GMN

Non Contact Seals
Type CF

8010 0114 ENG

GMN

GMN Non Contact Seals

· for spindle bearings: Type CF 60/619

· for deep groove ball bearings: Type CF 62

GMN Non Contact Seals

The specific design of GMN Non Contact Seals allows operation without any friction. Many different applications, especially high-speed applications, are taking advantage of this major benefit.

The seals are running maintenance free and without any wear with unlimited lifetime. As a result of no friction there is no power loss and no generation of heat and so the seal provides an optimum of efficiency.

GMN Type CF

Non Contact Seals Type CF are specifically designed for spindle bearings and offer highest efficiency with absolutely leak tightness within a minimized space of 6 mm width only.

The labyrinth design is a combination of gaps in axial and radial direction in five steps. The axial gaps are shielding while the radial gaps are providing back transport. A catching groove improves the sealing efficiency – even without any shaft rotation.

The option of saving sealing air and increased maintenance intervals are offering a considerable commercial progress and advantage.

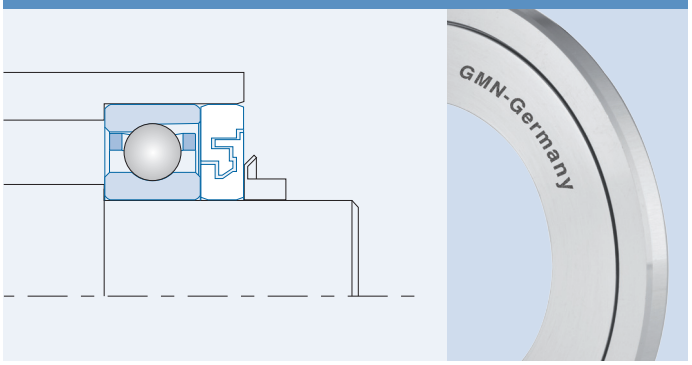
GMN

Non Contact Seals for spindle bearings

GMN Type CF 60/619

GMN Non Contact Seals Type CF 60 and CF 619 are produced according to the dimensions of ball bearing rows 60 and 619. They are made of nitriding steel, hardened and face-ground. The spindle bearing is pre-loaded directly through the CF seal's inner ring.

CF 60 / CF 619



Technical data

Material: Steel

Hardness: HRC = 45

Plane-parallelism: ≤ 5 µm

Range of temperature: -40°C – 170°C

Speed limit: No limit
CF 60 and CF 619 are positioned between the spindle bearing and the shaft nut without any axial mobility. For this reason there is no speed limit in this specific adjustment.

Design: Main dimensions (shaft/hub)
according to ball bearing row 60 and row 619

Series 60 diameter: 20 – 100 mm
Series 619 diameter: 40 – 80 mm

Width: 6 mm for all sizes

Sealing gap: CF-Profile

Axial clearance: S_{ax} = 1 mm
(Total axial movement)

Radial clearance: S_{rad} = 0,5 mm
(Total radial movement)

Characteristics

Material:

· To be used in a wide range of temperature
Nitriding steel is used for operating temperatures up to 170° C / 338°F

· Resistant
The hardened material is resistant against abrasive particles and chips

Design:

· No friction
Non-contact design of inner ring and outer ring

· No wear
Unlimited operating life time

· No abrasion
Fulfill highest requirements in cleanliness

· Unlimited speed
No axial movement between spindle bearing and shaft nut

· No increased temperatures
No thermal effects to the seal and the surrounding components

· Power saving performance
Non-friction operation with no loss of power which meets highest ecological and economical demands

· Compact design
Small width of 6 mm for all diameters allows a space saving solution

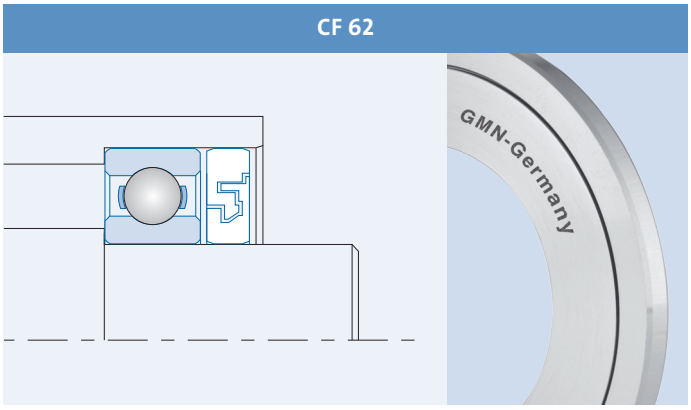
· Efficiency
High sealing efficiency against heavy splashing liquids in a wide range of speeds – even without any rotation

· Easy to assemble
No modification of the mating parts (different diameter or tolerances, hardening, shaft shoulder)
Easy assembly directly in contact with the spindle bearing

Non Contact Seals for deep groove ball bearings

GMN Type CF 62

For an effective sealing of standard deep groove ball bearings GMN Non Contact Seals Type CF 62 are produced in aluminum with non-ground plane surfaces, dimensions according to ball bearing row 62.



Technical data

Material: Aluminum

Range of temperature: -40°C – 200°C

Design: Main dimensions (shaft/hub) according to ball bearing row 62

Diameter: 10 – 50 mm

Width: 6 mm for all sizes

Sealing gap: CF-Profile

Axial clearance: S_{ax} = 1 mm
(Total axial movement)

Radial clearance: S_{rad} = 0,5 mm
(Total radial movement)

Mating parts: Shaft tolerance k5 / housing tolerance J6

Characteristics

Material:

· To be used in a wide range of temperature
Aluminum is used for operating temperatures up to 200° C / 392°F

· Well suited for high speed applications
Low mass of the inner ring when shaft is rotating

Design:

· No friction
Non-contact design of inner ring and outer ring

· No wear
Unlimited operating life time

· No abrasion
Fulfill highest requirements in cleanliness

· No increased temperatures
No thermal effects to the seal and the surrounding components

· Power saving performance
Non-friction operation with no loss of power which meets highest ecological and economical demands

· Compact design
Small width of 6 mm for all diameters allows a space saving solution

· Efficiency
High sealing efficiency against heavy splashing liquids in a wide range of speeds – even without any rotation

· Easy to assemble
No modification of the mating parts (different diameter or tolerances, hardening, shaft shoulder)

Type CF 60

Part name	ID [mm]	OD [mm]	W [mm]	e_1 [mm]	e_2 [mm]	$n_{max.}$ [rpm]	Weight [kg]	Item no.
CF 6004	20	42	6	28	38	-	0.051	306831
CF 6005	25	47	6	33	43	-	0.059	306835
CF 6006	30	55	6	39	49	-	0.079	306839
CF 6007	35	62	6	45	55	-	0.097	306843
CF 6008	40	68	6	50	60	-	0.113	306847
CF 6009	45	75	6	55	65	-	0.134	306851
CF 6010	50	80	6	60	70	-	0.145	306855
CF 6011	55	90	6	67	77	-	0.189	306859
CF 6012	60	95	6	72	82	-	0.202	306863
CF 6013	65	100	6	77	87	-	0.215	306867
CF 6014	70	110	6	83	93	-	0.268	306871
CF 6015	75	115	6	89	99	-	0.283	306875
CF 6016	80	125	6	94	104	-	0.343	306879
CF 6017	85	130	6	100	110	-	0.360	306883
CF 6018	90	140	6	107	117	-	0.428	306887
CF 6019	95	145	6	112	122	-	0.447	306891
CF 6020	100	150	6	117	127	-	0.465	306895

Type CF 619

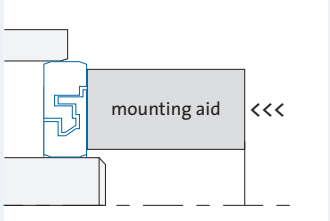
CF 61908	40	62	6	48	58	-	0.084	306899
CF 61909	45	68	6	53	63	-	0.097	306903
CF 61910	50	72	6	58	68	-	0.100	306907
CF 61911	55	80	6	63	73	-	0.126	306911
CF 61912	60	85	6	68	78	-	0.135	306915
CF 61913	65	90	6	73	83	-	0.144	306919
CF 61914	70	100	6	80	90	-	0.190	306923
CF 61915	75	105	6	85	95	-	0.201	306927
CF 61916	80	110	6	90	100	-	0.212	306931

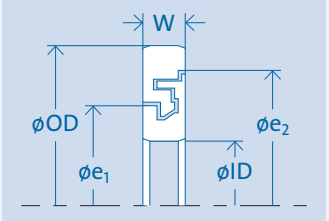
Type CF 62

Part name	ID [mm]	OD [mm]	W [mm]	e_1 [mm]	e_2 [mm]	$n_{max.}$ [rpm]	Weight [kg]	Item no.
CF 6200	10	30	6	17	27	66,420	0.010	306787
CF 6201	12	32	6	19	29	54,330	0.011	306791
CF 6202	15	35	6	22	32	46,100	0.013	306795
CF 6203	17	40	6	25	35	50,200	0.017	306799
CF 6204	20	47	6	29	39	45,580	0.023	306803
CF 6205	25	52	6	34	44	36,570	0.026	306807
CF 6206	30	62	6	42	52	32,270	0.037	306811
CF 6207	35	72	6	48	58	28,090	0.050	306815
CF 6208	40	80	6	54	64	24,810	0.061	306819
CF 6209	45	85	6	58	68	21,980	0.066	306823
CF 6210	50	90	6	63	73	19,810	0.071	306827

Installation: Type CF

Inner ring and outer ring of the seal are pressed-in with an assembling aid together at the same time. So both rings are axially aligned without any contact to each other.
The bigger gap diameter (e2) must always face the splashing contamination.





www.gmn.de

GMN

High Precision Ball Bearings

Spindle Technology

Sprag Type Freewheel Clutches

Non Contact Seals

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GMN Non-Contact Seals

The machine tool industry and its end users are continuously demanding the utmost in quality in every aspect of their machine. Highly specialized components are resulting in shorter process time, higher rotating speed, flexible material characteristics and a huge range of operating conditions. Simultaneously, new energy-saving solutions and maintenance-free characteristics are increasing economic efficiency of modern machine systems.

