2	75 FKM 230553	49030263	●
90	78	4	3,8	2,2	75 FKM 230553	49041730	●
100	88	4	3,9	2,2	80 NBR 186349	49017988	●
100	88	4	3,9	2,2	75 FKM 230553	49042431	●
125	110	5	4,9	2,2	80 NBR 186349	49017993	●
125	110	5	4,9	2,2	75 FKM 230553	49041731	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Compact Seal KDN

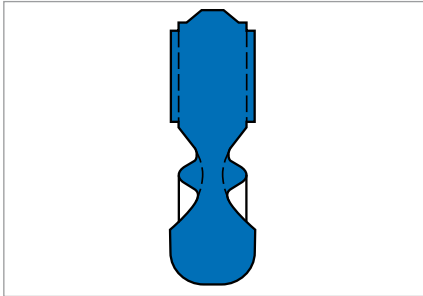


Fig. 1 Merkel Compact Seal KDN

Product description

- Merkel Compact Seal can be pressurised on both sides with grooves on the front side for pressure activation.

Product advantages

- The compact design permits short piston designs
- The rounded sealing profile and the flexible centre part give good tightness with low friction and maintain an effective lubricating film.

Application

Short-stroke cylinders.

Material

Material	Code	Hardness
Acrylonitrile-butadiene rubber	72 NBR 708	72 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1 MPa (10 bar)
Temperature T	-20 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 µm tp (25% R _{max}) = 50 ... 75%	<0,5
Groove base	≤10 µm	<0,5

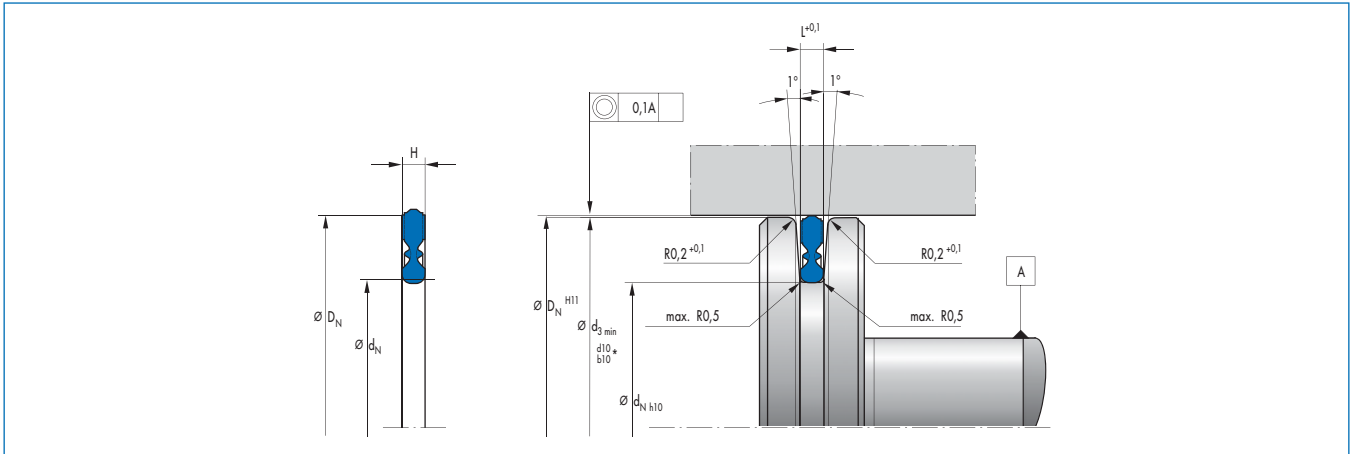
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

Merkel Compact Seal KDN is snapped over the de-burred housing edge into the housing groove.

Article list



D_N	d_N	$D_3 \text{ min}$	H	L	Material	Article No.	
12	5,1	12	1,8	1,8	72 NBR 708	49046430	●
16	8,9	16	2,1	2,1	72 NBR 708	49044391	●
20	12,9	20	2,1	2,1	72 NBR 708	49046431	●
25	17,9	25	2,1	2,1	72 NBR 708	429068	●
30	17,9	30	2,1	2,1	72 NBR 708	429070	●
32	19,9	32	2,1	2,1	72 NBR 708	502039	●
35	22,9	35	2,1	2,1	72 NBR 708	49046472	●
40	27,9	40	2,1	2,1	72 NBR 708	532581	●
50	37,9	50	2,1	2,1	72 NBR 708	429083	●
60	48	60	2,1	2,1	72 NBR 708	430632	●
63	51	63	2,1	2,1	72 NBR 708	527489	●
70	58	70	2,1	2,1	72 NBR 708	430634	●
80	68	80	2,1	2,1	72 NBR 708	429086	●
90	78,1	90	2,1	2,1	72 NBR 708	429527	●
100	88,1	100	2,1	2,1	72 NBR 708	429088	●
125	113,3	125	2,1	2,1	72 NBR 708	429090	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Complete Piston NADUOP

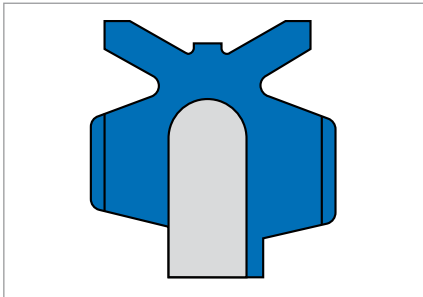


Fig. 1 Merkel Complete Piston NADUOP

Product description

Short Merkel complete piston with steel base plate, vulcanised buffers and sealing lips with special pneumatic sealing edges. Ready to install Merkel complete piston with integrated guide that can be pressurised on both sides.

Product advantages

- Vulcanised buffers for end-position damping of piston in the cylinder
- Radial venting passages for reliable pressure application at the end of the stroke.

Application

Pneumatic cylinders.

Material

Material	Code	Hardness	Base plate
Acrylonitrile-butadiene rubber	72 NBR 708	72 Shore A	mild steel according to DIN 1624

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1 MPa (10 bar)
Temperature T	-20 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 μm	<0,5
	tp (25% R _{max}) = 50 ... 75%	

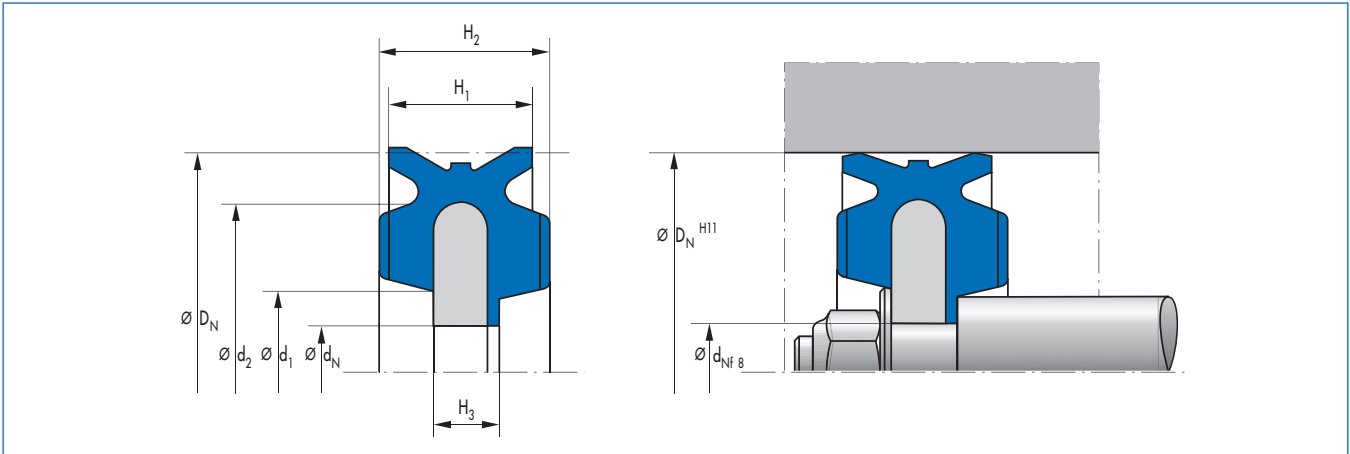
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Complete Piston NADUOP is fitted to shouldered end of the piston rod and fastened with washers and a nut. The threaded fitting is to be protected against loosening.

Article list



D_N	d_N	d_1	d_2	H_1	H_2	H_3	Material	Article No.	
8	3	4,8	6	4,2	2,1	1,8	72 NBR 708	407194	●
10	3	5	8	4,2	5,2	1,8	72 NBR 708	407199	●
12	4,5	6,6	9,8	5,2	6,2	2,3	72 NBR 708	407203	●
16	4,5	6,7	13,2	5,7	6,7	2,3	72 NBR 708	407205	●
20	6	8,7	16,8	6,7	7,7	2,8	72 NBR 708	407207	●
25	7	10,6	21,8	8	9	3,3	72 NBR 708	407209	●
32	8	15	28,8	8	9	4,5	72 NBR 708	451057	●
40	10	17	36,8	8,5	10	4,5	72 NBR 708	451142	●
50	10	25	46,8	8,5	10	4,5	72 NBR 708	451144	●
63	16	35,5	58,8	9,5	12	5,5	72 NBR 708	451146	●
80	16	48,5	74,8	9,5	12	5,5	72 NBR 708	451147	●
100	16	49	96,8	12,5	15	8,5	72 NBR 708	451148	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Complete Piston Pneuko G

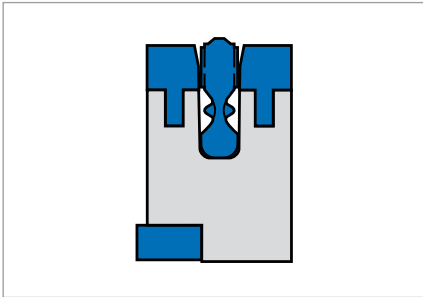


Fig. 1 Merkel Complete Piston Pneuko G

Product description

Merkel complete piston with light alloy/polyamide body, snap-action seal and integrated guide.

Product advantages

- Ready to fit Merkel complete piston with very low height to which pressure can be applied on both sides
- Easily fastened to the piston rod
- Integrated static seal on the inside diameter.

Application

Pneumatic cylinder without request, frequent special cylinder.

Material

Material	Acrylonitrile-butadiene rubber
Code	72 NBR 708
Hardness	72 Shore A
Base plate	Al (POM 20 for $\varnothing \leq 25$)
Guide	PA 4601 (POM for $\varnothing \geq 25$)
Static seal	72 NBR 872

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤ 1 MPa (10 bar)
Temperature T	$-20 \dots +100$ °C
Running speed v	≤ 1 m/s

Design notes

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual. The complete piston is fitted to

shouldered end of the piston rod and fastened with washers (up to and including $\varnothing 25$ DIN 125 $\geq \varnothing 25$ DIN 1440) and a nut. The threaded fitting is to be protected against loosening.

Surfaces

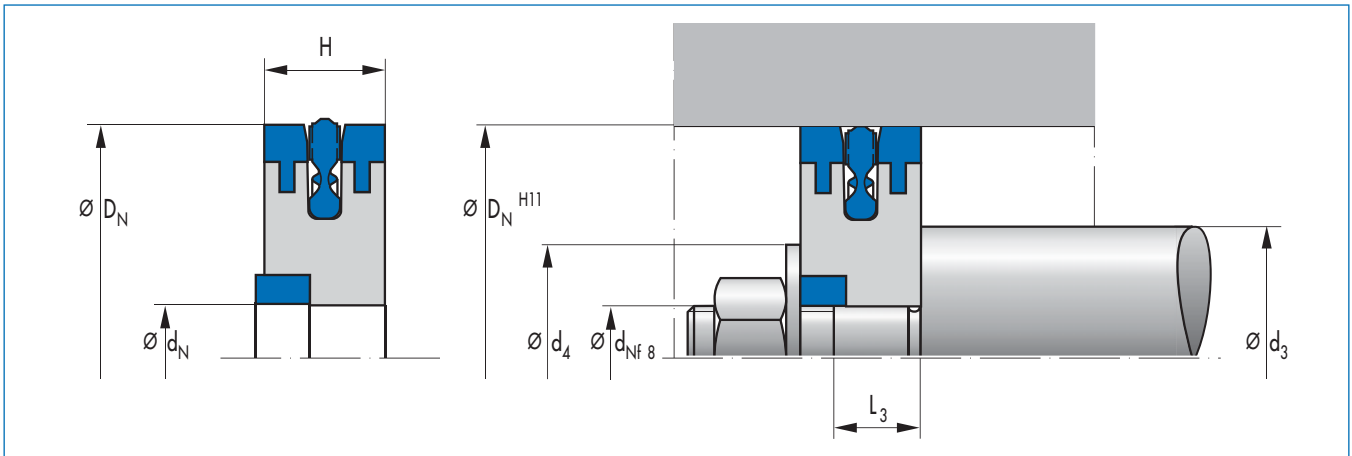
Surface roughness	R_{max}	R_p/R_z
Cylinder barrel	$\leq 4 \mu m$	$< 0,5$
$tp (25\% R_{max}) = 50 \dots 70\%$		

→ Technical Manual.

Fitting & installation

Prior to installation in the cylinder, grease all cylinder contact surfaces evenly. Do not introduce any grease into the piston groove.

Article list



D_N	d_N	H	L_3	d_3	$d_{4 \text{ min}}$	Material	Article No.	
12	3	6	4	5	6	POM 20 GF	430709	●
16	4	6	4	6	8	POM 20 GF	428576	●
20	6	6	4	8	10	POM 20 GF	430708	●
25	6	6	4	8	10	POM 20 GF	428564	●
30	8	8	6,5	10	13	PA 4601	428565	●
32	8	8	6,5	10	13	PA 4601	428566	●
35	8	8	6,5	10	13	PA 4601	430711	●
40	10	8	6,5	12	15	PA 4601	428567	●
50	10	8	6,5	12	15	PA 4601	430710	●
60	12	8	6,5	16	17	PA 4601	430702	●
63	12	8	6,5	16	17	PA 4601	428569	●
70	12	8	6,5	16	17	PA 4601	430707	●
80	12	10	8,5	16	17	PA 4601	428568	●
90	12	10	8,5	16	17	PA 4601	430712	●
100	12	10	8,5	16	17	PA 4601	428571	●
125	20	12	9,5	25	25	PA 4601	428572	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Complete Piston Pneuko M 210

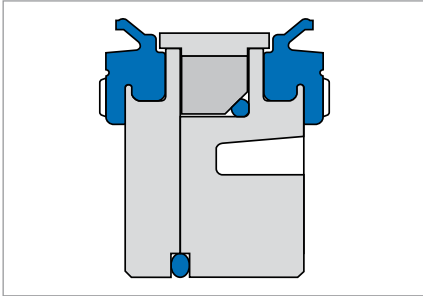


Fig. 1 Merkel Complete Piston Pneuko M 210

Product description

The compact, short, Merkel complete pneumatic piston Pneuko M consists of an aluminium body, guide strip, a magnet and the sealing body with a special sealing edge on the sealing lip and integrated buffers made of very wear resistant fluoro elastomer FKM for special applications.

Product advantages

- Long service life
- Low start friction due to optimised sealing lip geometry and additional venting passages
- Constant good sealing behaviour over a wide pressure range (to 1,2 MPa)
- Running properties without tendency to tilt due to a guide strip optimised for the application
- Aluminium body brings weight saving and permits high energy absorption
- Easily fastened to the piston rod
- Integrated static seal
- Supplied suitable for storage and fitting in deep-drawn inserts
- Simple provisioning
- Integrated magnet for a position check using a sensor.

Application

Broad range of uses, only one piston for short stroke cylinders, compact cylinders, round cylinders and ISO cylinders.

Material

Material	Code	Hardness
Fluoro elastomer	75 FKM 181327	70 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-5 ... +150 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 µm	<0,5
	tp (25% R _{max}) = 50 ... 70%	

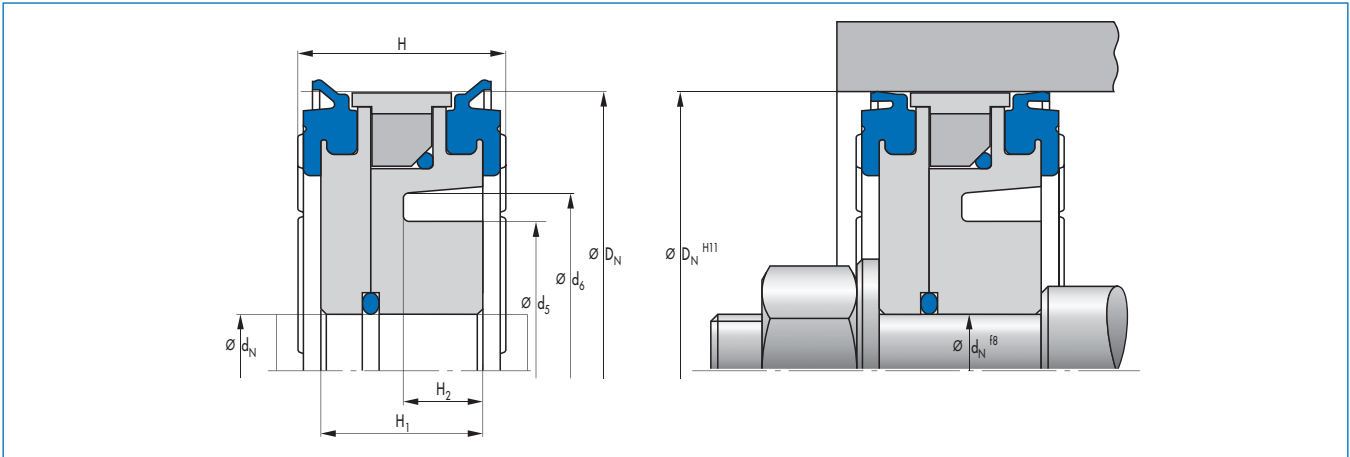
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Complete Piston Pneuko M 210 is fitted to shouldered end of the piston rod and fastened with washers and a nut. The threaded fitting is to be protected against loosening.

Article list



D_N	d_N	d_5	d_6	H	H_1	H_2	Material	Article No.	
32	8,1	17	20	14	10,6	5,2	75 FKM 181327	527394	●
40	8,1	21,4	25,4	15	11,6	5,7	75 FKM 181327	526800	●
50	10,1	27,3	32,8	15,5	12,1	5	75 FKM 181327	526824	●
63	10,1	28	33	19	15,79	4,9	75 FKM 181327	527506	●
80	12,1	29	34,4	21,5	17,5	8,5	75 FKM 181327	527767	●
100	17,1	39,6	46,8	25,5	20	8,85	75 FKM 181327	527866	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Complete Piston Pneuko M 310

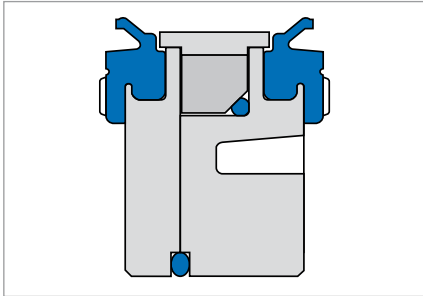


Fig. 1 Merkel Complete Piston Pneuko M 310

Product description

The compact, short, Merkel complete pneumatic piston Pneuko M consists of an aluminium body, guide strip, a magnet and the sealing body with a special sealing edge on the sealing lip and integrated buffers made of very wear resistant polyurethane.

Product advantages

- Long service life
- Low start friction due to optimised sealing lip geometry and additional venting passages
- Constant good sealing behaviour over a wide pressure range (to 1,2 MPa)
- Running properties without tendency to tilt due to a guide strip optimised for the application
- Aluminium body brings weight saving and permits high energy absorption
- Easily fastened to the piston rod
- Integrated static seal
- Supplied suitable for storage and fitting in deep-drawn inserts
- Simple provisioning
- Integrated magnet for a position check using a sensor.

Application

Broad range of uses, only one piston for short stroke cylinders, compact cylinders, round cylinders and ISO cylinders.

Material

Material	Code	Hardness
High performance polyurethane	80 AU 21000	80 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-25 ... +80 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 µm	<0,5
	tp (25% R _{max}) = 50 ... 70%	

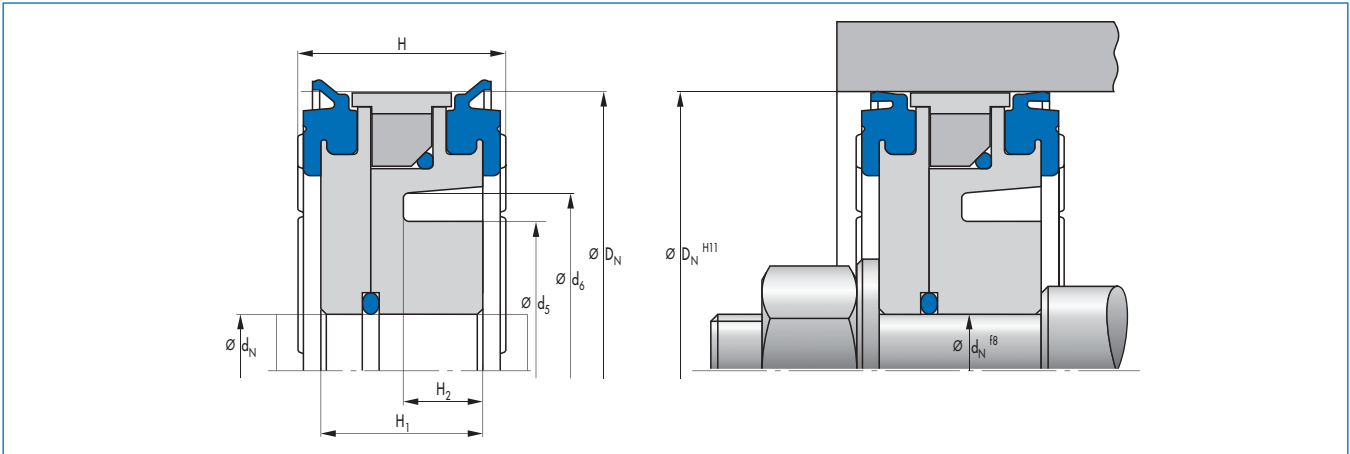
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Complete Piston Pneuko M 310 is fitted to shouldered end of the piston rod and fastened with washers and a nut. The threaded fitting is to be protected against loosening.

Article list



D_N	d_N	d_5	d_6	H	H_1	H_2	Material	Article No.	
32	8,1	17	20	14	10,6	5,2	80 AU 21000	525994	●
40	8,1	21,4	25,4	15	11,6	5,7	80 AU 21000	523464	●
50	10,1	27,3	32,8	15,5	12,1	5	80 AU 21000	523546	●
63	10,1	28	33	19	15,79	4,9	80 AU 21000	525337	●
80	12,1	29	34,4	21,5	17,5	8,5	80 AU 21000	526210	●
100	17,1	39,6	46,8	25,5	20	8,85	80 AU 21000	526499	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Complete Piston TDUOP

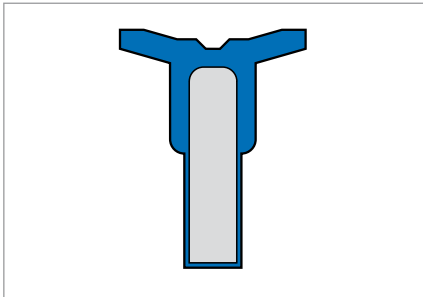


Fig. 1 Merkel Complete Piston TDUOP

Product description

Merkel complete piston with steel base plate and vulcanised sealing lips with special pneumatic sealing edges.

Product advantages

- Ready to fit complete piston to which pressure can be applied on both sides with integrated guide
- Easily fastened to the piston rod without additional sealing components
- Long service life
- Constant good sealing behaviour over a wide pressure range (to 1,2 MPa)
- Simple provisioning.

Application

Pneumatic cylinder without request.

Material

Material	Code	Hardness	Base plate
NBR rubber	72 NBR 708	72 Shore A	mild steel according to DIN 1624

FKM on enquiry.

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-20 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 µm	<0,5
	tp (25% R _{max}) = 50 ... 70%	

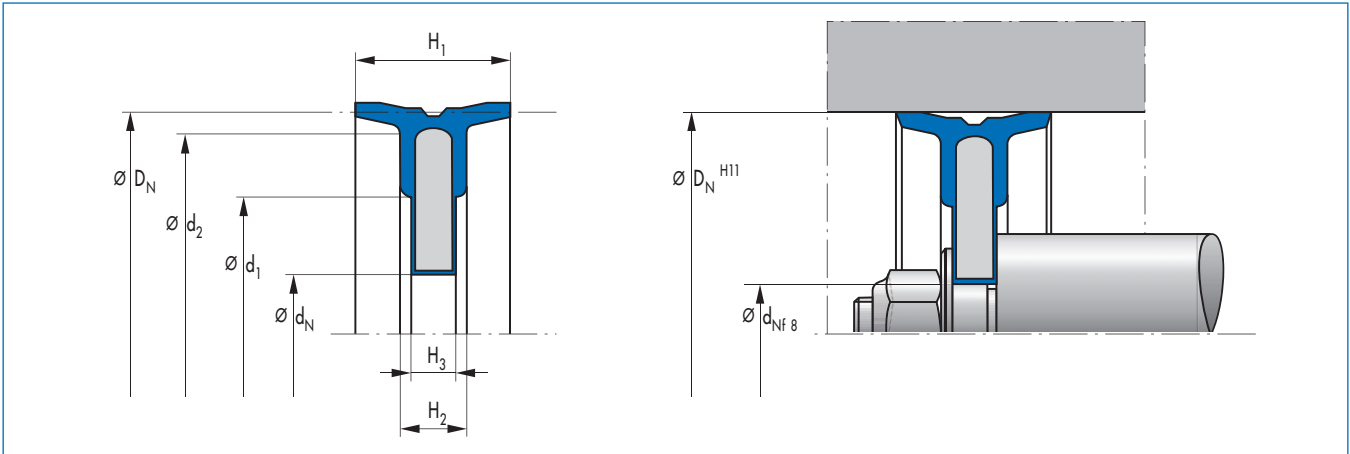
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Complete Piston TDUOP is fitted to shouldered end of the piston rod and fastened with washers and a nut. The threaded fitting is to be protected against loosening.