Based on decades of experience, GMN has specialized in producing extremely high quality machine tool components.
Through this strategy, GMN manufactures a wide range of standard non-contact seals and customized solutions.

The frictionless, no-wear characteristics of GMN Non-Contact Seals offer effective, economical and ecological solutions for modern applications in and outside of the machine tool industry.

Seals Classification

Classification

Varying industrial processes and demands require specialized sealing systems which could be classified into several product groups.

GMN Non-Contact Seals

GMN provides efficient, economical, quality sealing components made of metal or plastic for concentric rotating parts.

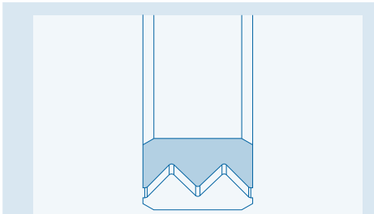
Seals (Classification)

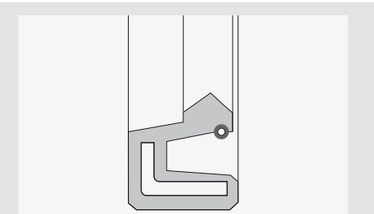
Dynamic seals				Static seals	
Linear movement		Rotary movement			
Rod, piston, linear guided seals		Shaft seals			
Non-Contact	Contact	Non-Contact	Contact	Non-Contact	Contact
Gap Special solutions Sealing air	Grooved ring Wiper ring Edge sealing ring Compact seal	**GMN** **Labyrinth Seal** **- Metal** **- Plastic** **Special solutions**	Felt ring Compression gland Slide ring seal Radial shaft seal	Ventilation	O-Ring Sealing mass Bellow-type seal Profile seal Flat seal Membrane seal High pressure seal Cutting ring seal

Non-Contact Seals vs. Contact Seals

The design of GMN Non-Contact Seals offers – compared to conventional contact seals – operation without any friction, an essential advantage for many seal applications.

Comparisons of Non-Contact Seals vs. Contact Seals





Characteristic	**GMN Non-Contact Seals**	**Contact Seals**
Seal wear	**Absolutely no wear of any component** Minimal maintenance	Rubbing wear due to relative movement (rotation) at the sealing lip
Power loss	**No power loss** Increases the possibility for smaller drives	Power loss due to friction
Speed limit	At high speed rotation only, the inner-ring can lift-off from the shaft due to its weight combating centrifugal forces	Limited applications for high speed rotation due to the increased wear
Contamination / abrasion	**Absolute no contamination** A key factor for food, electro-technical and electronic industries	**Micro-wear due to friction** Wear may turn into contaminant
Lifetime	**Unlimited lifetime**	Lifetime/function is limited due to wear
Lubrication of the seal	**Not necessary**	Often recommended
Mating components - Hardening and grinding	**No hardening or grinding of the mating parts** Simple turning quality (IT6) is sufficient	Shaft must be hardened and ground in most applications
Increase of temperature	**No increase of temperature**	Increase of temperature due to friction
Temperature range	**High operating range** Due to the steel and aluminium construction; 392° F [200° C] Plastic (POM) is rated to 140° F [60° C]	**Narrow operating range** Because of materials such as various rubbers and elastomeres.

Non-Contact Seals Basics

In correlation with the application's design, non-contact seals also:

- Protect/shield inner workings of the application
- Throttling/switching
- Back transport of application medium(s)
- Optional draining within the seal design

The seal itself as well as the specific design encompassing the seal satisfies only parts of the sealing requirement.

The maximum efficiency of a GMN labyrinth seal is achieved with an optimised interaction of the seal-component and the surrounding construction/design.

Sealing function at machine standstill
The functions of protecting, shielding, throttling and switching are effective even when the shaft stands still. The seal functions of back transport and draining require the shaft to be rotating.

Functions of the seal and the surrounding construction in an application

Components encompassing the seal

Protecting/ Shielding

The sealing gap is protected against direct contamination with a customized housing/shaft design. Specifically, the design in front of the seal's entrance area is important to the seal's efficiency.

GMN seal component

Throttling/ Switching

The tight sealing gap throttles (reduces) the flow and minimizes possible penetration by any contamination. The labyrinth geometry creates an efficient barrier against liquids and dust.

GMN seal component

Back transport of application medium(s)

If heavy splashing liquids are penetrating the gap, drain grooves in the outer ring and a ring groove inside the housing can provide back transport when the shaft is rotating. This is commonly used for heavy coolant or oil splashing where saving the medium is key to the application (M Type seal).

Surrounding components to the seal

Draining

Grooves in the housing will effectively drain the medium. GMN engineers are available to help with waste gate design. This groove design is essential to the optimization of a GMN M Type seal.

Function

GMN produces non-contact seals in two different types:

GMN Labyrinth Metal Seals are made from two different materials with different stiffness. A special production process creates a tight horizontal labyrinth gap between the steel inner ring and the aluminium outer ring.

The inner and outer rings of GMN Labyrinth Plastic Seals are made from the same material (POM). The gap within the labyrinth geometry has a conical design.

GMN Non-Contact Seal (metal)

GMN Non-Contact Seal (plastic)

Gap height

The theory of non-contact seals is based on the gap height between inner and outer rings.
The tighter the gap height is on the seal (reduction in ring gap area), diminishes the opportunity for any contaminant entry.

Depending on amount, direction and speed (intensity) of the contamination, an additional protection against direct splashing liquids is recommended.

As an additional supporting effect inherent in a non-contact seal, tight gaps create an air cushion inside the gap. This air cushion increases in correlation to rotational speed.

Sealing gap

With the constant gap height of only 0.2 to 0.5 mm. The complete product line of GMN Labyrinth Metal Seals achieves the highest efficiency.

Plastic seals have a varying internal gap height due to the asymmetric labyrinth geometry.
The minimal gap height of approximately 0.5 mm also guarantees the highest efficiency.

Labyrinth

The labyrinth geometry acts as a barrier against any liquids or dust. Particles entering the Labyrinth seal bump against the labyrinth, therefore any media is slowed. The shifts in direction inside the labyrinth make passing the seal almost impossible.

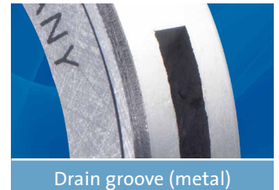
Metal seals provide 1 to 4 labyrinth steps (depending on size) in a minimized space. GMN's proprietary manufacturing process guarantees 100% conformity of inner- and outer ring's labyrinth geometry to each other.

Plastic seals are providing 2 to 4 labyrinths steps depending on size. With this type, the conical gap design increases sealing efficiency due to centrifugal forces of rotation.
Penetrated media is transported back to the larger gap diameter when the shaft is rotating. The larger gap diameter always faces the contamination.

Labyrinth (metal)

Labyrinth (plastic)

In case of heavy splashing liquids, type M and SA with drain grooves are preferred.



Drain groove (metal) Type M

Drain groove (plastic) Type SA

GMN Non-Contact Seals
Benefits and applications

Benefits

The specific design of GMN Labyrinth Seals allows operation without any friction. Many different applications are taking advantage of this major benefit:

Technical benefits
- No wear
- Rated for high rotating speeds
- Sealing efficiency is independent from direction of rotation
- No abrasion, no contamination

Thermal benefits
- No frictional heat increase
- No thermal effects to the surrounding application

Functional benefits
- Maintenance free
- Constant sealing efficiency during operation
- No adjustment required
- No lubrication required (approved for dry operation)

Economic benefits
- No hardening or grinding of mating parts
- Unlimited lifetime – no replacement due to the Non-Contact design
- Cost saving component instead of expensive self made labyrinth
- Less maintenance results in higher machine yield
- No frictional loss results in reduced demand to engine output

Ecological benefits
- Operation without friction saves energy

Applications

- **High-speed**
  (no-wear operation)

- **Sealing against dust**
  (Pre-greased GMN Labyrinth Seal made of plastic)

- **High cleanliness**
  (Freedom from any wear)

- **Positioning without resistance**
  (No opposing forces during operation)

- **Protection for lip seals**
  (Guarding against wear from chips and abrasive particles)

Practical examples

Textile / paper industry

Sealing against dust

The sealing of fine textile fibres is a challenge for any sealing system. Fibres and micro-fibres have the tendency to cling to the sealing gap of a lip seal. As a result, friction and wear are increasing with use. With time, the fibres are making their way to the bearings. In applications like this, pre-greased GMN Labyrinth Seals made of plastic are providing an established, proven alternative.

Examples in the textile industry are; carding engines, spinning machines, coiling machines, mechanical looms, knitting machines, cutting machines, etc..
Similar applications can be found in the paper industry. Pre-greased GMN Labyrinth Seals made of plastic are providing high efficiency sealing alternatives against fine paper dust.

Machine tool industry, spindle heads

High-speed applications

The maximum speed of contact seals is limited because of temperature, wear and resultant life expectancy.