Article list



D_N	d_N	d_1	d_2	H_1	H_2	H_3	Material	Article No.	
25	8	15,6	21,4	12	4,6	3,8	72 NBR 708	112175	●
32	8	20	27,8	15	6,2	3,8	72 NBR 708	112176	●
35	8	25	30,8	15	4	4,8	72 NBR 708	125373	●
40	10	25	35	18	7,4	4,8	72 NBR 708	112177	●
50	10	37	45	18	7,4	4,8	72 NBR 708	112178	●
63	12	43	57,4	22	9	5,8	72 NBR 708	112179	●
70	12	50	64,4	22	9	5,8	72 NBR 708	112180	●
80	16	55	73,5	25	9	5,8	72 NBR 708	112239	●
100	16	75	93,5	25	9	6,8	72 NBR 708	112181	●
125	20	95	118	30	13	9,6	72 NBR 708	112182	●
140	20	110	132,5	30	14,2	10,8	72 NBR 708	112183	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Complete Piston TDUOP with Venting Passages

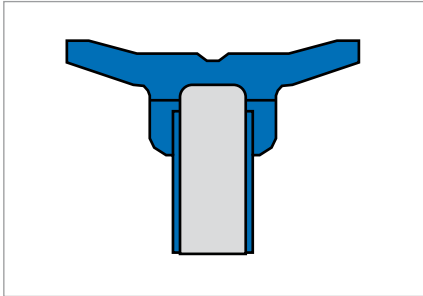


Fig. 1 Merkel Complete Piston TDUOP with Venting Passages

Product description

- Merkel complete piston with steel base plate and vulcanised sealing lips with special pneumatic sealing edges
- Ready to fit complete piston to which pressure can be applied on both sides with integrated guide
- Easily fastened to the piston rod without additional sealing components
- The design with radial venting passages on the front sides facilitates reliable pressure application at the end of the stroke.

Product advantages

- Long service life
- Low start friction due to optimised sealing lip geometry and supported by additional venting passages
- Constant good sealing behaviour over a wide pressure range (to 1,2 MPa)
- Easily fastened to the piston rod
- Simple provisioning.

Application

Pneumatic cylinder without request.

Material

Material	Code	Hardness	Base plate
NBR rubber	72 NBR 708	72 Shore A	mild steel according to DIN 1624

FKM on enquiry.

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-20 ... +100 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 µm	<0,5
	tp (25% R _{max}) = 50 ... 75%	

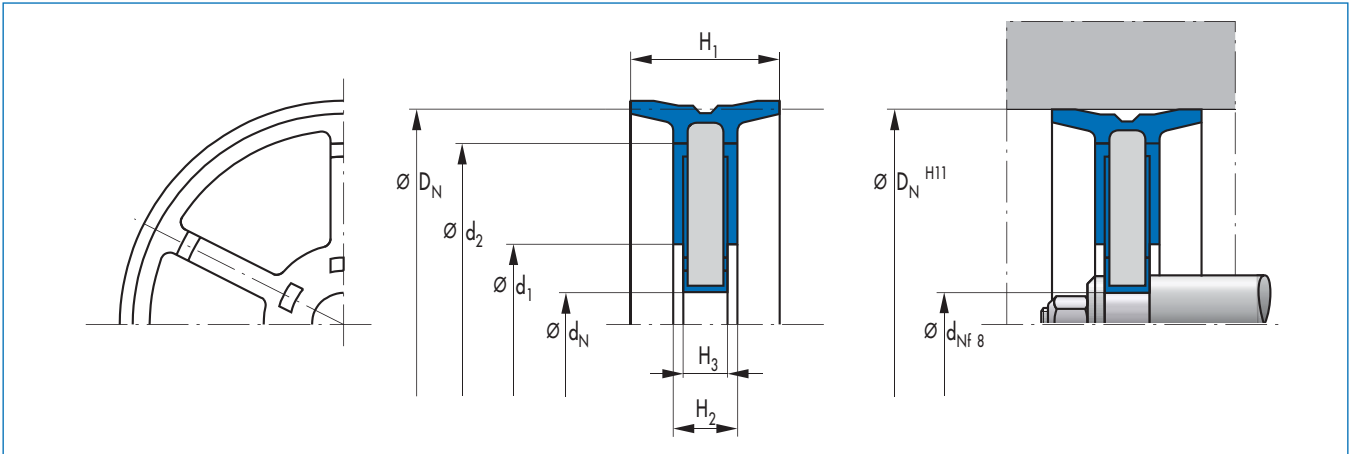
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Complete Piston TDUOP with Venting Passages is fitted to shouldered end of the piston rod and fastened with washers and a nut. The threaded fitting is to be protected against loosening.

Article list



D_N	d_N	d_1	d_2	H_1	H_2	H_3	Material	Article No.	
25	8	15,5	20	12	6	4	72 NBR 708	406238	●
32	8	14	24,5	15	6	4	72 NBR 708	406239	●
40	10	20	32	18	7	5	72 NBR 708	406241	●
50	10	20	42	18	7	5	72 NBR 708	406245	●
63	14	32	54	22	9	6	72 NBR 708	406246	●
63	16	43	54	22	9	6	72 NBR 708	406248	●
80	14	32	70	25	9	6	72 NBR 708	406250	●
80	16	55	70	25	9	6	72 NBR 708	406266	●
90	12	64	82	24	10	7	72 NBR 708	406275	●
100	18	45	90	25	12	9	72 NBR 708	406277	●
100	20	45	90	25	12	9	72 NBR 708	406279	●
125	18	45	114	30	12	9	72 NBR 708	406280	●
160	24	55	149	30	14	11	72 NBR 708	406282	●
200	24	55	190	30	14	11	72 NBR 708	406288	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Complete Piston TDUOP M

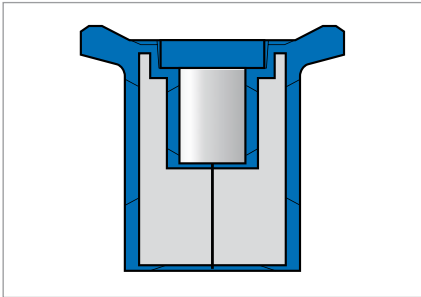


Fig. 1 Merkel Complete Piston TDUOP M

Product description

The compact, short, Merkel Complete Piston TDUOP M consists of an aluminium body, a guide strip, a magnet and a sealing element with a special sealing edge on the sealing lip.

Product advantages

- Broad range of uses, only one complete piston for round cylinders and ISO cylinders
- Long service life
- Low start friction due to optimised sealing lip geometry
- Constant good sealing behaviour over a wide pressure range (to 1,2 MPa)
- Running properties without tendency to tilt due to a guide strip optimised for the application
- Aluminium body brings weight saving and permits high energy absorption
- Easily fastened to the piston rod
- Integrated static seal
- Supplied suitable for storage and fitting in deep-drawn inserts
- Simple provisioning
- Integrated magnet for a position check using a sensor.

Application

Pneumatic cylinder with request.

Material

Material	Code	Hardness
Acrylonitrile-butadiene rubber	72 NBR 708	72 Shore A

Operating conditions

Medium	Prepared, dried and de-oiled compressed air (after greasing for fitting)
Operating pressure p	≤1,2 MPa (12 bar)
Temperature T	-20 ... +80 °C
Running speed v	≤1 m/s

Design notes

Surfaces

Surface roughness	R _{max}	R _p /R _z
Cylinder barrel	≤4 µm	<0,5
	tp (25% R _{max}) = 50 ... 75%	

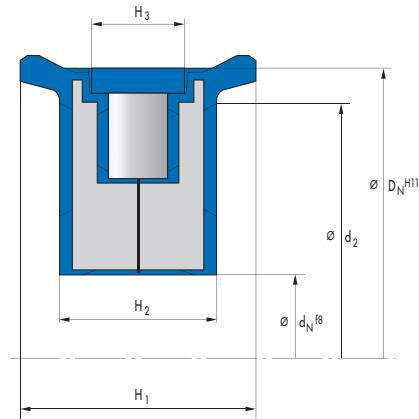
→ Technical Manual.

Fitting & installation

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

The Merkel Complete Piston TDUOP M is fitted to shouldered end of the piston rod and fastened with washers and a nut. The threaded fitting is to be protected against loosening.

Article list



D_N	d_N	H_1	H_2	d_2	H_3	Material	Article No.	
32	8	18	13	24	10	72 NBR 708	436297	●
40	10	22	13	32	10	72 NBR 708	420487	●
50	10	20	11	42	8	72 NBR 708	420488	●
50	16	20	13	45	8	72 NBR 708	438283	●
63	16	25	14	54	10	72 NBR 708	420489	●
80	16	27	14	70	10	72 NBR 708	420491	●
80	20	27	14	75	10	72 NBR 708	438285	●
100	20	27	16	90	10	72 NBR 708	420494	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Guide Strip SF

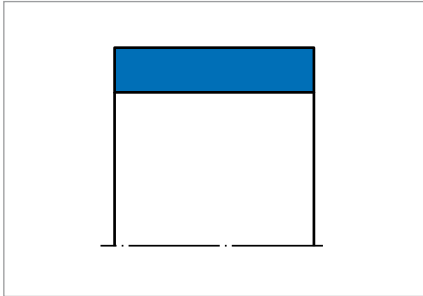


Fig. 1 Merkel Guide Strip SF

Product description

Non-metallic Merkel Guide Strip SF, available ready to fit cut to size or by the metre.

Product advantages

As a non-metallic guide element for rods, also for standardised housings according to ISO 10766

- Low friction, free of stick-slip.

Application

Control and regulation equipment, handling equipment, injection moulding machines.

Material

Material	Code
PTFE bronze compound	PTFE B500

Operating conditions

Material	PTFE B500
Temperature range in °C	
Hydraulic oils HL, HLP	-40 ... +200
HFA fluids	-
HFB fluids	-
HFC fluids	-
HFD fluids	-40 ... +200
Water	-
HETG (rapeseed oil)	-40 ... +80
HEES (synthetic esters)	-40 ... +100
HEPG (glycol)	-40 ... +80
Mineral greases	-40 ... +200

Surface quality

Surface roughness	R _a	R _{max}
Sliding surface	0,05 ... 0,3 µm	≤2,5 µm
Groove base	≤2 µm	≤10,0 µm
Side of groove	≤3 µm	≤15,0 µm

Percentage contact area M_r >50% to max. 90% at cutting depth c = Rz/2 and reference line C ref = 0%.

Design notes

Please observe our general design notes in → Technical Manual.

Calculating straight length L2

L2	Production tolerances
>20 ... 80	... 0,5
>80 ... 250	... 1,0
>250 ... 500	... 1,5
>500 ... 1000	... 2,0
>1000 ... 2000	... 3,0
>2000 ... 4000	... 4,0

Tolerance recommendation

D₁
H8

The tolerance definition for the dimensions D and d_F must be viewed in connection with the seal used. The diameter d₁ specified in the table of dimensions is to be viewed exclusively in relation to the guide ring. The corresponding diameter of an adjacent seal housing should be tailored to the sealing component.

Manufacturing tolerance

Production tolerance profile thickness S
-0,05

Surface load

p < 15 N/mm ² up to 20 °C
p < 7,5 N/mm ² up to 80 °C
p < 5 N/mm ² up to 120 °C

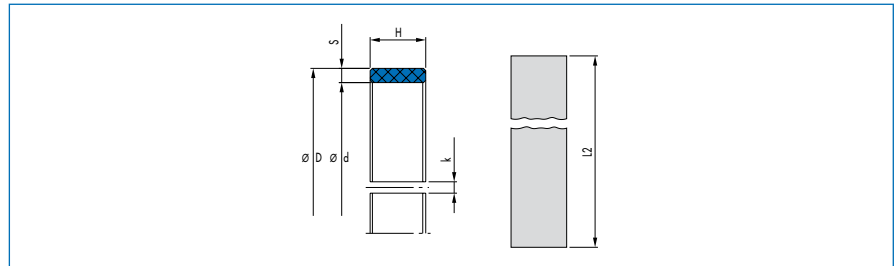
For running speed, see sealing system.

Cutting rolls to size

The following dimensions are available from stock by the metre. The straight length L₂ of blanks is to be determined using the formula. The gap k produced after fitting is necessary due to thermal expansion. We recommend a straight cut on the strips. In the event of butt joints the tips may be damaged and break-off. Our cutter (Article No. 507228) facilitates time-saving and accurate cutting to size.

Calculation of the straight length L₂ for rods:

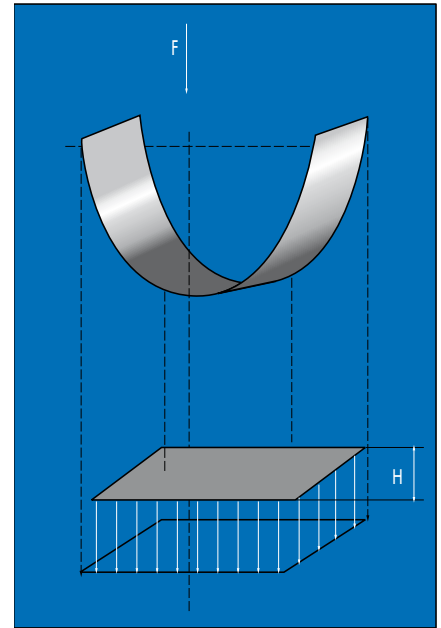
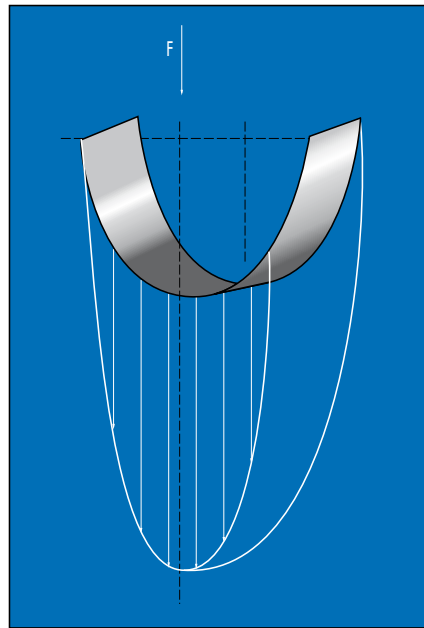
$$L_2 = (d + S) \times 3,11 - 0,5$$



Groove length L	Profile thickness S	Article No.
8	2,5	24226174
9,7	2,5	24102775
10	2,5	24102563
12	2,5	24099191
15	2,5	24102564
20	2,5	24076217
25	2,5	24107955
15	4,0	24160019
20	4,0	24238052
25	4,0	24148093

Surface force

The pressure distribution on the guide rings is non-linear. The non-linear pressure curve over the contact range was taken into account when calculating the permissible specific surface pressure. The permissible load on the guide strip is calculated by multiplying the projected surface with the permissible specific surface pressure. However, the figure for the permissible specific surface pressure takes into account the possible angular offset of the rods when the recommended guide elements are used.



$$F = P \times A$$

$$H = F / (d \times P)$$

H = guide strip width [mm]

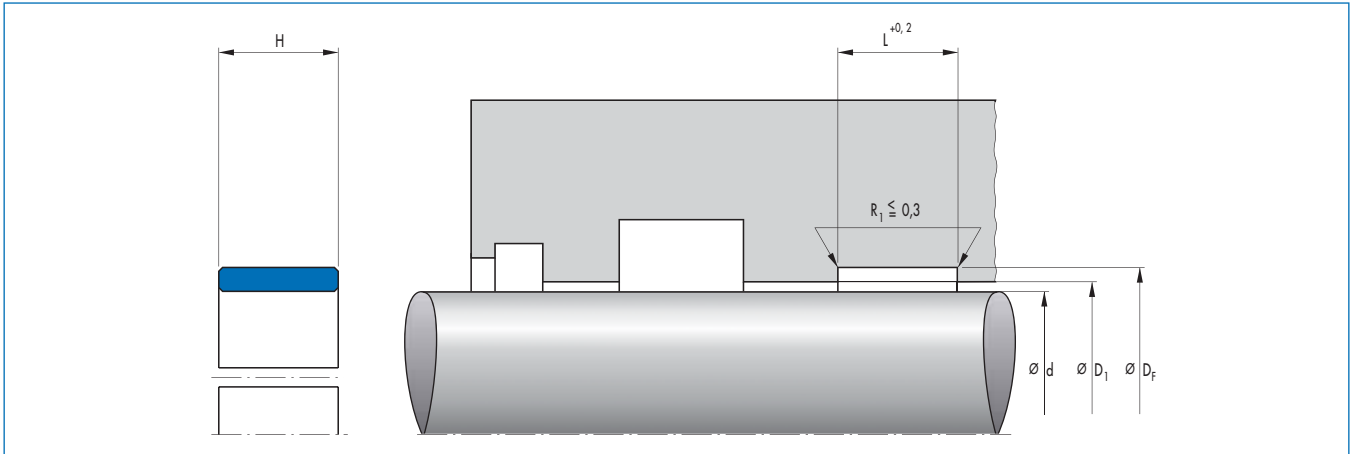
F = radial loading [N]

A = projected area [mm²]

P = perm. compression per unit area [N/mm²]

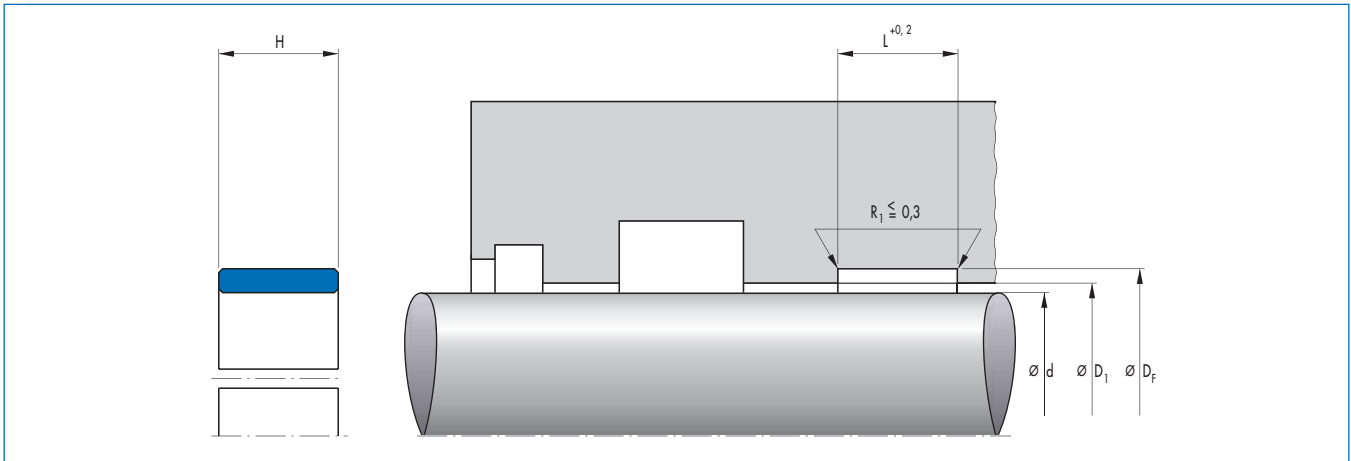
d = rod diameter with rod guidance;
piston diameter with
piston guidance [mm].

Article list



d	D _F	D ₁	H	L	Profile	Material	Article No.	
25	28	25,8	5,5	5,6	1,5	PTFE B500	24300101	●
28	31	28,8	5,5	5,6	1,5	PTFE B500	24300102	○
32	37	32,8	9,6	9,7	2,5	PTFE B500	24294062	○
35	38	35,8	5,5	5,6	1,5	PTFE B500	24300105	○
36	41	36,8	5,5	5,6	2,5	PTFE B500	24165260	○
40	45	40,8	9,6	9,7	2,5	PTFE B500	24216883	○
42	47	43,2	5,5	5,6	2,5	PTFE B500	24300109	○
44	49	45,2	9,6	9,7	2,5	PTFE B500	24333828	○
45	50	46,2	5,5	5,6	2,5	PTFE B500	24300110	●
45	50	46,2	9,6	9,7	2,5	PTFE B500	24266350	○
45	50	46,6	14,8	15	2,5	PTFE B500	24311361	○
50	55	51,2	5,5	5,6	2,5	PTFE B500	24110082	●
50	55	51,2	9,6	9,7	2,5	PTFE B500	24169558	●
50	55	51,6	14,8	15	2,5	PTFE B500	24203345	○
55	60	56,2	9,6	9,7	2,5	PTFE B500	24160646	●
55	60	56,6	14,8	15	2,5	PTFE B500	24275190	○
56	61	57,2	5,5	5,6	2,5	PTFE B500	24300111	○
56	61	57,2	9,6	9,7	2,5	PTFE B500	24245671	●
56	61	57,6	14,8	15	2,5	PTFE B500	24316593	○
58	63	59,2	9,6	9,7	2,5	PTFE B500	24333829	○
60	65	61,2	9,6	9,7	2,5	PTFE B500	24165598	●
60	65	61,6	14,8	15	2,5	PTFE B500	24203612	○
63	68	64,2	9,6	9,7	2,5	PTFE B500	24300114	●
63	68	64,6	14,8	15	2,5	PTFE B500	24275191	○
65	70	66,2	9,6	9,7	2,5	PTFE B500	24300116	●
68	73	69,2	9,6	9,7	2,5	PTFE B500	24332153	○
70	75	71,2	9,6	9,7	2,5	PTFE B500	24300118	●
75	80	76,2	9,6	9,7	2,5	PTFE B500	24300120	●
75	80	76,6	14,8	15	2,5	PTFE B500	24244742	○
80	85	81,2	9,6	9,7	2,5	PTFE B500	24300122	●
80	85	81,6	14,8	15	2,5	PTFE B500	24266958	○
80	85	81,6	24,5	25	2,5	PTFE B500	24265250	○
85	90	86,2	9,6	9,7	2,5	PTFE B500	24167352	●
85	90	86,6	14,8	15	2,5	PTFE B500	24244741	○
90	95	91,2	9,6	9,7	2,5	PTFE B500	24300125	●
90	95	91,6	14,8	15	2,5	PTFE B500	24291194	○