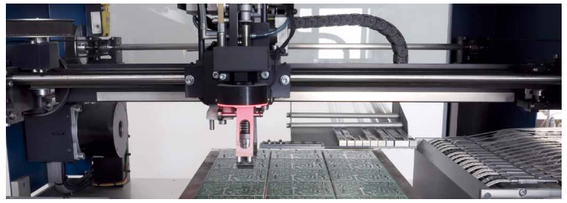
GMN Non-Contact Seals protect spindle bearings against cooling fluid and metal/wood chips. They are operating free from wear and any frictional contact. Unlimited life, no temperature increase from operation, freedom from maintenance and no loss of power provide a perfect economic solution.

Food / chemical / electronic industries

High cleanliness

Cleanliness and freedom from wear is essential in the food industry. Every contact seal is operating with some kind of relative movement between two different components being in contact continuously. With this friction, small amounts of wear (i.e. rubber material) have to be accepted, it could never be fully excluded. In the worst case, this wear could contaminate food.

A Non-Contact Seal is absolutely free from any friction contact and free from any wear. There is no risk for any kind of contamination.
An additional advantage of our GMN Labyrinth Plastic Seals is the resistance against many acids (i.e. lactic acid), chemicals (cleaning processes) and fungi; the material (POM) is already FDA-approved.



Highly accurate positioning

Positioning without resistance

Sophisticated optical or magnetic systems have to be reliably protected against any external contamination.

Encoders are exposed to high dynamic accelerations at an already high speed. With GMN Non-Contact Seals encoders could be positioned without resistance to the highest accuracy.
This is a requirement of many high-tech performance applications.

Sealing against chips and abrasive contaminations

Protection for a lip seal

Lip Seal life is extremely limited with contact of chips and abrasive particles. This contact greatly accelerates the wear of the rubber material.

An optimal solution is the combination of both seal systems: In a first step the GMN Non-Contact Seal keeps chips and abrasive particles away from the lip seal. In this scenario the contact seal is protected and the lifetime of the complete sealing system increases greatly.

The additional investment for the GMN Non-Contact Seal is minimal compared to the lost time to repair and/or replace worn seals.

Characteristics of sealing systems

The performance of any seal in various machines is extremely important to the life and efficiency of the complete system.

Because of this, GMN prefers to help customers early in the design phase to ensure that everything will perform as planned and the correct design choices are made.

Different applications require specialized and individual solutions; there is a large variety of products on the market.

The table below includes some general information to help find the best seal for your application.

In many cases the combination of different sealing systems provides the perfect solution. An additional GMN Non-Contact Seal could protect a standard contact seal against chips to increase the lifetime of the complete sealing system.

	GMN Metal	**GMN** Plastic	Shield	Radial shaft seal	Sliding shield	Felt ring	Packed gland	Face seal
Suitable for high rotational speed	++	++	++	+-	+	--	-	++
Suitable against splashing liquids	++	++	-	++	++	++	+-	+-
Suitable against dust	+	++	-	-	+	+	+-	+-
Suitable against water	+-	++	+-	+	+-	++	++	++
Suitable against chemicals	-	++	-	+-	+-	+-	+	++
Suitable for food industry	--	++	-	+-	+-	-	+-	+
Suitable against liquid levels	--	--	--	+	+-	+-	+	++
Suitable against pressure differentials	--	--	--	+-	-	-	+	++
Suitable in high temperature applications	++	-	+-	+	+	-	+	++
Power efficiency	++	++	++	+-	+	-	--	--
Life time	++	++	++	+-	++	-	--	+-
Thermal effects to surrounding construction	no	no	no	low	low	middle	high	high
Requirements to the mating parts	low	low	middle	middle	low	middle	high	high
Maintenance	no	no	no	middle	low	low	high	middle

Limits of use

GMN Non-Contact Seals are providing solutions for a wide field of applications. However, in certain cases the use of GMN seals is also limited.

Liquid levels and pressure differentials

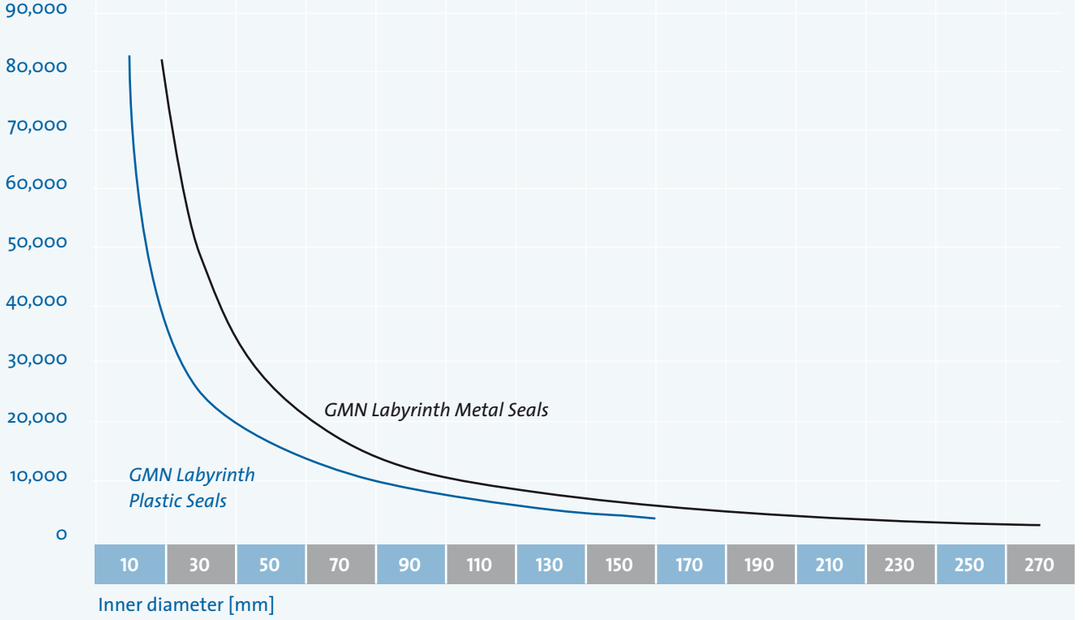
The design of a GMN Non-Contact Seal requires a gap between the outer and the inner ring. With this gap liquid levels and any difference of pressure could be reduced, but not sealed.

Speed limit

With increasing rotational speed the press-fit inner ring on the shaft has the tendency to lift-off due to centrifugal forces (lift-off speed). Most applications are far below this speed limit.

In certain cases the speed limit could be increased with increased press fit. We recommend contacting a GMN engineer when you feel that this may happen in your application.

Speed limit of GMN Non-Contact Seals

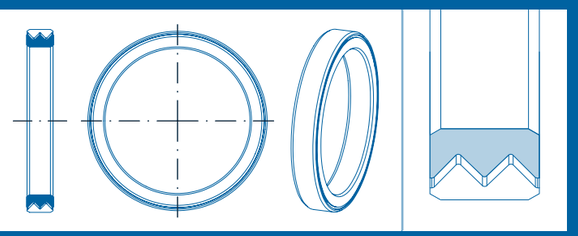


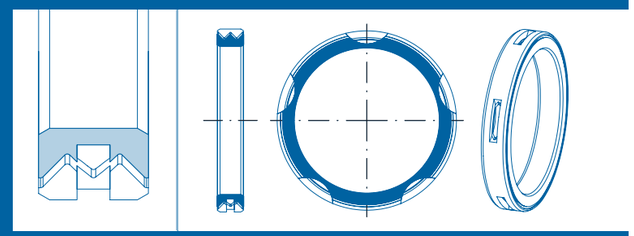
The maximum circumferential speed is (depending on the size) v = 35–60 m/s for GMN Labyrinth Metal Seals and v = 45–70 m/s for GMN Labyrinth Plastic Seals.

GMN Labyrinth Metal Seals
Type L and M

Type L
Against splashing liquids for rotating shafts and housings

Type M with drain grooves
Against heavy splashing liquids (optimized back transport) for rotating shafts only





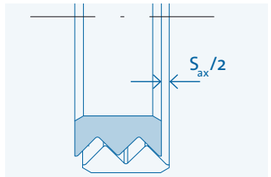
Technical data

Material

Outer ring:	Aluminium (GD AlSi 12)
Inner ring:	Non-alloy steel
Range of temperature:	-40°– 200°C (-40°– 392°F)

Design

Shaft diameter:	15 – 210 mm (Customized solutions until max. 270 mm)
Width:	4*, 10, 14, 15, 20, 22 mm (depending on size) (*Thin product line - DL)
Gap height:	Constantly 0.2 – 0.5 mm (Depending on size)
Sealing gap:	Horizontal
Axial clearance:	S_{ax} (see table of dimensions) = total axial movement of the seals inner and outer ring in relation to each other; from one end position to the other.
Increased axial clearance:	On request all types are also available with increased axial clearance: $S_{ax}' = 1.5 \times S_{ax}$ (order example: L d x D x B with increased axial clearance)
Radial clearance:	$S_{rad} = S_{ax} / \tan(42.5°)$
Type M	Heavy and direct splashing liquids could be drained through a certain number of grooves in the outer ring into a circular groove inside the housing;



Axial clearance

Type M

The interlocked labyrinth design keeps inner- and outer ring together as an inseparable unit.

Characteristics

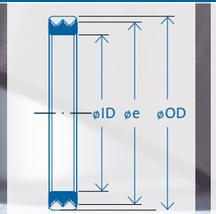
Material

- Robust
  Metallic materials of GMN seal components guarantee highest resistance against coarse and fine contamination.
- Well suited for high temperature applications
  Metallic materials are suitable for temperatures up to 200°C (392°F).