● Available from stock ○ On request: Tool is available, delivery at short notice

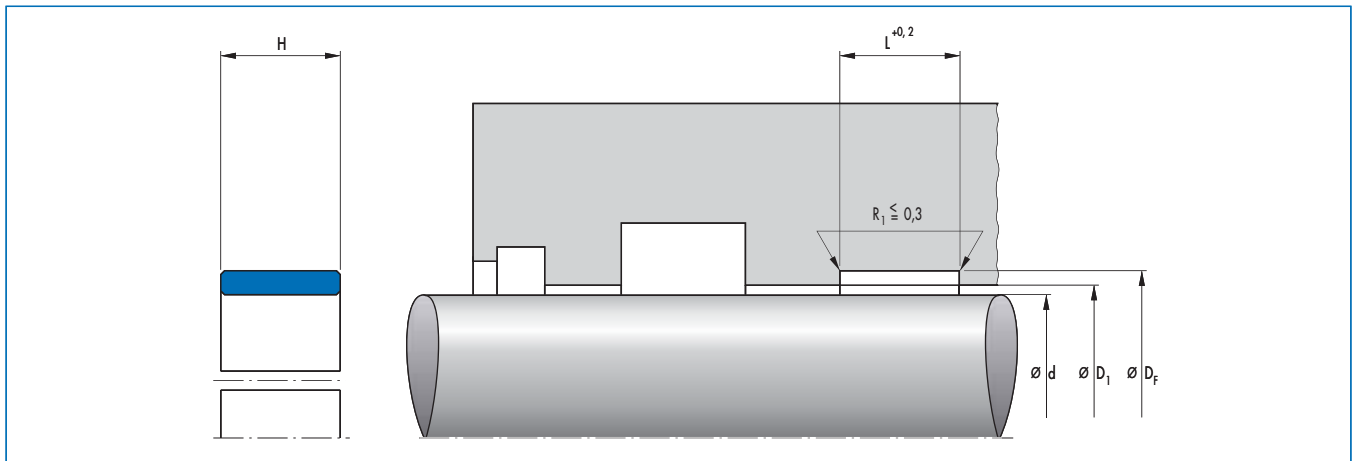


d	D _f	D ₁	H	L	Profile	Material	Article No.	
95	100	96,2	9,6	9,7	2,5	PTFE B500	24300127	○
100	105	101,2	9,6	9,7	2,5	PTFE B500	24300129	●
100	105	101,6	14,8	15	2,5	PTFE B500	24250627	●
100	105	101,6	19,5	20	2,5	PTFE B500	24260605	○
100	105	101,6	24,5	25	2,5	PTFE B500	24342265	○
100	108	102,5	14,8	15	4	PTFE B500	24327233	○
105	110	106,2	9,6	9,7	2,5	PTFE B500	24300131	○
110	115	111,2	9,6	9,7	2,5	PTFE B500	24300133	●
110	115	111,6	14,8	15	2,5	PTFE B500	24293684	○
110	115	111,6	19,5	20	2,5	PTFE B500	24166931	○
110	115	111,6	24,5	25	2,5	PTFE B500	24292915	○
110	118	112,5	14,8	15	4	PTFE B500	24327234	○
115	120	116,2	9,6	9,7	2,5	PTFE B500	24300135	○
115	120	116,6	19,5	20	2,5	PTFE B500	24242172	○
120	125	121,2	9,6	9,7	2,5	PTFE B500	24300137	○
120	125	121,6	14,8	15	2,5	PTFE B500	24300138	○
125	130	126,2	9,6	9,7	2,5	PTFE B500	24300140	●
125	130	126,6	14,8	15	2,5	PTFE B500	24300141	●
125	130	126,6	19,5	20	2,5	PTFE B500	24230162	○
130	135	131,2	9,6	9,7	2,5	PTFE B500	24300143	○
130	135	131,6	14,8	15	2,5	PTFE B500	24300144	○
130	135	131,6	24,5	25	2,5	PTFE B500	24262562	○
135	140	136,2	9,6	9,7	2,5	PTFE B500	24300146	○
140	145	141,6	14,8	15	2,5	PTFE B500	24300149	○
140	145	141,6	19,5	20	2,5	PTFE B500	24328413	○
140	145	141,6	24,5	25	2,5	PTFE B500	24256885	○
140	148	142,5	14,8	15	4	PTFE B500	24327236	○
145	150	146,2	9,6	9,7	2,5	PTFE B500	24248043	○
150	155	151,6	14,8	15	2,5	PTFE B500	24300151	●
150	155	151,6	19,5	20	2,5	PTFE B500	24203276	○
150	155	151,6	24,5	25	2,5	PTFE B500	24168884	○
160	165	161,2	9,6	9,7	2,5	PTFE B500	24204644	○
160	165	161,6	14,8	15	2,5	PTFE B500	24204055	○
160	165	161,6	24,5	25	2,5	PTFE B500	24263903	○
170	175	171,6	14,8	15	2,5	PTFE B500	24300153	●
175	180	176,6	24,5	25	2,5	PTFE B500	24264758	○
180	185	181,2	9,6	9,7	2,5	PTFE B500	24300154	●

● Available from stock ○ On request: Tool is available, delivery at short notice

d	D _F	D ₁	H	L	Profile	Material	Article No.	
180	185	181,6	14,8	15	2,5	PTFE B500	24300155	●
185	190	186,2	9,6	9,7	2,5	PTFE B500	24291724	○
190	195	191,6	14,8	15	2,5	PTFE B500	24300157	○
195	200	196,2	9,6	9,7	2,5	PTFE B500	24242182	○
200	205	201,6	14,8	15	2,5	PTFE B500	24154721	○
200	205	201,6	24,5	25	2,5	PTFE B500	24266925	○
200	208	202,5	24,5	25	4	PTFE B500	24299021	○
210	215	211,2	9,6	9,7	2,5	PTFE B500	24300159	○
210	215	211,6	14,8	15	2,5	PTFE B500	24300160	●
210	215	211,6	19,5	20	2,5	PTFE B500	24239042	○
220	225	221,2	9,6	9,7	2,5	PTFE B500	24300161	○
220	225	221,6	14,8	15	2,5	PTFE B500	24300162	○
220	225	221,6	19,5	20	2,5	PTFE B500	24157304	○
230	235	231,6	14,8	15	2,5	PTFE B500	24154716	○
230	235	231,6	19,5	20	2,5	PTFE B500	24342108	○
240	245	241,2	9,6	9,7	2,5	PTFE B500	24258216	○
240	245	241,6	14,8	15	2,5	PTFE B500	24223045	○
240	245	241,6	24,5	25	2,5	PTFE B500	24314554	○
245	250	246,6	24,5	25	2,5	PTFE B500	24311377	○
250	255	251,6	14,8	15	2,5	PTFE B500	24300163	○
260	265	261,6	14,8	15	2,5	PTFE B500	24300164	○
270	275	271,6	24,5	25	2,5	PTFE B500	24262561	○
280	285	281,6	14,8	15	2,5	PTFE B500	24300166	○
290	295	291,6	14,8	15	2,5	PTFE B500	24300167	○
300	305	301,6	14,8	15	2,5	PTFE B500	24300168	○
300	305	301,6	24,5	25	2,5	PTFE B500	24348072	○
310	315	311,6	14,8	15	2,5	PTFE B500	24300169	○
325	330	326,6	24,5	25	2,5	PTFE B500	24293821	○
330	335	331,6	14,8	15	2,5	PTFE B500	24300172	○
330	335	331,6	24,5	25	2,5	PTFE B500	24300173	○
340	345	341,6	14,8	15	2,5	PTFE B500	24300174	○
340	345	341,6	24,5	25	2,5	PTFE B500	24162997	○
343	348	344,6	14,8	15	2,5	PTFE B500	24301095	○
350	355	351,6	14,8	15	2,5	PTFE B500	24300175	○
350	355	351,6	24,5	25	2,5	PTFE B500	24300176	○
350	358	352,5	24,5	25	4	PTFE B500	24337998	○
360	365	361,6	14,8	15	2,5	PTFE B500	24300177	○
360	368	362,5	24,5	25	4	PTFE B500	24342011	○
390	395	391,6	14,8	15	2,5	PTFE B500	24350238	○
390	395	391,6	24,5	25	2,5	PTFE B500	24336658	○
390	398	392,5	24,5	25	4	PTFE B500	24355839	○
400	405	401,6	14,8	15	2,5	PTFE B500	24274959	○
400	408	402,5	24,5	25	4	PTFE B500	24269425	○
410	415	411,6	14,8	15	2,5	PTFE B500	49045103	○
410	415	411,6	24,5	25	2,5	PTFE B500	24296901	○
420	425	421,6	19,5	20	2,5	PTFE B500	24230161	○
420	425	421,6	24,5	25	2,5	PTFE B500	24233817	○
420	428	422,5	24,5	25	4	PTFE B500	24269684	○
425	430	426,6	24,5	25	2,5	PTFE B500	24261535	○
430	435	431,6	19,5	20	2,5	PTFE B500	24203171	○

● Available from stock ○ On request: Tool is available, delivery at short notice



d	DF	D1	H	L	Profile	Material	Article No.	
430	435	431,6	24,5	25	2,5	PTFE B500	24348071	○
431,8	439,8	434,3	24,5	25	4	PTFE B500	24362369	○
435	440	436,6	24,5	25	2,5	PTFE B500	24162988	○
440	445	441,6	24,5	25	2,5	PTFE B500	24344261	○
450	455	451,6	14,8	15	2,5	PTFE B500	24265878	○
450	455	451,6	24,5	25	2,5	PTFE B500	24257338	○
450	458	452,5	24,5	25	4	PTFE B500	24294991	○
460	465	461,6	24,5	25	2,5	PTFE B500	24308715	○
460	468	462,5	24,5	25	4	PTFE B500	24269409	○
463,6	471,6	466,1	24,5	25	4	PTFE B500	24361808	○
470	475	471,6	24,5	25	2,5	PTFE B500	24347036	○
470	478	472,5	24,5	25	4	PTFE B500	24274936	○
475	480	476,6	24,5	25	2,5	PTFE B500	24261562	○
480	485	481,6	24,5	25	2,5	PTFE B500	24261536	○
480	488	482,5	24,5	25	4	PTFE B500	24337938	○
490	495	491,6	14,8	15	2,5	PTFE B500	24366903	○
500	505	501,6	14,8	15	2,5	PTFE B500	24264832	○
500	505	501,6	24,5	25	2,5	PTFE B500	24263467	○
500	508	502,5	19,5	20	4	PTFE B500	24360925	○
500	508	502,5	24,5	25	4	PTFE B500	24269420	○
510	515	511,6	24,5	25	2,5	PTFE B500	24269186	○
520	525	521,6	19,5	20	2,5	PTFE B500	24242786	○
540	545	541,6	24,5	25	2,5	PTFE B500	24358194	○
540	548	542,5	24,5	25	4	PTFE B500	24332687	○
550	555	551,6	24,5	25	2,5	PTFE B500	24344262	○
560	568	562,5	24,5	25	4	PTFE B500	24274998	○
570	575	571,5	24,5	25	2,5	PTFE B500	24263227	○
580	588	582,5	24,5	25	4	PTFE B500	24307426	○
590	595	591,6	24,5	25	2,5	PTFE B500	24290939	○
596,9	604,9	599,4	29,5	30	4	PTFE B500	24236371	○
600	605	601,6	14,8	15	2,5	PTFE B500	24316132	○
600	605	601,6	19,5	20	2,5	PTFE B500	24300403	○
600	608	602,5	24,5	25	4	PTFE B500	24354936	○
620	625	621,6	19,5	20	2,5	PTFE B500	24291416	○
620	625	621,6	24,5	25	2,5	PTFE B500	24354129	○
630	635	631,6	19,5	20	2,5	PTFE B500	24361332	○
630	635	631,6	24,5	25	2,5	PTFE B500	24263904	○

● Available from stock ○ On request: Tool is available, delivery at short notice

d	D _F	D ₁	H	L	Profile	Material	Article No.	
640	648	642,5	24,5	25	4	PTFE B500	24298429	○
650	658	652,5	24,5	25	4	PTFE B500	24293967	○
670	675	671,6	24,5	25	2,5	PTFE B500	24162996	○
670	678	672,5	24,5	25	4	PTFE B500	24361116	○
675	680	676,6	24,5	25	2,5	PTFE B500	24261537	○
700	705	701,6	14,8	15	2,5	PTFE B500	24234909	○
700	705	701,6	24,5	25	2,5	PTFE B500	24223046	○
700	708	702,5	29,5	30	4	PTFE B500	24262945	○
710	718	712,5	14,8	15	4	PTFE B500	24216172	○
720	728	722,5	24,5	25	4	PTFE B500	24359660	○
723,9	731,9	726,4	19,5	20	4	PTFE B500	24249366	○
730	738	732,5	24,5	25	4	PTFE B500	24263632	○
735	740	736,6	24,5	25	2,5	PTFE B500	24163718	○
740	748	742,5	19,5	20	4	PTFE B500	24344397	○
740	748	742,5	24,5	25	4	PTFE B500	24243175	○
750	755	751,6	24,5	25	2,5	PTFE B500	24227972	○
787,4	795,4	789,9	24,5	25	4	PTFE B500	24331521	○
790	798	792,5	24,5	25	4	PTFE B500	24351827	○
800	805	801,6	24,5	25	2,5	PTFE B500	24162994	○
800	808	802,5	24,5	25	4	PTFE B500	24295216	○
820	828	822,5	19,5	20	4	PTFE B500	24238051	○
830	838	832,5	24,5	25	4	PTFE B500	24344381	○
850	858	852,5	24,5	25	4	PTFE B500	24314615	○
890	898	892,5	14,8	15	4	PTFE B500	24263607	○
890	898	892,5	24,5	25	4	PTFE B500	24263885	○
900	908	902,5	24,5	25	4	PTFE B500	24257241	○
950	958	952,5	24,5	25	4	PTFE B500	24233242	○
975	983	977,5	24,5	25	4	PTFE B500	24361413	○
1050,00	1058,00	1052,50	24,5	25	4	PTFE B500	24296554	○
1150,00	1158,00	1152,50	24,5	25	4	PTFE B500	24357284	○

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Guide Ring EKF

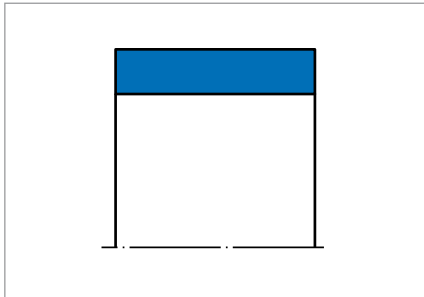


Fig. 1 Merkel Guide Ring EKF

Product description

Slit, non-metallic Merkel Guide Ring EKF.