Design

- No friction
  GMN-Seals guarantee operation without any frictional contact.
- No wear
  GMN-Seals operate without any kind of wear, unlimited life possibilities.
- No abrasion
  The Non-Contact design of GMN-L-Seals guarantees operation without any metallic abrasion. The L-Seal is suitable for the highest demands of cleanliness.
- Effective
  The small distance between outer and inner ring of approx. 0.2-0.5 mm offers high sealing efficiency and effective protection against contamination.
- No increased temperatures
  No friction means no thermal effects to the surrounding parts and/or the lubricant.
- Power saving performance
  The specific design of the GMN Labyrinth Seal allows operating conditions without any power loss. The result is the highest efficiency and power saving performance in high speed applications.
- Compact design
  GMN Labyrinth Seals are offering 1 to 4 labyrinth steps within a tight space.
- Efficiency
  The small gap height creates an air cushion inside the gap at high rotating speeds which helps increase efficiency.
- Back transporting
  Drain grooves on the outer ring are draining liquids with great effectiveness (Type M).

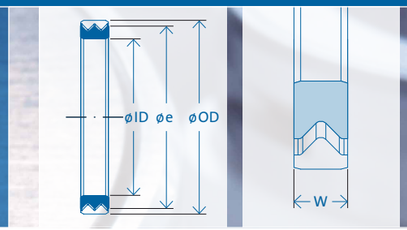
Labyrinth Metal Seals



ID	OD	W	c	e	S_{ax}	max. speed	Weight	Type L			Type M (with groove)		
								Type	Part no.	Part name	Type	Part no.	Part name
15	26	8	2.5	24	0.35	63,500	0.020	L	301171	L 15 x 26 x 8	M	301337	M 15 x 26 x 8
18	28	10	3	26	0.38	56,800	0.020	L	301176	L 18 x 28 x 10	M	301341	M 18 x 28 x 10
20	28	10	3	26	0.38	81,000	0.010	L	301178	L 20 x 28 x 10	M	301343	M 20 x 28 x 10
	30	10	3	28	0.38	70,700	0.010	L	301180	L 20 x 30 x 10	M	301345	M 20 x 30 x 10
22	30	10	3	28	0.38	71,400	0.010	L	301182	L 22 x 30 x 10	M	301347	M 22 x 30 x 10
25	37	10	3	34	0.38	50,600	0.030	L	301185	L 25 x 37 x 10	M	301349	M 25 x 37 x 10
28	39	10	3	36	0.38	45,700	0.030	L	301187	L 28 x 39 x 10	M	301351	M 28 x 39 x 10
30	42	10	3	39	0.38	48,900	0.030	L	301189	L 30 x 42 x 10	M	301353	M 30 x 42 x 10
32	45	10	3	42	0.40	43,300	0.040	L	301192	L 32 x 45 x 10	M	301355	M 32 x 45 x 10
35	47	10	3	44	0.40	39,800	0.040	L	301194	L 35 x 47 x 10	M	301357	M 35 x 47 x 10
40	52	10	3	49	0.40	33,300	0.040	L	301199	L 40 x 52 x 10	M	301360	M 40 x 52 x 10
42	55	10	3	52	0.40	30,100	0.050	L	301204	L 42 x 55 x 10	M	301364	M 42 x 55 x 10
45	55	10	3	52	0.40	30,700	0.030	L	301206	L 45 x 55 x 10	M	301366	M 45 x 55 x 10
	62	10	3	59	0.40	24,800	0.080	L	301210	L 45 x 62 x 10	M	301369	M 45 x 62 x 10
48	62	10	3	59	0.40	24,500	0.060	L	301215	L 48 x 62 x 10	M	301371	M 48 x 62 x 10
50	62	10	3	59	0.40	28,300	0.050	L	301217	L 50 x 62 x 10	M	301373	M 50 x 62 x 10
52	68	10	3	65	0.40	24,200	0.090	L	301220	L 52 x 68 x 10	M	301376	M 52 x 68 x 10
55	68	10	3	65	0.40	24,100	0.070	L	301222	L 55 x 68 x 10	M	301378	M 55 x 68 x 10
58	72	10	3	68.5	0.40	22,100	0.070	L	301226	L 58 x 72 x 10	M	301384	M 58 x 72 x 10
60	72	10	3	68.5	0.40	22,300	0.060	L	301228	L 60 x 72 x 10	M	301387	M 60 x 72 x 10
	80	10	3	76	0.40	18,900	0.130	L	301230	L 60 x 80 x 10	M	301389	M 60 x 80 x 10
63	80	10	3	76	0.40	18,700	0.100	L	301234	L 63 x 80 x 10	M	301392	M 63 x 80 x 10
65	80	10	3	76	0.40	18,600	0.090	L	301237	L 65 x 80 x 10	M	301394	M 65 x 80 x 10
	85	10	3	81	0.42	17,000	0.140	L	301240	L 65 x 85 x 10	M	301396	M 65 x 85 x 10
68	85	10	3	81	0.42	16,800	0.110	L	301243	L 68 x 85 x 10	M	301400	M 68 x 85 x 10
70	85	10	3	81	0.42	16,700	0.140	L	301247	L 70 x 85 x 10	M	301404	M 70 x 85 x 10
	90	10	3	86	0.42	15,300	0.150	L	301250	L 70 x 90 x 10	M	301406	M 70 x 90 x 10
72	90	10	3	86	0.42	15,200	0.130	L	301254	L 72 x 90 x 10	M	301409	M 72 x 90 x 10
75	90	10	3	86	0.42	15,100	0.100	L	301257	L 75 x 90 x 10	M	301411	M 75 x 90 x 10
80	100	10	3	95	0.42	14,500	0.160	L	301266	L 80 x 100 x 10	M	301420	M 80 x 100 x 10
85	100	10	3	95	0.42	14,500	0.110	L	301270	L 85 x 100 x 10	M	301426	M 85 x 100 x 10
90	110	10	3	105	0.42	12,300	0.180	L	301272	L 90 x 110 x 10	M	301428	M 90 x 110 x 10
100	120	10	3	115	0.42	10,600	0.190	L	301278	L 100 x 120 x 10	M	301433	M 100 x 120 x 10
	120	14	4	115	0.70	11,100	0.250	L	301282	L 100 x 120 x 14	M	301437	M 100 x 120 x 14
110	130	15	5	125	0.70	11,700	0.290	L	301285	L 110 x 130 x 15	M	301439	M 110 x 130 x 15
120	140	15	5	135	0.70	10,400	0.310	L	301293	L 120 x 140 x 15	M	301445	M 120 x 140 x 15
130	150	15	5	145	0.70	9,200	0.330	L	301297	L 130 x 150 x 15	M	301449	M 130 x 150 x 15
140	170	15	5	165	0.70	7,500	0.650	L	301301	L 140 x 170 x 15	M	301453	M 140 x 170 x 15
150	180	15	5	175	0.70	6,800	0.700	L	301304	L 150 x 180 x 15	M	301455	M 150 x 180 x 15
160	190	20	5	184.5	0.80	6,200	0.950	L	301306	L 160 x 190 x 20	M	301457	M 160 x 190 x 20
170	210	20	5	204.5	0.80	5,400	1.500	L	301309	L 170 x 210 x 20	M	301460	M 170 x 210 x 20
180	210	20	5	204.5	0.80	5,300	1.070	L	301312	L 180 x 210 x 20	M	301463	M 180 x 210 x 20
190	230	20	5	224.5	0.80	4,700	1.660	L	301316	L 190 x 230 x 20	M	301468	M 190 x 230 x 20
200	230	20	5	224.5	0.80	4,600	1.180	L	301318	L 200 x 230 x 20	M	301470	M 200 x 230 x 20
210	250	22	5	244.5	1.00	4,000	1.960	L	301321	L 210 x 250 x 22	M	301473	M 210 x 250 x 22

ID = Inner diameter [mm]
OD = Outer diameter [mm]
W = Width
e = Gap diameter [mm]
c = Groove width
Max. speed [rpm]
S_{ax} = Axial clearance [mm]
Weight [kg]

GMN Labyrinth Metal Seals Specials

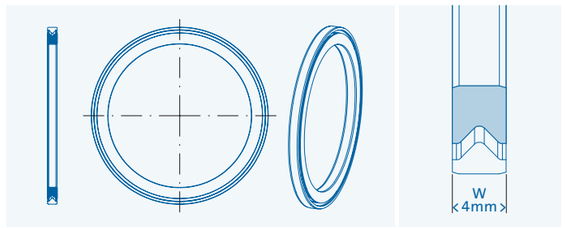


Mounting tolerances (mating parts)

In addition to our standard products, GMN offers many special solutions.

Reduced width

Series DL is engineered specifically for limited space designs. For shaft diameters up to 65 mm, the seal width is only 4 mm. This small seal could protect existing Contact Seals against chips and abrasive particles reliably and the lifetime of the complete sealing system increases greatly.