Product advantages

Non-metallic guide element for pistons.

Application

Standard cylinders, mobile hydraulics, injection moulding machines.

Material

Material	Code
Polyamide	PA 4201

Operating conditions

Material	PA 4201
	Temperature range in °C
Hydraulic oils HL, HLP	-30 ... +100
HFA fluids	+5 ... +50
HFB fluids	+5 ... +50
HFC fluids	-30 ... +50
HFD fluids	-
Water	+5 ... +50
HETG (rapeseed oil)	-30 ... +60
HEES (synthetic ester)	-30 ... +80
HEPG (glycol)	-30 ... +50
Mineral greases	-30 ... +100
Running speed v in m/s	1
Loading (permitted specific surface pressure*)	≤25 N/mm ² at 20 °C ≤15 N/mm ² at 100 °C

* For the simple determination of the loading, a constant surface pressure is calculated using the projected area (D x H). The actual surface pressure is clearly greater in the centre of the surface than the calculated surface pressure. This is taken into account in the value for the permissible specific surface pressure.

Surface quality

Surface roughness	R _a	R _{max}
Sliding surface	0,05 ... 0,3 µm	≤2,5 µm
Groove base	≤2 µm	≤10,0 µm
Groove flanks	≤3 µm	≤15,0 µm

Percentage contact area M_r >50% to max. 90% at cutting depth c = Rz/2 and reference line C ref = 0%.

Design notes

Please observe our general design notes in → Technical Manual.

Tolerance recommendation

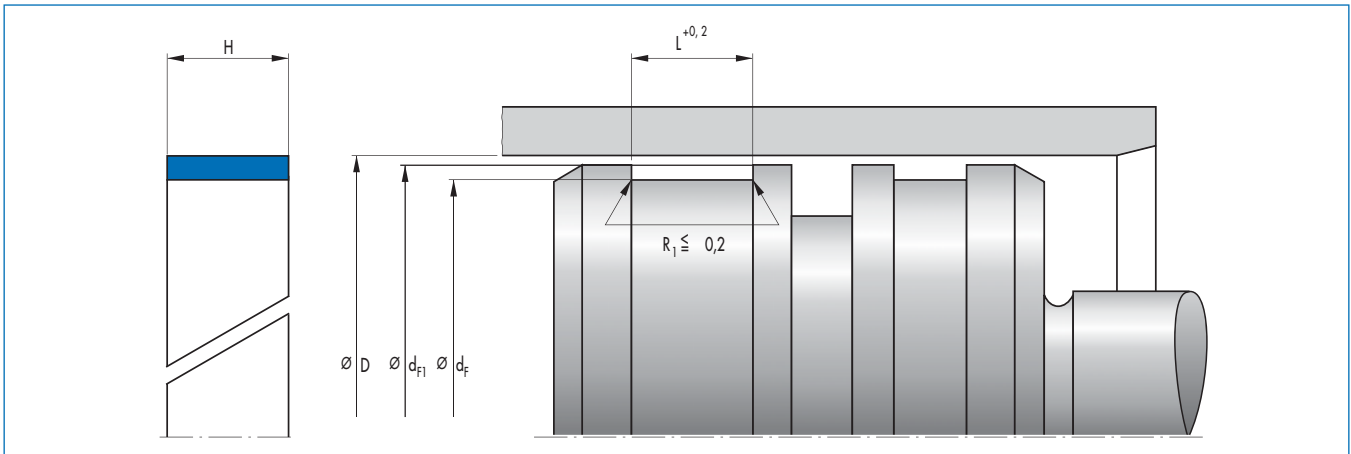
D_1	d_f	d_{F1}
H8	h8	h9

The tolerances given are recommended values. The usage of the guide and tolerance definition are to be considered in connection with the seal employed. The diameter d_{F1} given in the table of dimensions is to be considered exclusively in relation to the guide ring. The corresponding diameter for the adjacent seal housing is to be matched to the sealing component. → Technical Manual.

Fitting & installation

Merkel Guide Ring EKF can be easily snapped into the housing groove. Careful fitting is a prerequisite for correct function. → Technical Manual.

Article list



D	d _F	L	H	d _{F1}	Material	Article No.	
20	16	8,2	8	19,4	PA 4201	94215	●
25	21	8,2	8	24,4	PA 4201	99664	●
30	26	8,2	8	29,4	PA 4201	99665	●
32	28	8,2	8	31,4	PA 4201	94044	●
35	31	8,2	8	34,4	PA 4201	1264	●
40	36	8,2	8	39,4	PA 4201	99422	●
45	41	10,2	10	44,4	PA 4201	94191	●
50	46	10,2	10	49,4	PA 4201	99423	●
55	51	10,2	10	54,4	PA 4201	99424	●
58	54	10,2	10	57,4	PA 4201	95290	○
60	56	10,2	10	59,4	PA 4201	99375	●
63	59	10,2	10	62,4	PA 4201	99861	●
65	61	10,2	10	64,4	PA 4201	99368	●
70	66	10,2	10	69,4	PA 4201	99739	●
75	71	15,2	15	74,4	PA 4201	94192	●
80	76	15,2	15	79,4	PA 4201	34024	●
85	81	15,2	15	84,4	PA 4201	99331	○
90	86	15,2	15	89,4	PA 4201	99426	●
95	91	15,2	15	94,4	PA 4201	94193	○
100	96	15,2	15	99,4	PA 4201	99376	●
105	101	20,3	20	104,4	PA 4201	27257	○
110	106	20,3	20	109,4	PA 4201	99864	●
115	111	20,3	20	114,4	PA 4201	94194	○
120	116	20,3	20	119,4	PA 4201	99740	●
125	121	20,3	20	124,4	PA 4201	99172	●
130	126	20,3	20	129,4	PA 4201	99863	●
135	131	20,3	20	134,4	PA 4201	34301	○
140	136	20,3	20	139,4	PA 4201	99425	●
150	146	25,4	25	149,4	PA 4201	94201	●
160	156	25,4	25	159,4	PA 4201	99862	●
180	176	25,4	25	179,4	PA 4201	94204	●
200	196	25,4	25	199,4	PA 4201	99963	●
220	216	30,5	30	219,4	PA 4201	95594	○
250	246	30,5	30	249,4	PA 4201	94323	●

● Available from stock ○ On request: Tool is available, delivery at short notice

Merkel Guide Strip KF

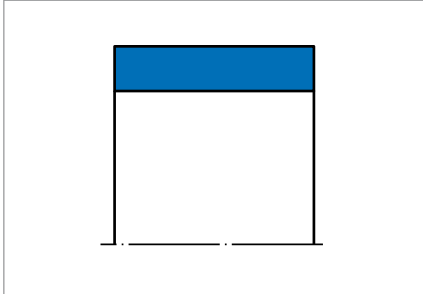


Fig. 1 Merkel Guide Strip KF

Product description

Non-metallic Merkel Guide Strip KF, available ready to fit cut to size or by the metre.

Product advantages

Non-metallic guide element for pistons, also for standardised housings as per ISO 10766

- Low friction, free of stick-slip.

Application

Injection moulding machines, control and regulation equipment, handling equipment.

Material

Material	Code
PTFE bronze compound	PTFE B500

Operating conditions

Material	PTFE B500
	Temperature range in °C
Hydraulic oils HL, HLP	-40 ... +200
HFA fluids	-
HFB fluids	-
HFC fluids	-
HFD fluids	-40 ... +200
Water	-
HETG (rapeseed oil)	-40 ... +80
HEES (synthetic esters)	-40 ... +100
HEPG (glycol)	-40 ... +80
Mineral greases	-40 ... +200

Surface quality

Surface roughness	R_a	R_{max}
Sliding surface	0,05 ... 0,3 μm	$\leq 2,5 \mu\text{m}$
Groove base	$\leq 2 \mu\text{m}$	$\leq 10,0 \mu\text{m}$
Groove flanks	$\leq 3 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

Percentage contact area $M_v > 50\%$ to max. 90% at cutting depth $c = R_z/2$ and reference line $C_{ref} = 0\%$.

Design notes

Please observe our general design notes in → Technical Manual.

Calculating straight length L2

L2	Production tolerances
>20 ... 80	... 0,5
>80 ... 250	... 1,0
>250 ... 500	... 1,5
>500 ... 1000	... 2,0
>1000 ... 2000	... 3,0
>2000 ... 4000	... 4,0

Tolerance recommendation

d₁
h8

The tolerance definition for the dimensions D and d_F must be viewed in connection with the seal used. The diameter D₁ specified in the table of dimensions is to be viewed exclusively in relation to the guide ring. The corresponding diameter of an adjoining seal housing should be tailored to the sealing component.

Manufacturing tolerance

Production tolerance profile thickness S
-0,05

Surface load

p < 15 N/mm ² up to 20 °C
p < 7,5 N/mm ² up to 80 °C
p < 5 N/mm ² up to 120 °C

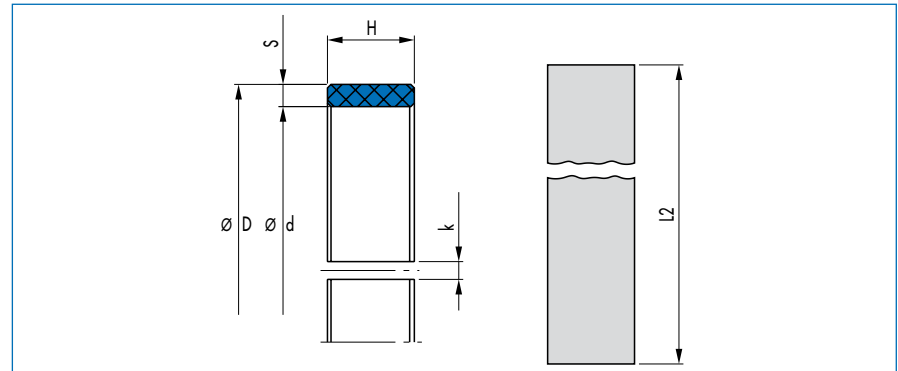
For running speed, see sealing system.

Cutting rolls to size

The following dimensions are available from stock by the metre. The straight length L₂ of blanks is to be determined using the formula. The gap k produced after fitting is necessary due to thermal expansion. We recommend a straight cut on the strips. On impact at an angle the tips may be damaged and break-off. Our cutter (Article No. 507228) facilitates time-saving and accurate cutting to size.

Calculating stretched length L₂ for rods:

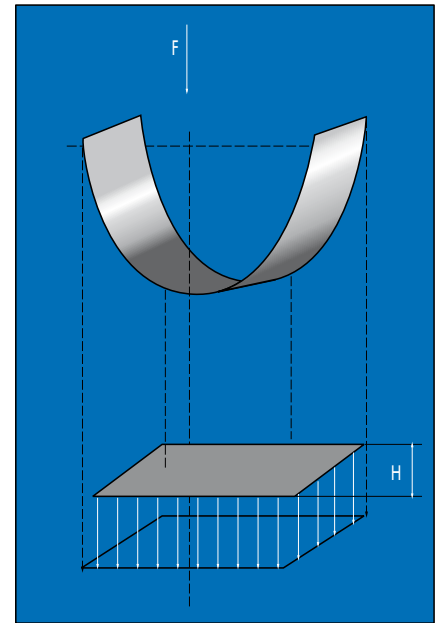
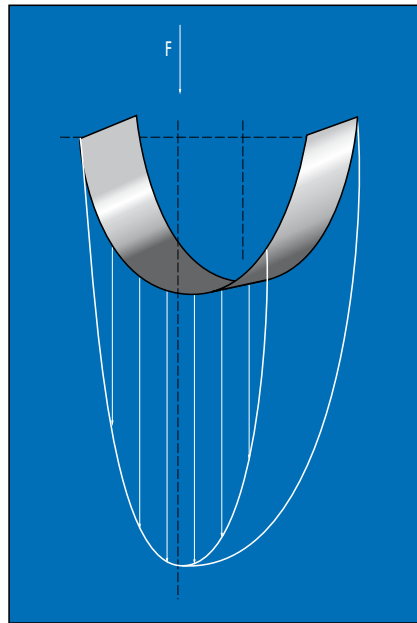
$$L_2 = (D - S) \times 3,11 - 0,5$$



Groove length L	Profile thickness S	Article No.
8	2,5	24226174
9,7	2,5	24102775
10	2,5	24102563
12	2,5	24099191
15	2,5	24102564
20	2,5	24076217
25	2,5	24107955
15	4,0	24160019
20	4,0	24238052
25	4,0	24148093