Different material

In applications against aggressive and corrosive media, GMN produces Labyrinth Seals Type L and M made from alternative material:

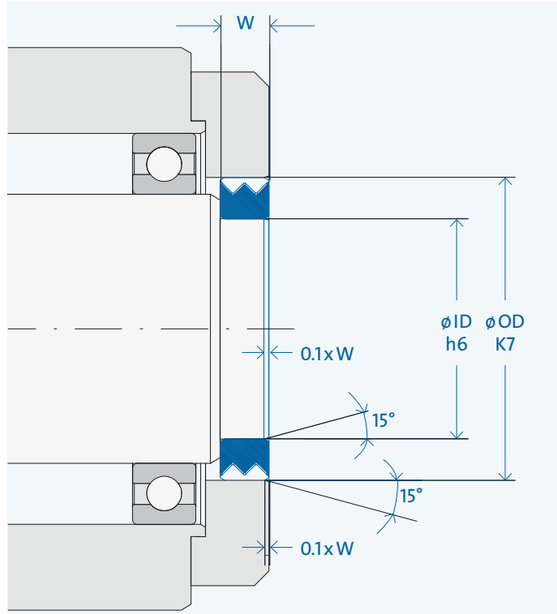
- Inner ring made of stainless steel
- Outer ring made of aluminium or zinc

Special sizes

On request, GMN can also produce customized dimensions.

GMN Non-Contact Seals with reduced width							Type DL		
ID	OD	W	e	S_{ax}	max. speed	Weight	Type	Part no.	Part name
15	26	4	24	0.35	53,000	0.010	DL	306347	DL 15 x 26 x 4
20	28	4	26	0.38	60,000	0.010	DL	306354	DL 20 x 28 x 4
25	37	4	34	0.38	41,000	0.020	DL	306364	DL 25 x 37 x 4
30	42	4	39	0.38	39,000	0.020	DL	306188	DL 30 x 42 x 4
35	47	4	44	0.40	32,000	0.025	DL	306190	DL 35 x 47 x 4
40	52	4	49	0.40	27,000	0.030	DL	306365	DL 40 x 52 x 4
45	62	4	59	0.40	22,000	0.045	DL	306366	DL 45 x 62 x 4
50	62	4	59	0.40	20,000	0.030	DL	306367	DL 50 x 62 x 4
55	68	4	65	0.40	20,500	0.040	DL	306368	DL 55 x 68 x 4
60	72	4	68.5	0.40	18,500	0.040	DL	306192	DL 60 x 72 x 4
63	80	4	76	0.40	14,000	0.060	DL	306186	DL 63 x 80 x 4
65	80	4	76	0.40	14,000	0.055	DL	306194	DL 65 x 80 x 4
110	130	10	125	0.70	9,900	0.300	DL	306196	DL 110 x 130 x 10
120	140	10	135	0.70	8,800	0.320	DL	306198	DL 120 x 140 x 10

ID = Inner diameter [mm]
OD = Outer diameter [mm]
W = Width
e = Gap diameter [mm]
c = Groove width
Max. speed [rpm]
S_{ax} = Axial clearance [mm]
Weight [kg]



Tolerances

Surrounding constructions (mating component)

Fits

Housing: K7
Shaft: h6
Surface: Rz ≤ 16 µm; Ra ≤ 3.2 µm

Assembly

"l" Length (chamfer of housing and shaft) depending on the width "W": l = 0.1 x W

Aluminium outer ring

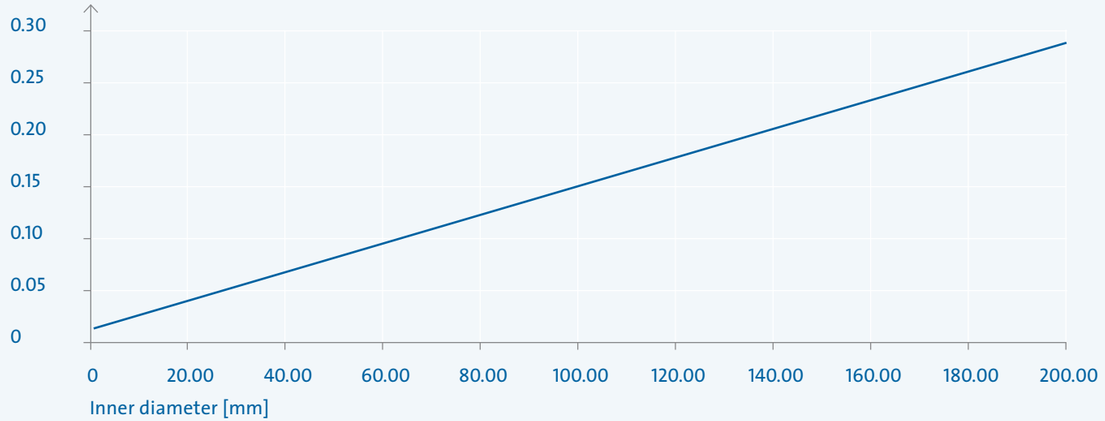
The softer aluminium outer ring may be deformed during transport and arrive out of roundness. When the seal is then pressed into the housing, the outer ring easily re-forms to the circular housing.

The outer ring could also be wider by max. 0.1 mm than the inner ring.

GMN Metal Seals are pressed through a round steel ring to calibrate the outer ring. After this process the outer ring widens again a little bit due to its elasticity.

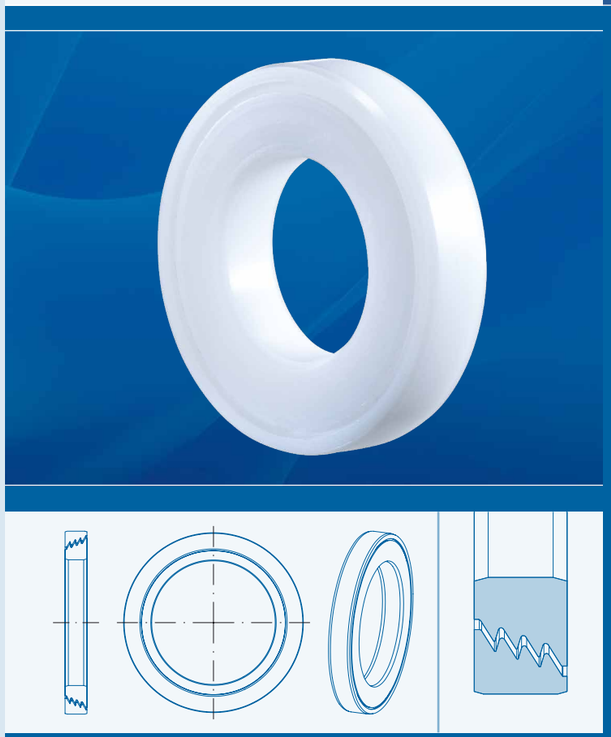
Outer ring after calibrating

Plus-tolerance OR (mm)



GMN Labyrinth Plastic Seals
Type S and SA

Type S
Against normal splashing liquids
For rotating shafts and housings



Type SA with drain groove
Against heavy splashing liquids
For rotating shafts only (increased back transport)

Technical Data

Material

Outer- and inner ring: high quality Polyoxymethylene plastic (POM)

Temperature range: -40°–60°C (-40°–140°F)
special design with O-ring up to 80°C (170°F)

Design

Shaft diameter: 10–160 mm
(customized solutions available upon request)

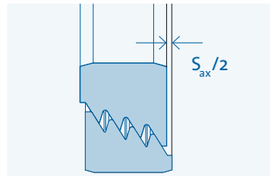
Width: 6.5*, 10, 12, 15 mm (depending on size)
(*thin product line - DS)

Sealing gap: Conical

Axial clearance: S_{ax} = 1mm
Total axial movement of the seals inner and outer ring in relation to each other from one end position to the other.

Type SA: Heavy and direct splashing liquids could be drained through an additional groove in the outer ring – for rotating shafts only.

Greased seals: Pre-greased Seals Type S – available in all sizes – provide improved protection against dust.



Axial clearance

Drain groove Type SA

The labyrinth peaks are overlapping each other. With the assembly the rings are simply clicked together.

Characteristics

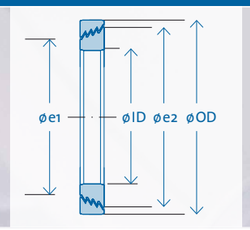
Material

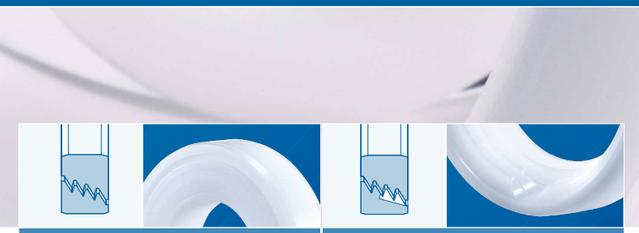
- Non corrosive
  GMN Plastic Seals are made from non corrosive material and are particularly suitable against watery liquids.
- Chemical resistant
  Polyoxymethylene (POM) guarantees high resistance against a lot of acids (i.e. lactic acid), chemicals and fungi. *GMN Non-Contact Plastic Seals are approved for the food Industry.*

Design

- No friction
  GMN-Seals operate without any frictional contact.
- No wear
  GMN-Seals operate without any kind of wear, unlimited life possibilities.
- No abrasion
  The Non-Contact design of GMN Labyrinth Seals guarantee operation without any abrasion. (*GMN Plastic Non-Contact Seals are suitable for the highest demands of cleanliness.)*
- Effective
  The small distance between outer and inner ring offers high sealing efficiency and effective protection against contamination.
- No increased temperatures
  No friction means no thermal effects to the surrounding parts and/or the lubricant.
- Power saving performance
  The specific design of the GMN Labyrinth Seal allows operating conditions without any power loss. The result is the highest efficiency and power saving performance in high speed applications.
- Compact design
  GMN Labyrinth Plastic Seals are offering 2 to 4 labyrinth steps within a small space.
- Efficient
  GMN Labyrinth Seal Type S and SA take advantage of the centrifugal force to improve the sealing efficiency. Entering liquids are trans ported back to the bigger gap diameter with the rotation of the inner ring. Because of this effect, the bigger gap diameter (e2) of the Labyrinth seal must always face the splashing liquids/ contamination.
- Back transporting
  Special seal Type SI is specifically designed for rotating housings. Passing liquids are drained with an additional groove at the inner ring.
- Dust-free
  The gap of pre-greased seals is filled with a specific grease type and improves protection against dust and fine particles.

Labyrinth Plastic Seals





ID	OD	W	e1	e2	S_{ax}	max. speed	Weight	Type S			Type SA (with groove)		
								Type	Part no.	Part name	Type	Part no.	Part name
10	30	10	14	24	1	82,000	0.010	S	301491	S 10 X 30 X 10	SA	301753	SA 10 X 30 X 10
12	32	10	14	24	1	75,000	0.010	S	301494	S 12 X 32 X 10	SA	301756	SA 12 X 32 X 10
	37	10	19	24	1	59,500	0.010	S	301496	S 12 X 37 X 10	SA	301758	SA 12 X 37 X 10
15	35	10	19	29	1	53,400	0.010	S	301498	S 15 X 35 X 10	SA	301759	SA 15 X 35 X 10
	42	10	24	34	1	44,300	0.010	S	301501	S 15 X 42 X 10	SA	301762	SA 15 X 42 X 10
17	35	10	19	29	1	67,900	0.010	S	301506	S 17 X 35 X 10	SA	301767	SA 17 X 35 X 10
	40	10	24	34	1	56,900	0.010	S	301509	S 17 X 40 X 10	SA	301771	SA 17 X 40 X 10
	47	10	31	41	1	45,600	0.020	S	301511	S 17 X 47 X 10	SA	301773	SA 17 X 47 X 10
20	40	10	24	34	1	51,300	0.010	S	301515	S 20 X 40 X 10	SA	301777	SA 20 X 40 X 10
	42	10	24	34	1	51,300	0.010	S	301516	S 20 X 42 X 10	SA	301779	SA 20 X 42 X 10
	47	10	31	41	1	45,600	0.020	S	301517	S 20 X 47 X 10	SA	301781	SA 20 X 47 X 10
22	42	10	24	34	1	48,500	0.010	S	301520	S 22 X 42 X 10	SA	301786	SA 22 X 42 X 10
25	47	10	31	41	1	40,500	0.010	S	301523	S 25 X 47 X 10	SA	301789	SA 25 X 47 X 10
	52	10	31	41	1	40,500	0.020	S	301524	S 25 X 52 X 10	SA	301791	SA 25 X 52 X 10
28	47	10	31	41	1	37,800	0.010	S	301533	S 28 X 47 X 10	SA	301802	SA 28 X 47 X 10
	52	10	31	41	1	37,800	0.020	S	301534	S 28 X 52 X 10	SA	301803	SA 28 X 52 X 10
30	62	10	46	56	1	25,900	0.030	S	301537	S 30 X 62 X 10	SA	301807	SA 30 X 62 X 10
	72	10	47	61	1	24,500	0.040	S	301541	S 30 X 72 X 10	SA	301812	SA 30 X 72 X 10
35	62	10	46	56	1	23,900	0.020	S	301547	S 35 X 62 X 10	SA	301819	SA 35 X 62 X 10
	72	10	47	61	1	22,600	0.030	S	301550	S 35 X 72 X 10	SA	301824	SA 35 X 72 X 10
36	62	10	46	56	1	23,500	0.020	S	301555	S 36 X 62 X 10	SA	301829	SA 36 X 62 X 10
40	62	10	46	56	1	22,000	0.020	S	301567	S 40 X 62 X 10	SA	301842	SA 40 X 62 X 10
	68	10	47	62	1	21,000	0.030	S	301570	S 40 X 68 X 10	SA	301845	SA 40 X 68 X 10
	90	10	60	74	1	17,300	0.060	S	301576	S 40 X 90 X 10	SA	301851	SA 40 X 90 X 10
42	65	10	46	56	1	25,300	0.020	S	301578	S 42 X 65 X 10	SA	301854	SA 42 X 65 X 10
	72	10	47	61	1	24,100	0.030	S	301580	S 42 X 72 X 10	SA	301857	SA 42 X 72 X 10
45	80	10	60	74	1	19,200	0.040	S	301584	S 45 X 80 X 10	SA	301862	SA 45 X 80 X 10
	85	10	60	74	1	19,200	0.050	S	301585	S 45 X 85 X 10	SA	301864	SA 45 X 85 X 10
50	80	10	60	74	1	17,800	0.030	S	301593	S 50 X 80 X 10	SA	301873	SA 50 X 80 X 10
	90	10	60	74	1	17,800	0.050	S	301596	S 50 X 90 X 10	SA	301876	SA 50 X 90 X 10
55	80	10	60	74	1	19,100	0.030	S	301606	S 55 X 80 X 10	SA	301886	SA 55 X 80 X 10
	85	10	60	74	1	19,100	0.040	S	301608	S 55 X 85 X 10	SA	301888	SA 55 X 85 X 10
60	95	12	72	87	1	15,400	0.060	S	301618	S 60 X 95 X 12	SA	301899	SA 60 X 95 X 12
	110	12	87	102	1	13,200	0.090	S	301622	S 60 X 110 X 12	SA	301901	SA 60 X 110 X 12
65	100	12	72	87	1	16,300	0.060	S	301631	S 65 X 100 X 12	SA	301910	SA 65 X 100 X 12
68	95	12	72	87	1	15,800	0.050	S	301639	S 68 X 95 X 12	SA	301918	SA 68 X 95 X 12
70	110	12	87	102	1	13,400	0.080	S	301643	S 70 X 110 X 12	SA	301920	SA 70 X 110 X 12
	125	15	96	112	1	12,300	0.170	S	301646	S 70 X 125 X 15	SA	301923	SA 70 X 125 X 15
75	130	15	96	112	1	12,900	0.160	S	301659	S 75 X 130 X 15	SA	301936	SA 75 X 130 X 15
80	110	12	87	102	1	13,300	0.060	S	301666	S 80 X 110 X 12	SA	301944	SA 80 X 110 X 12
	140	15	116	132	1	9,600	0.180	S	301671	S 80 X 140 X 15	SA	301950	SA 80 X 140 X 15
82	110	12	87	102	1	13,100	0.060	S	301675	S 82 X 110 X 12	SA	301954	SA 82 X 110 X 12
85	120	15	96	112	1	10,800	0.100	S	301678	S 85 X 120 X 15	SA	301956	SA 85 X 120 X 15
90	120	15	96	112	1	10,400	0.090	S	301687	S 90 X 120 X 15	SA	301963	SA 90 X 120 X 15
	145	15	116	132	1	9,800	0.200	S	301691	S 90 X 145 X 15	SA	301968	SA 90 X 145 X 15
95	140	15	116	132	1	9,500	0.150	S	301697	S 95 X 140 X 15	SA	301973	SA 95 X 140 X 15
100	140	15	116	132	1	9,100	0.130	S	301704	S 100 X 140 X 15	SA	301981	SA 100 X 140 X 15
110	140	15	116	132	1	7,900	0.100	S	301715	S 110 X 140 X 15	SA	301992	SA 110 X 140 X 15
120	150	15	126	142	1	6,200	0.110	S	301725	S 120 X 150 X 15	SA	302002	SA 120 X 150 X 15
125	170	15	146	162	1	5,400	0.210	S	301729	S 125 X 170 X 15	SA	302008	SA 125 X 170 X 15
130	170	15	146	162	1	5,200	0.190	S	301731	S 130 X 170 X 15	SA	302011	SA 130 X 170 X 15
140	170	15	146	162	1	5,000	0.140	S	301739	S 140 X 170 X 15	SA	302019	SA 140 X 170 X 15
150	190	15	166	182	1	4,300	0.190	S	301746	S 150 X 190 X 15	SA	302025	SA 150 X 190 X 15
160	190	15	166	182	1	4,100	0.140	S	301750	S 160 X 190 X 15	SA	302029	SA 160 X 190 X 15

ID = Inner diameter [mm]
OD = Outer diameter [mm]
W = Width
e2 = Gap diameter [mm]
e1 = Groove width
Max. speed [rpm]
S_{ax} = Axial clearance [mm]
Weight [kg]

GMN Labyrinth Plastic Seals Specials

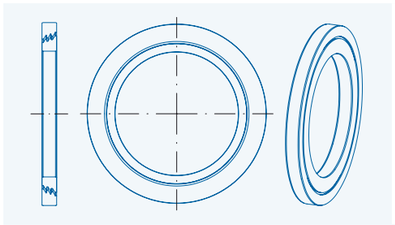
Besides our wide range of standard products GMN offers many special solutions.

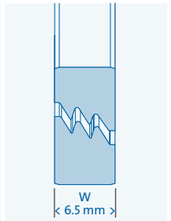
Special sizes

Upon request, GMN can also produce customized dimensions.

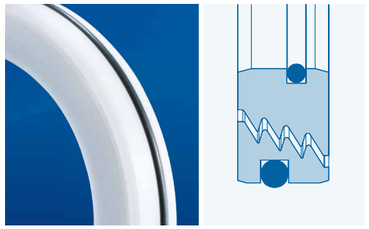
Thin Type DS

For applications with limited seal space, GMN offers thin plastic seals with width 6.5 mm; these seals are available upon request.