Surface force

The pressure distribution on the guide rings is non-linear. The non-linear pressure curve over the contact range was taken into account when calculating the permissible specific surface pressure. The permissible load on the guide strip is calculated by multiplying the projected area with the permissible specific surface pressure. However, the figure for the permissible specific surface pressure takes into account the possible angular offset of the piston when the recommended guide elements are used.



$$F = P \times A$$

$$H = F / (d \times P)$$

H = guide strip width [mm]

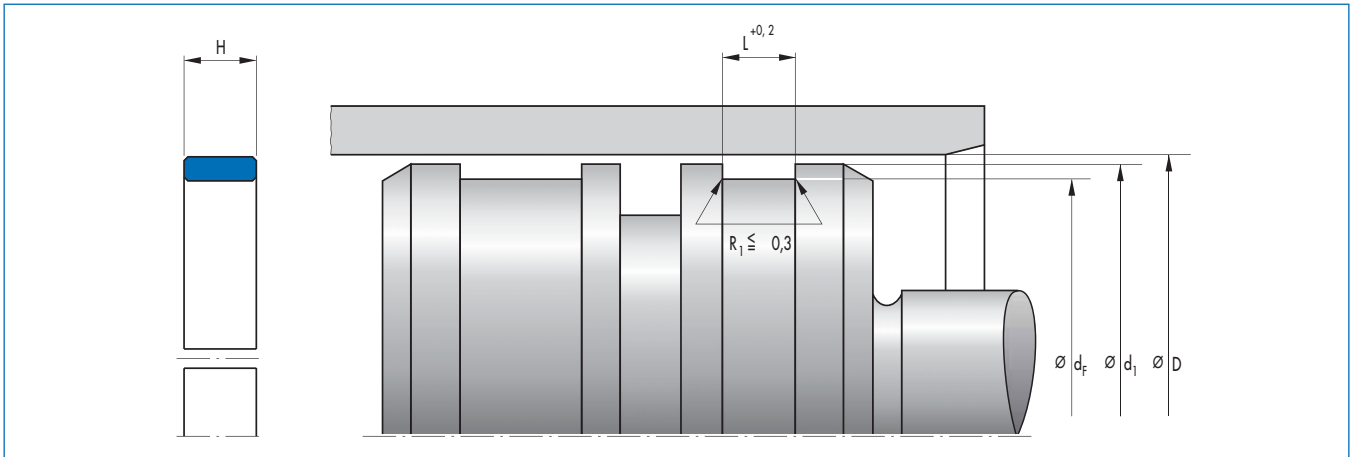
F = radial loading [N]

A = projected area [mm²]

P = perm. compression per unit area [N/mm²]

d = rod diameter with rod guidance;
piston diameter with
piston guidance [mm].

Article list

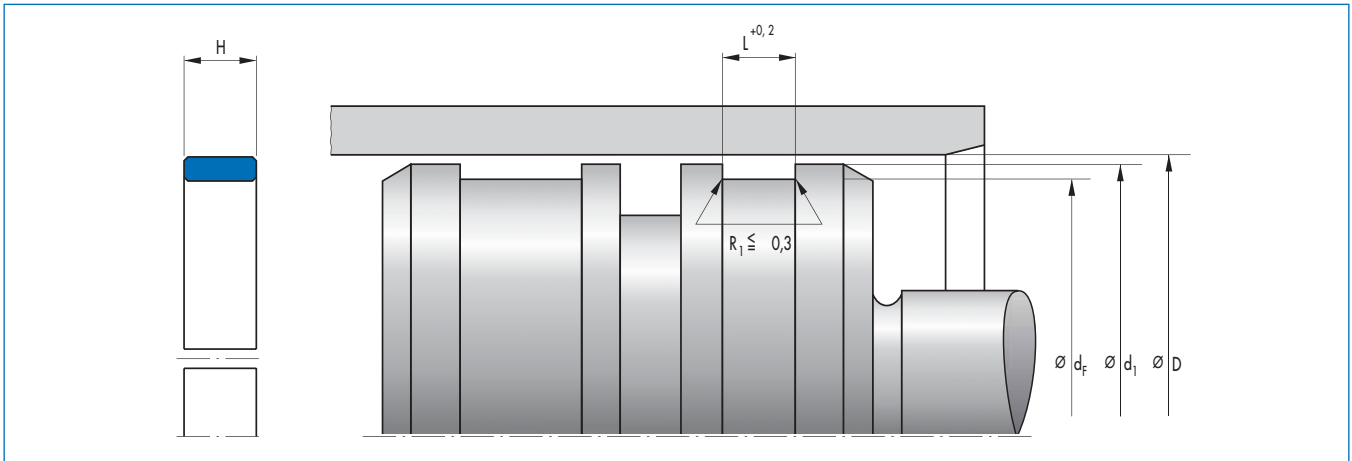


D	d _F	d ₁	L	H	Profile	Material	Article No.	
20	17	19,2	5,6	5,5	1,5	PTFE B500	24300179	○
22	19	21,2	5,6	5,5	1,5	PTFE B500	24300180	○
25	22	24,2	5,6	5,5	1,5	PTFE B500	24300182	○
28	25	27,2	5,6	5,5	1,5	PTFE B500	24300183	○
30	27	29,2	5,6	5,5	1,5	PTFE B500	24300184	○
32	29	31,2	5,6	5,5	1,5	PTFE B500	24300185	○
35	32	34,2	5,6	5,5	1,5	PTFE B500	24300186	○
36	33	35,2	5,6	5,5	1,5	PTFE B500	24300187	○
40	35	38,8	5,6	5,5	2,5	PTFE B500	24168850	○
40	37	39,2	5,6	5,5	1,5	PTFE B500	24300188	○
42	37	40,8	5,6	5,5	2,5	PTFE B500	24300189	○
45	40	43,8	5,6	5,5	2,5	PTFE B500	24108647	●
45	42	44,2	5,6	5,5	1,5	PTFE B500	24312965	○
50	45	48,8	5,6	5,5	2,5	PTFE B500	24162171	●
50	45	48,8	9,7	9,6	2,5	PTFE B500	24340072	○
55	50	53,8	5,6	5,5	2,5	PTFE B500	24300190	●
56	51	54,8	5,6	5,5	2,5	PTFE B500	24260615	○
60	55	58,8	5,6	5,5	2,5	PTFE B500	24210205	○
60	55	58,8	9,7	9,6	2,5	PTFE B500	24163238	○
63	58	61,8	9,7	9,6	2,5	PTFE B500	24169847	●
65	60	63,8	9,7	9,6	2,5	PTFE B500	24300192	○
70	65	68,8	9,7	9,6	2,5	PTFE B500	24165146	○
70	65	68,8	15	14,8	2,5	PTFE B500	24338058	○
75	70	73,8	9,7	9,6	2,5	PTFE B500	24300193	○
76	71	74,8	9,7	9,6	2,5	PTFE B500	24264453	○
80	75	78,8	9,7	9,6	2,5	PTFE B500	24217207	●
85	80	83,8	9,7	9,6	2,5	PTFE B500	24169641	○
85	80	83,8	15	14,8	2,5	PTFE B500	24258738	○
90	85	88,8	9,7	9,6	2,5	PTFE B500	24165145	●
90	85	88,8	15	14,8	2,5	PTFE B500	24164295	○
90	85	88,8	20	19,5	2,5	PTFE B500	24229424	○
95	90	93,8	9,7	9,6	2,5	PTFE B500	24300197	○
95	90	93,8	15	14,8	2,5	PTFE B500	24343224	○
100	95	98,8	9,7	9,6	2,5	PTFE B500	24153611	●
100	95	98,8	15	14,8	2,5	PTFE B500	24165294	○
100	95	98,8	25	24,5	2,5	PTFE B500	24311931	○

● Available from stock ○ On request: Tool is available, delivery at short notice

D	d _F	d ₁	L	H	Profile	Material	Article No.	
105	100	103,8	9,7	9,6	2,5	PTFE B500	24216699	●
105	100	103,8	25	24,5	2,5	PTFE B500	24333282	○
110	105	108,8	9,7	9,6	2,5	PTFE B500	24165147	○
110	105	108,8	15	14,8	2,5	PTFE B500	24291125	○
110	105	108,8	20	19,5	2,5	PTFE B500	24243431	○
115	110	113,8	9,7	9,6	2,5	PTFE B500	24153613	○
120	115	118,4	15	14,8	2,5	PTFE B500	24300203	○
120	115	118,8	9,7	9,6	2,5	PTFE B500	24166736	●
125	120	123,4	9,7	9,6	2,5	PTFE B500	24204056	●
125	120	123,8	15	14,8	2,5	PTFE B500	24165043	○
130	125	128,4	15	14,8	2,5	PTFE B500	24300206	○
130	125	128,8	9,7	9,6	2,5	PTFE B500	24153612	●
130	125	128,8	20	19,5	2,5	PTFE B500	24166634	○
135	130	133,8	9,7	9,6	2,5	PTFE B500	24203611	○
135	130	133,8	15	14,8	2,5	PTFE B500	24340099	○
140	135	138,8	9,7	9,6	2,5	PTFE B500	24102436	●
140	135	138,8	15	14,8	2,5	PTFE B500	24236467	○
140	135	138,8	20	19,5	2,5	PTFE B500	24339882	○
140	135	138,8	25	24,5	2,5	PTFE B500	24338745	○
150	145	148,8	9,7	9,6	2,5	PTFE B500	24300208	●
150	145	148,8	15	14,8	2,5	PTFE B500	24169689	○
150	145	148,8	20	19,5	2,5	PTFE B500	24336312	○
150	145	148,8	25	24,5	2,5	PTFE B500	24243485	○
155	150	153,8	9,7	9,6	2,5	PTFE B500	24169405	○
160	155	158,8	9,7	9,6	2,5	PTFE B500	24168887	●
160	155	158,8	15	14,8	2,5	PTFE B500	24300209	●
160	155	158,8	20	19,5	2,5	PTFE B500	24217554	○
170	165	168,4	15	14,8	2,5	PTFE B500	24300211	○
170	165	168,8	9,7	9,6	2,5	PTFE B500	24300210	○
170	165	168,8	20	19,5	2,5	PTFE B500	24336310	○
180	175	178,4	15	14,8	2,5	PTFE B500	24219351	●
180	175	178,8	9,7	9,6	2,5	PTFE B500	24203474	●
180	175	178,8	25	24,5	2,5	PTFE B500	24258396	○
190	185	188,4	15	14,8	2,5	PTFE B500	24300213	●
190	185	188,8	9,7	9,6	2,5	PTFE B500	24300212	○
200	195	198,4	9,7	9,6	2,5	PTFE B500	24300214	○
200	195	198,8	15	14,8	2,5	PTFE B500	24300215	●
200	195	198,8	20	19,5	2,5	PTFE B500	24227497	○
200	195	198,8	25	24,5	2,5	PTFE B500	24306765	○
210	205	208,4	15	14,8	2,5	PTFE B500	24236228	○
210	205	208,8	9,7	9,6	2,5	PTFE B500	24301068	○
220	215	218,4	15	14,8	2,5	PTFE B500	24203911	●
220	215	218,4	20	19,5	2,5	PTFE B500	24340941	○
220	215	218,4	25	24,5	2,5	PTFE B500	24290417	○
220	215	218,8	9,7	9,6	2,5	PTFE B500	24300216	○
225	220	223,4	9,7	9,6	2,5	PTFE B500	24259939	○
225	220	223,4	15	14,8	2,5	PTFE B500	24169846	○
225	220	223,4	20	19,5	2,5	PTFE B500	24260604	○
225	220	223,4	25	24,5	2,5	PTFE B500	24298509	○
230	225	228,4	15	14,8	2,5	PTFE B500	24338432	○