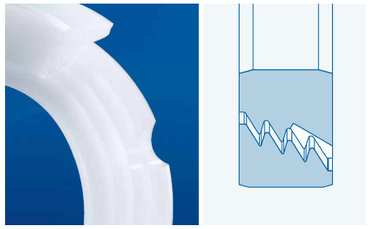


Specials with O-ring-design and Type SI are available in all GMN standard sizes



Special design with O-ring for higher temperatures up to 176°F [80°C]

In applications with high temperatures, an additional O-ring at the outer ring (also available at the inner ring) saves the press fit and keeps the seal in position.

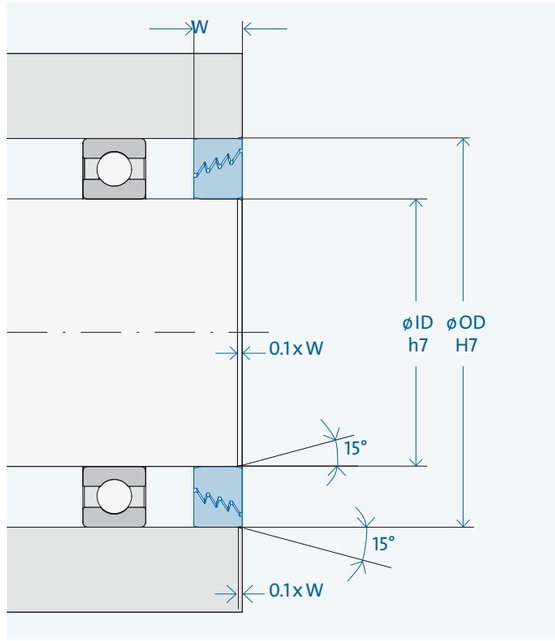


Type SI with drain groove at the inner ring

In applications with a rotating housing, GMN offers a drain groove (similar to Type SA) at the inner ring.

Quotes upon request.

Mounting tolerances



Tolerances

Surrounding constructions (mating component)

Fits

Housing: H7
Shaft: h7
Surface: Rz ≤ 16 µm; Ra ≤ 3.2 µm

Assembly

“l” Length (chamfer of housing and shaft) depending on the width
“W”: l = 0.1 x W

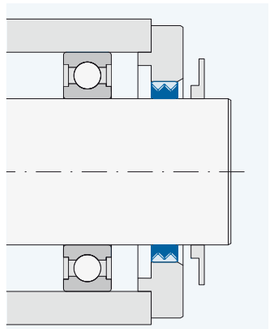
Installation

General information

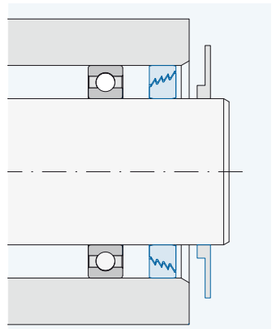
When installing a GMN Non-Contact Seal, one must be certain that both the inner and outer races are axially aligned. Furthermore, the races need to be unrestricted by any shoulder, nut(s), and/or other restrictions from axial movement.

Surrounding construction

An additional disc in front of the seal protects the gap against strong and direct splashing liquids.
The disc should be assembled in front of the seal with sufficient distance (capillary forces should be considered).



Non-Contact Seal (metal):
Type L
with disc



Non-Contact Seal (plastic):
Type S
with disc

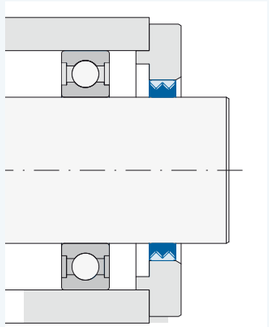
Any kind of high liquid level in front of the seal's gap needs to be avoided. (Attention: High liquid levels may cause leakage).

In a non-horizontal working application, GMN can offer specific advice to optimize your individual design in order to protect the sealing gap effectively.

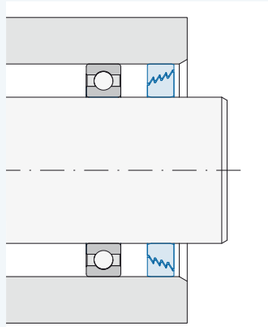
When using Type SA and SI, care should be taken that the drain groove in the stationary part is always positioned at the lowest point.

Standard assembly

Non-Contact Seal (metal)
Type L



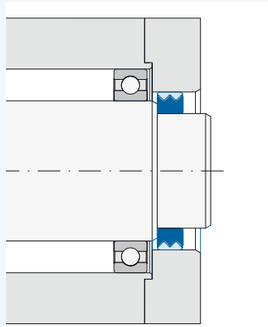
Non-Contact Seal (plastic)
Type S



Shaft shoulder

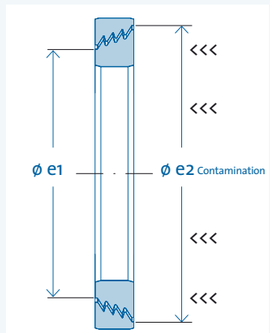
A precise positioning of the seal is provided with a shaft shoulder for the inner ring.

The outer ring of GMN Labyrinth Metal Seals made of metal should be positioned freely without any shoulder.



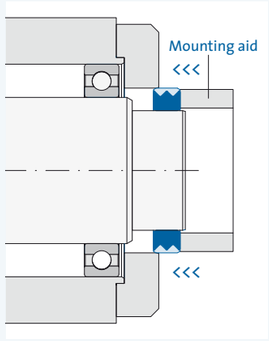
Orientation of Plastic Seals

The bigger gap diameter (e2) of the GMN Labyrinth Plastic Seals must always face the splashing liquids/contamination.



Face-mounting with pre-assembled bearing

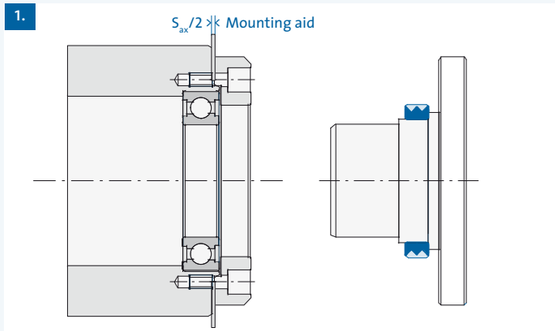
Both rings of the seal are pressed-in with an assembling aid (i.e. tube) together at the same time. If pressure would be applied on one ring only the labyrinth could be destroyed.

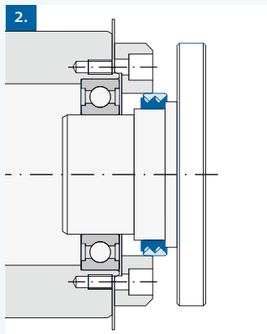


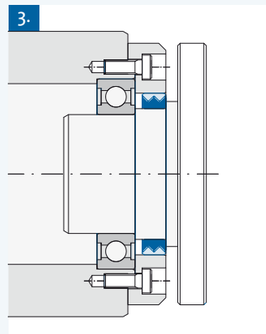
(The outer ring could be wider by maximum 0.1 mm than the inner ring.)

Assembly inside the unit

1. The GMN seal is pre-assembled onto the shaft. A thin metal sheet mounting aid (Thickness $S_{ax}/2$, half the amount of the seal's axial clearance) should be interested between the housing and an additional ring.







2. Shaft (with the seal) and housing (with the bearing) are fitted into each other carefully. Now the outer ring stands in the right-hand end position of the seal.

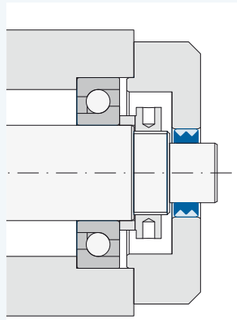
3. Finally the mounting aid is removed and the screws are tightened. With this process the seal's outer ring moves to the left by $S_{ax}/2$ and finds itself in the final, correct non-contact position.

Installation

Specific Assembly Situations

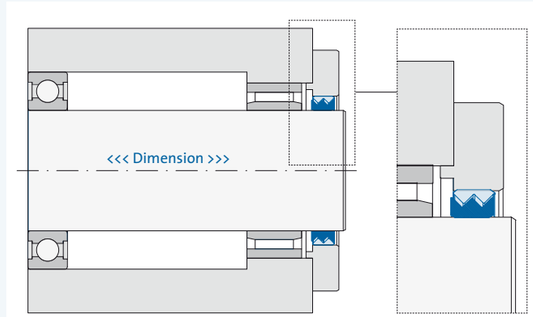
Assembly with pre-loaded spindle bearings

The seal's outer and inner ring cannot be affected when the bearing is pre-loaded.
The assembly into the cover keeps the seal independent from any bearing displacement.



Shaft Expansion with Temperature

To avoid any increase of the maximum axial clearance, GMN recommends a seal with an increased axial clearance or an asymmetrical seal adjustment in the extension direction. (The excess of maximum axial clearance could destroy the seal.)

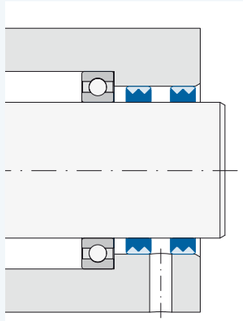


Seals with drainage

Tandem arrangement

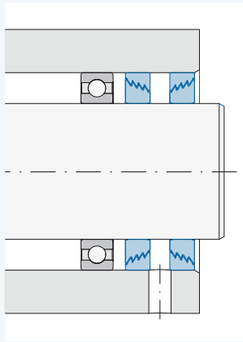
Metal Seal (Type L)

100% sealing efficiency is guaranteed with two seals in a row (minimum distance 5 mm) with a drain hole in between. With this design any liquid between the seals could be drained reliably.



Plastic Seal (Type S)

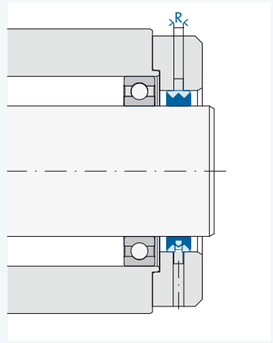
The tandem arrangement of the plastic seals require opposite orientation with the assembly. One seal is operating specifically against possible contamination from outside while the other seal keeps the bearing's lubrication inside.
The bigger gap-diameter always faces the contamination.
(Space between the seals: min. 5 mm)



Seals with drain groove

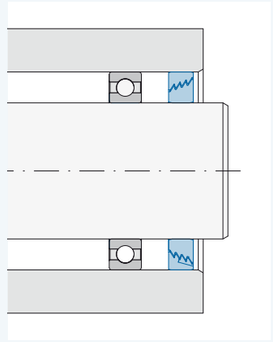
Metal Seal (Type M)

In case of limited construction space Type M offers a compromise of the tandem arrangement in a tight package.
Passing liquid is centrifugally forced through the outer ring's grooves into a drain groove inside the housing. *Width of the drain groove in housing: R = c + 1mm* (c = drain groove width)



Plastic Seal (Type SA and SI)

When using the Type SA or SI, care should be taken that the drain groove in the stationary part is always positioned at the lowest point.



Sealing air

Sealing air improves the efficiency of the seal, but please note the reasonable amount of air consumption. If sealing air should be applied through the grooves of the M Type the air releases in both directions of the seal; paying special attention with the bearing.

Additional aspects to consider

Correct choice of the seal as well as customized design of the mating parts is the most important aspects for a successful application, but there is more. If a milling machine is stopped suddenly within a very short time, a temporary oil level could be created in front of the sealing gap. The following questions should help to analyze your application from different points of view:

Is the level of the sealing gap fixed?

Would another size of the seal move the sealing gap into a more protected area?

Could the viscosity of the cooling/oil etc. be influenced in a positive way?

Are there any existing components (i.e. shield) which could be included into a complete design?

Are all drain holes and drain grooves big enough?
Could any possibility of backwater be excluded?

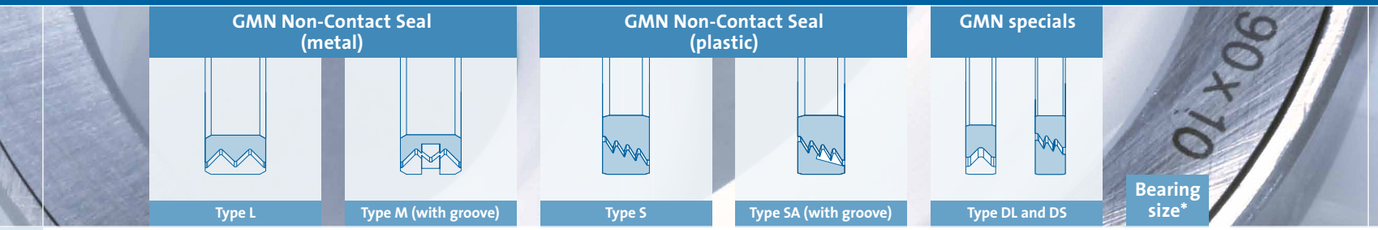
What is the size of any particles to be sealed? What is their speed and direction?

Could any negative aspects be changed in a positive way with the control system?

...

On request, GMN would be pleased to give advice based on our decades of experience in order to optimize your individual solution.

Product overview



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10									S	10	30	10	SA	10	30	10					6200
12									S	12	32	10	SA	12	32	10					6201
									S	12	37	10	SA	12	37	10					6301
15	L	15	26	8	M	15	26	8									DL	15	26	4	
									S	15	35	10	SA	15	35	10					6202
									S	15	42	10	SA	15	42	10					6302
17									S	17	35	10	SA	17	35	10					6003
									S	17	40	10	SA	17	40	10					6203
									S	17	47	10	SA	17	47	10					6303
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	L	20	30	10	M	20	30	10													
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									S	20	42	10	SA	20	42	10					6004
									S	20	47	10	SA	20	47	10	DS	20	47	6,5	6204
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25	L	25	37	10	M	25	37	10									DL	25	37	4	61805
									S	25	47	10	SA	25	47	10					6005
									S	25	52	10	SA	25	52	10					6205
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									S	28	52	10	SA	28	52	10					
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36									S	36	62	10	SA	36	62	10					
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									S	40	62	10	SA	40	62	10					61908
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									S	40	90	10	SA	40	90	10					6308
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									S	42	72	10	SA	42	72	10					
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	L	45	62	10	M	45	62	10									DL	45	62	4	
									S	45	80	10	SA	45	80	10					
									S	45	85	10	SA	45	85	10					6209
48	L	48	62	10	M	48	62	10													
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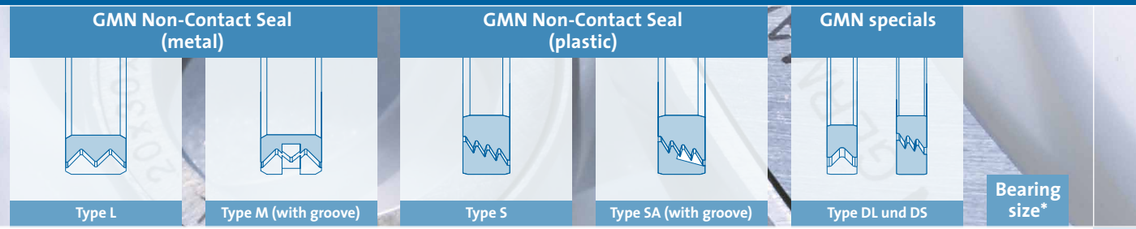
									S	50	80	10	SA	50	80	10					6010
									S	50	90	10	SA	50	90	10					

Special Sizes on request (d_{max}=270mm) ID = Inner diameter [mm] OD = Outer diameter [mm] W = Width [mm]

*ID and OD according to bearing sizes

Width W off-size



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									S	60	95	12	SA	60	95	12					6012
									S	60	110	12	SA	60	110	12					6212
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190	L	190	230	20	M	190	230	20													
200	L	200	230	20	M	200	230	20													
210	L	210	250	22	M	210	250	22													

Tolerance table

Tolerances

Housing	Extract of DIN ISO 286-2						
Bore diameter (OD) Nominal size [mm]; above	10	18	30	50	80	120	180
to	18	30	50	80	120	180	250
Tolerances [µm]							
K7	+6 -12	+6 -15	+7 -18	+9 -21	+10 -25	+12 -28	+13 -33
M7	0 -18	0 -21	0 -25	0 -30	0 -35	0 -40	0 -46
N7	-5 -23	-7 -28	-8 -33	-9 -39	-10 -45	-12 -52	-14 -60
H7	+18 0	+21 0	+25 0	+30 0	+35 0	+40 0	+46 0
G7	+24 +6	+28 +7	+34 +9	+40 +10	+47 +12	+54 +14	+61 +15

Shaft	Extract of DIN ISO 286-2						
Shaft diameter (d) Nominal size [mm]; above	10	18	30	50	80	120	180
to	18	30	50	80	120	180	250
Tolerances [µm]							
h6	0 -11	0 -13	0 -16	0 -19	0 -22	0 -25	0 -29
j6	+8 -3	+9 -4	+11 -5	+12 -7	+13 -9	+14 -11	+16 -13
k6	+12 +1	+15 +2	+18 +2	+21 +2	+25 +3	+28 +3	+33 +4
g6	-6 -17	-7 -20	-9 -25	-10 -29	-12 -34	-14 -39	-15 -44
f6	-16 -34	-20 -41	-25 -50	-30 -60	-36 -71	-43 -83	-50 -96

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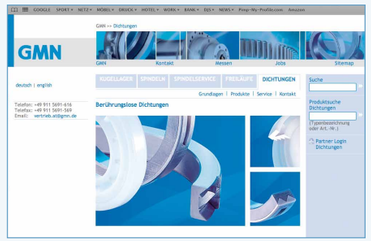

Internet

On our website www.gmn.de we provide comprehensive product information for download.

GMN

GMN Paul Müller Industrie GmbH & Co. KG manufactures non-contact seals, machine spindles, freewheel clutches and seals for many areas of application.

On the basis of long experience in the development and production of machine components, GMN has specialized in manufacturing high quality products in the area of non-contact seals and beyond a comprehensive standard product range also offers customer-oriented special solutions.
A worldwide GMN service network provides competent customer advice as well as individual solutions.

GMN Quality management – tested and certified.

GMN guarantees maximum quality of products and services on the basis of high reliability over the long term. Highly modern development and production methods safeguard products that always correspond to the state of the art. Transparency in the structure of all GMN corporate divisions as well as comprehensible organizational procedures ensure customer-oriented services and economic safety.

All GMN corporate divisions are certified according to DIN ISO 9001:2008.

GMN – safeguarding the future.

Progress means for GMN best possible customer support and performance-oriented optimization of technical products.

This aspiration is realized by GMN especially under strict observance of national and international environmental standards with regard to efficient and sustainable utilization of ecological resources.

GMN

High Precision Ball Bearings
Spindle Technology
Freewheel Clutches
Non-Contact Seals

Reference

Parts of chapter "Non-Contact Seals" are based on publications of the Institute of Machine Components (IMA), University of Stuttgart.

This catalogue corresponds to the state of art at the time of printing.
Technical changes, factual errors, printing errors are reserved.

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