● Available from stock ○ On request: Tool is available, delivery at short notice

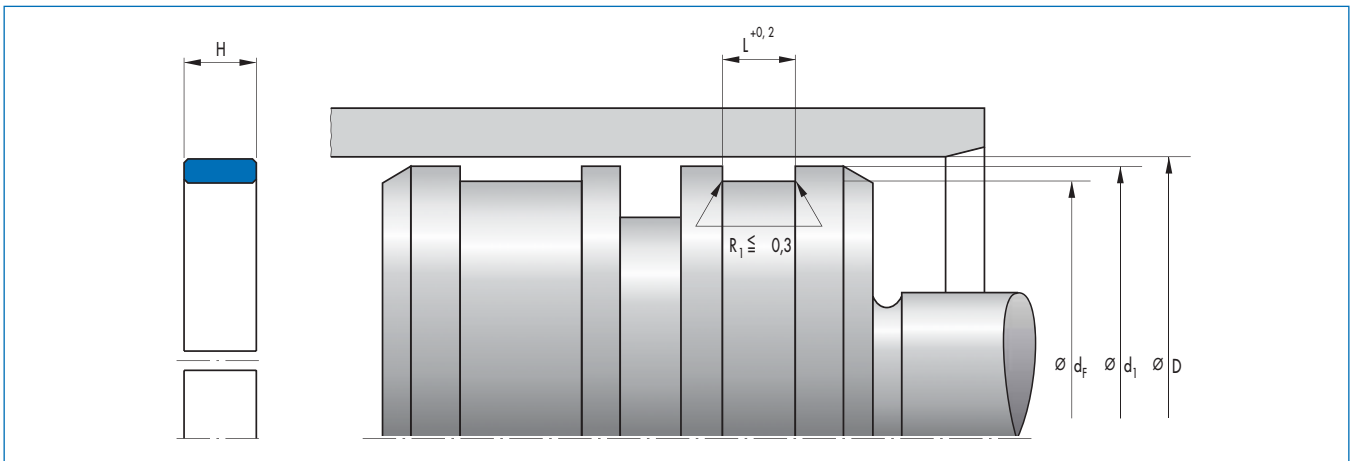


D	d _f	d ₁	L	H	Profile	Material	Article No.	
230	225	228,4	20	19,5	2,5	PTFE B500	24233567	○
240	235	238,4	15	14,8	2,5	PTFE B500	24167876	○
250	245	248,4	9,7	9,6	2,5	PTFE B500	24344263	○
250	245	248,4	15	14,8	2,5	PTFE B500	24300217	●
250	245	248,4	20	19,5	2,5	PTFE B500	24338719	○
260	255	258,4	15	14,8	2,5	PTFE B500	24300218	○
260	255	258,4	25	24,5	2,5	PTFE B500	24293567	○
270	265	268,4	15	14,8	2,5	PTFE B500	24238840	○
270	265	268,4	25	24,5	2,5	PTFE B500	24332002	○
280	275	278,4	15	14,8	2,5	PTFE B500	24300219	●
280	275	278,4	20	19,5	2,5	PTFE B500	24153362	○
280	275	278,4	25	24,5	2,5	PTFE B500	24203990	○
300	295	298,4	15	14,8	2,5	PTFE B500	24137238	○
300	295	298,4	25	24,5	2,5	PTFE B500	24134951	○
305	300	303,4	15	14,8	2,5	PTFE B500	24350592	○
310	305	308,4	25	24,5	2,5	PTFE B500	24237194	○
320	312	317,5	20	19,5	4	PTFE B500	24245663	○
320	315	318,4	15	14,8	2,5	PTFE B500	24300220	○
320	315	318,4	20	19,5	2,5	PTFE B500	24231223	○
320	315	318,4	25	24,5	2,5	PTFE B500	24300221	○
330	325	328,4	15	14,8	2,5	PTFE B500	24296714	○
330	325	328,4	25	24,5	2,5	PTFE B500	24314011	○
340	335	338,4	15	14,8	2,5	PTFE B500	24300222	○
340	335	338,4	25	24,5	2,5	PTFE B500	24300223	○
350	345	348,4	9,7	9,6	2,5	PTFE B500	24316713	○
350	345	348,4	15	14,8	2,5	PTFE B500	24234725	○
355	350	353,4	25	24,5	2,5	PTFE B500	24336608	○
360	352	357,5	15	14,8	4	PTFE B500	24266168	○
360	352	357,5	25	24,5	4	PTFE B500	24298511	○
360	355	358,4	15	14,8	2,5	PTFE B500	24300224	○
360	355	358,4	25	24,5	2,5	PTFE B500	24164558	○
380	375	378,4	20	19,5	2,5	PTFE B500	24257157	○
380	375	378,4	25	24,5	2,5	PTFE B500	24299555	○
390	382	387,5	25	24,5	4	PTFE B500	24344184	○
390	385	388,4	20	19,5	2,5	PTFE B500	24248042	○
390	385	388,4	25	24,5	2,5	PTFE B500	24215936	○
400	392	397,5	25	24,5	4	PTFE B500	24353170	○

● Available from stock ○ On request: Tool is available, delivery at short notice

D	d _F	d ₁	L	H	Profile	Material	Article No.	
400	395	398,4	15	14,8	2,5	PTFE B500	24300225	○
400	395	398,4	20	19,5	2,5	PTFE B500	24241924	○
400	395	398,4	25	24,5	2,5	PTFE B500	24237477	○
410	405	408,4	25	24,5	2,5	PTFE B500	24292267	○
420	415	418,4	20	19,5	2,5	PTFE B500	24246829	○
420	415	418,4	25	24,5	2,5	PTFE B500	24298563	○
430	425	428,4	15	14,8	2,5	PTFE B500	24274579	○
430	425	428,4	25	24,5	2,5	PTFE B500	24356343	○
440	435	438,4	15	14,8	2,5	PTFE B500	24362293	○
440	435	438,4	25	24,5	2,5	PTFE B500	24238056	○
445	440	443,4	25	24,5	2,5	PTFE B500	24169312	○
450	442	447,5	25	24,5	4	PTFE B500	24336064	○
450	445	448,4	15	14,8	2,5	PTFE B500	24295904	○
450	445	448,4	20	19,5	2,5	PTFE B500	24218386	○
450	445	448,4	25	24,5	2,5	PTFE B500	24339916	○
457,2	449,2	454,7	25	24,5	4	PTFE B500	24361018	○
460	455	458,4	15	14,8	2,5	PTFE B500	24237495	○
460	455	458,4	20	19,5	2,5	PTFE B500	24216297	○
460	455	458,4	25	24,5	2,5	PTFE B500	24258000	○
480	472	477,5	25	24,5	4	PTFE B500	24298510	○
480	475	478,4	25	24,5	2,5	PTFE B500	24250182	○
500	492	497,5	15	14,8	4	PTFE B500	24344266	○
500	492	497,5	25	24,5	4	PTFE B500	24261230	○
500	495	498,4	15	14,8	2,5	PTFE B500	24274580	○
500	495	498,4	25	24,5	2,5	PTFE B500	24263977	○
510	505	508,4	15	14,8	2,5	PTFE B500	24291161	○
510	505	508,4	25	24,5	2,5	PTFE B500	24360396	○
510,2	502,2	507,7	25	24,5	4	PTFE B500	24355928	○
520	515	518,4	20	19,5	2,5	PTFE B500	24230163	○
520,7	515,7	519,1	15	14,8	2,5	PTFE B500	24224011	○
530	525	528,4	15	14,8	2,5	PTFE B500	24258834	○
540	535	538,4	25	24,5	2,5	PTFE B500	24339008	○
545	540	543,4	25	24,5	2,5	PTFE B500	24250579	○
550	545	548,4	25	24,5	2,5	PTFE B500	24257339	○
560	552	557,5	25	24,5	4	PTFE B500	24359710	○
560	555	558,4	15	14,8	2,5	PTFE B500	24351466	○
560	555	558,4	25	24,5	2,5	PTFE B500	24269185	○
570	562	567,5	15	14,8	4	PTFE B500	24352095	○
570	562	567,5	25	24,5	4	PTFE B500	24351060	○
580	572	577,5	15	14,8	4	PTFE B500	24344267	○
580	575	578,4	25	24,5	2,5	PTFE B500	24339500	○
584,2	576,2	581,7	25	24,5	4	PTFE B500	24362368	○
600	592	597,5	25	24,5	4	PTFE B500	24275000	○
600	595	598,4	15	14,8	2,5	PTFE B500	24234910	○
600	595	598,4	20	19,5	2,5	PTFE B500	24329803	○
600	595	598,4	25	24,5	2,5	PTFE B500	24234912	○
625	620	623,4	15	14,8	2,5	PTFE B500	24352637	○
630	625	628,4	15	14,8	2,5	PTFE B500	24161640	○
630	625	628,4	25	24,5	2,5	PTFE B500	24263466	○
640	632	637,5	25	24,5	4	PTFE B500	24275167	○

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D	d _f	d ₁	L	H	Profile	Material	Article No.	
650	642	647,5	25	24,5	4	PTFE B500	24358984	○
650	645	648,4	25	24,5	2,5	PTFE B500	24239182	○
655	650	653,4	25	24,5	2,5	PTFE B500	24231930	○
660,4	652,4	657,9	25	24,5	4	PTFE B500	24361508	○
665	660	663,4	25	24,5	2,5	PTFE B500	24336379	○
680	672	677,5	15	14,8	4	PTFE B500	24344269	○
680	672	677,5	25	24,5	4	PTFE B500	24298430	○
680	675	678,4	25	24,5	2,5	PTFE B500	24357190	○
690	682	687,5	25	24,5	4	PTFE B500	24361405	○
700	692	697,5	25	24,5	4	PTFE B500	24349705	○
700	695	698,4	15	14,8	2,5	PTFE B500	24275183	○
700	695	698,4	25	24,5	2,5	PTFE B500	24338859	○
710	705	708,4	20	19,5	2,5	PTFE B500	24162128	○
720	712	717,5	20	19,5	4	PTFE B500	24226253	○
720	712	717,5	25	24,5	4	PTFE B500	24355876	○
720	715	718,4	15	14,8	2,5	PTFE B500	24348252	○
720	715	718,4	20	19,5	2,5	PTFE B500	24291417	○
720	715	718,4	25	24,5	2,5	PTFE B500	24240256	○
725	720	723,4	25	24,5	2,5	PTFE B500	24340198	○
750	742	747,5	25	24,5	4	PTFE B500	24293964	○
760	752	757,5	15	14,8	4	PTFE B500	24216171	○
760	752	757,5	20	19,5	4	PTFE B500	24216170	○
760	755	758,4	25	24,5	2,5	PTFE B500	24162992	○
770	762	767,5	15	14,8	4	PTFE B500	24344270	○
775	770	773,4	25	24,5	2,5	PTFE B500	24245794	○
780	775	778,4	15	14,8	2,5	PTFE B500	24358668	○
800	792	797,5	15	14,8	4	PTFE B500	24348279	○
800	792	797,5	25	24,5	4	PTFE B500	24243176	○
812,8	804,8	810,3	25	24,5	4	PTFE B500	24249318	○
820	812	817,5	25	24,5	4	PTFE B500	24341042	○
830	822	827,5	25	24,5	4	PTFE B500	24354856	○
830	825	828,4	25	24,5	2,5	PTFE B500	24353637	○
850	842	847,5	25	24,5	4	PTFE B500	24300402	○
850	845	848,4	20	19,5	2,5	PTFE B500	24265124	○
850	845	848,4	25	24,5	2,5	PTFE B500	24163721	○
900	892	897,5	20	19,5	4	PTFE B500	24238053	○
900	892	897,5	25	24,5	4	PTFE B500	24344380	○

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D	d _F	d ₁	L	H	Profile	Material	Article No.	
900	895	898,4	25	24,5	2,5	PTFE B500	24162990	○
914,5	906,5	912	25	24,5	4	PTFE B500	24354414	○
920	915	918,4	25	24,5	2,5	PTFE B500	24258318	○
940	932	937,5	25	24,5	4	PTFE B500	24352164	○
940	935	938,4	25	24,5	2,5	PTFE B500	24163720	○
965	957	962,5	15	14,8	4	PTFE B500	24263608	○
965	957	962,5	25	24,5	4	PTFE B500	24295215	○
965,2	957,2	962,7	25	24,5	4	PTFE B500	24331520	○
1000	995	998,4	25	24,5	2,5	PTFE B500	24162989	○
1050	1042	1047,5	25	24,5	4	PTFE B500	24257242	○
1050	1045	1048,4	25	24,5	2,5	PTFE B500	24227975	○
1100	1092	1097,5	25	24,5	4	PTFE B500	24269869	○
1140	1132	1137,5	20	19,5	4	PTFE B500	24167297	○
1180	1172	1177,5	25	24,5	4	PTFE B500	24361406	○
1200	1192	1197,5	15	14,8	4	PTFE B500	24359446	○
1300	1292	1297,5	25	24,5	4	PTFE B500	24357283	○

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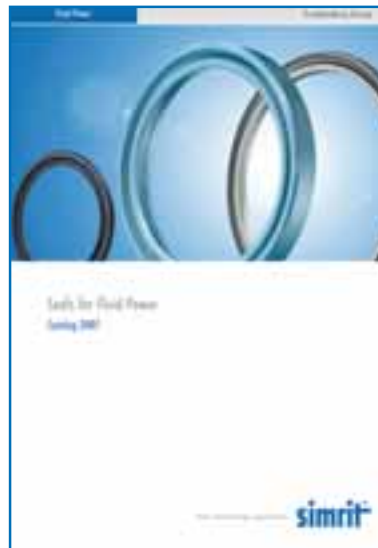
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